

**Zitholele Consulting**

Reg. No. 2000/000392/07

PO Box 6002 Halfway House 1685, South Africa  
Building 1, Maxwell Office Park, Magwa Crescent West  
c/o Allandale Road & Maxwell Drive, Waterfall City, Midrand  
T : 011 207 2060 F : 086 674 6121 E : mail@zitholele.co.za



**ENVIRONMENTAL MANAGEMENT PLAN REPORT (EMPr)**

**WATER USE APPLICATION FOR THE PROPOSED CONSTRUCTION AND  
OPERATION OF ADDITIONAL STORMWATER INFRASTRUCTURE  
ASSOCIATED WITH THE DEVELOPMENT OF THE NEW WASTEWATER  
TREATMENT WORKS IN LANSERIA, GAUTENG**

**Report No:** 20003-46-Rep-004-Lanseria WwTW EMPr-Rev0

**Submitted to:**

Department of Water and Sanitation  
14th Floor  
Bothongo Plaza-East  
285 Franscis Baard Street  
Pretoria  
0001

November 2023

20003



Director: S. Pillay  
Associate Directors: J. Heera (Ms.), T. Kaponda, Dr. M. Vosloo




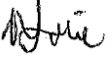
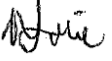
---

## DOCUMENT CONTROL SHEET

**Project Title** : **Water Use License Application for the proposed Construction and Operation of Additional Stormwater Infrastructure Associated with the Development of the New Wastewater Treatment Works in Lanseria, Gauteng**  
**Project No** : **20003**

**Document Ref. No** : **20003-46-Rep-005-Lanseria WwTW EMPr-Rev0**

### DOCUMENT APPROVAL

<b>ACTION</b>	<b>DESIGNATION</b>	<b>NAME</b>	<b>DATE</b>	<b>SIGNATURE</b>
Prepared	EAP	Londolani Sitsula	01.09.2023	
Reviewed	Senior EAP	Natasha Lalie	02.11.2023	
Approved	Senior EAP	Natasha Lalie	16.11.2023	

### RECORD OF REVISIONS

<b>Date</b>	<b>Revision</b>	<b>Author</b>	<b>Comments</b>

---

## EXECUTIVE SUMMARY

Johannesburg Water SOC Ltd (JW), hereinafter referred to as “Johannesburg Water”, has proposed the development of a new Wastewater Treatment Works (WwTW) located adjacent the Jukskei River in the Lanseria area. The preferred and approved site is located right next to the North Farm in Lanseria. WwTW will consist of three stages, each of which will have 50 M<sup>3</sup>/d modules, thus providing a total capacity of 150 M<sup>3</sup>/d. The project area is in the Jukskei River Basin, Quaternary Basin A21C, within the Limpopo Water Management Area.

The proposed Lanseria WwTW is located at the northern edge of the City of Johannesburg jurisdiction and developmental is intended to service new development areas and to provide additional treatment capacity for the existing and growing northern suburbs of the city. This project is in support of the Spatial Development Framework and Integrated Development Plan for the City of Johannesburg for the years 2012 to 2016. Urban development is planned for Diepsloot and Lanseria, and significant municipal infrastructure is already present or is being built there. The property on Northern Farm to the south of the proposed WwTW has been set aside by the City of Johannesburg for a future construction of mass housing that will be served by the new WwTW.

An Environmental Authorisation (EA) dated 17 November 2017 was obtained from the Gauteng Department of Agriculture and Rural Development (GDARD). Johannesburg Water has applied for a Part 2 amendment in terms of Sections 31 of the NEMA Environmental Impact Assessment (EIA) Regulations 2014 (as amended) to authorize modifications to the Site Layout Plan that was approved in the EA. On July 22, 2020, a Water Use License (WUL) was acquired for the Lanseria WwTW development project. The projected Lanseria WwTW was authorized for several water use activities in terms of Section 21 of the National Water Act, 1998 (Act No. 36 of 1998), namely Sections 21(a), 21(c), 21(f), 21(g), and 21(i) in accordance with the WUL. The WUL Amendment to WwTW was submitted to the DWS in September 2021 under a separate WULA process and is pending a decision from the DWS.

This WULA is relevant to the proposed additional stormwater infrastructure and road bridge that is proposed at the WwTW site. The proposed infrastructure development falls within a 500m wetland buffer, 100m regulated area of the riparian zone of the Jukskei River and within the wetlands. In terms of Section 21 of the National Water Act (No. 36 of 1998) (NWA), the proposed additional infrastructure triggers the following water uses for which an Integrated Water Use License Application (IWULA) is required:

Water Use	Description	Applicable Water Uses to this project
S21 (c)	Impeding or diverting the flow of water in a water course.	There will be several new infrastructure occurring within the 500m regulated area of the wetlands, in the wetlands and in the 100m regulated area of the riparian zone as follows: <ul style="list-style-type: none"> <li>• Stormwater side drain outlets along access road to the WwTW (8)</li> <li>• Road bridges (2)</li> <li>• Proposed re-alignment of road bridge</li> <li>• Pipe bridges (4)</li> <li>• Pipe crossings (2)</li> <li>• Stormwater culvert crossings along access road to the WwTW (11)</li> <li>• Permanent attenuation ponds (4)</li> <li>• Temporary attenuation ponds (11)</li> <li>• Stormwater infrastructure and ponds (27)</li> </ul>
S21 (i)	Altering the bed, banks, course, or characteristics of a watercourse. This includes altering the course of a watercourse (previously referred to as a river diversion).	

As such, Zitholele Consulting (Pty) Ltd was appointed to undertake the IWULA for the proposed additional infrastructure. This EMPr intends to highlight all relevant project activities associated to the proposed development, as well as to highlight how they will be impacted and what can be done to mitigate them to achieve the projected environmental management outcomes. The upgrade of the road bridge and proposed additional stormwater infrastructure must be done in a sustainable and environmentally responsible manner, considering all environmental impacts as well as appropriate mitigations measures.

## TABLE OF CONTENTS

<b>SECTION</b>	<b>PAGE</b>
DOCUMENT ROADMAP .....	1
1 INTRODUCTION.....	4
1.1 Background .....	4
1.2 Need and Desirability .....	4
1.3 General objectives and purpose of the EMPr .....	5
1.4 Details and expertise of Environmental Assessment Practitioner .....	6
1.5 Details of project proponent .....	7
1.6 Legal Context.....	7
1.6.1 Legislative Requirements for this EMPr.....	7
1.6.2 Applicable Legislation.....	8
2 PROJECT DESCRIPTION.....	12
2.1 Project Area .....	12
2.2 Property Description .....	15
2.3 Project Activities .....	16
2.3.1 Lifespan of the facility.....	16
2.3.2 Footprint of the facility .....	16
2.3.3 Project Description .....	17
2.3.4 Development phases.....	21
3 DESCRIPTION OF THE RECEIVING ENVIRONMENT .....	22
4 ENVIRONMENTAL IMPACT ASSESSED.....	27
5 ENVIRONMENTAL ROLES AND RESPONSIBILITIES .....	38
5.1 Contractual obligation .....	38
5.2 Responsibilities and Duties .....	38
5.2.1 Competent Authority .....	38
5.2.2 The Developer.....	38
5.2.3 Contractor, including appointed Sub-Contractors .....	39
5.2.4 Environmental Control Officer (ECO) .....	40
5.2.5 Safety, Health, Environment and Quality Officer (SHEQO) .....	41
6 ENVIRONMENTAL MANAGEMENT MEASURES .....	42
7 ENVIRONMENTAL AWARENESS PLAN .....	83
7.1 Communication Plan.....	84
7.1.1 Internal Communication .....	84
7.1.2 External Communication Strategies .....	85
7.2 Evaluation of the Environmental Awareness Plan .....	85
7.2.1 Emergency Incident Reporting .....	85
7.2.2 Induction .....	86
7.2.3 On the Job Training.....	86
7.2.4 Hazardous Substances .....	86
7.2.5 Dust mitigation .....	86
7.2.6 Fire Incidents .....	87
7.2.7 Pollution Incidents or Forms of Environmental Damage .....	87
7.2.8 Waste Management .....	87
7.2.9 Water Management.....	87
7.3 Emergency Response Plan.....	88
7.3.1 Intent.....	88
7.4 Risk Management.....	89
8 IMPLEMENTATION REQUIREMENTS OF THE EMPr.....	89
8.1 General requirements during the operation.....	89
8.2 Stormwater Monitoring and Management Plan .....	90

8.3	Site Documentation / Reporting .....	90
9	MONITORING .....	91
9.1.1	Baseline Monitoring.....	91
9.1.2	Compliance Monitoring.....	91
9.1.3	Undertaking audits .....	93
9.1.4	Compliance with the EMPr .....	93
9.1.5	Non-Compliance .....	93
9.2	Implementation of Corrective Action .....	94
9.3	Environmental Contact Person .....	94
9.4	Emergency Numbers .....	94

## LIST OF FIGURES

Figure 1: Project Area Locality for the proposed additional stormwater infrastructure at the WwTW at Lanseria.....	14
Figure 2: Master layout Plan for Proposed Additional Stormwater Infrastructure at proposed Lanseria WwTW.....	18
Figure 3: Master Layout Plan ( <i>Including stormwater infrastructure along access road to be upgraded</i> ) .....	19

## LIST OF TABLES

Table 1: Document Roadmap.....	1
Table 2: Details of EAP who compiled the EMPr to support this WULA process .....	6
Table 3: Proponent's details.....	7
Table 4: Water Uses authorised by the proposed Lanseria WwTW development.....	9
Table 5: Water use activities that are triggered in terms of the National Water Act, 1998 (Act No. 107 of 1998) .....	10
Table 6: List of Applicable Legislation .....	11
Table 7: Potential impacts assessed and their mitigation measures.....	27
Table 8: Impact management measures as per the approved EMPr (Nemai Consulting, 2017) .....	42
Table 9: Risk Management .....	89
Table 10: Baseline Monitoring Requirements.....	91
Table 11: Details of a contact person .....	94

**LIST OF APPENDICES**

APPENDIX A: EAP CVs

---

**LIST OF ACRONYMS**

<b>Acronym</b>	<b>Description</b>
CA	Competent Authority
CBA	Critical Biodiversity Area
CoJ	City of Johannesburg
DEFF	Department of Environment, Forestry and Fisheries
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioners Association South Africa
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Plan Report
EO	Environmental Officer
ESA	Ecological Support Area
GDARD	Gauteng Department of Agriculture and Rural Development
GP EMF	Gauteng Province Environmental Management Framework
NEMA	National Environmental Management Act 107 of 1998 (as amended)
NEMWA	National Environmental Management Waste Management Act 59 of 2008
NWA	National Water Act 36 of 1998
HSO	Health and Safety Officer
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
LA	Listed Activity (EIA Regulations, 2014)
LDF	Lanseria Development Framework
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act (NEMA, Act 107 of 1998)
NEMWA	National Environmental Management Waste Act
NHRA	National Heritage Resources Act (Act 25 of 1999)
NWA	National Water Act (Act 36 of 1998)



---

<b>Acronym</b>	<b>Description</b>
OHS	Occupational Health and Safety Act 85 of 1993
PM	Project Manager
PPP	Public Participation Process
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SEO	Site Environmental Officer
SOP	Standard Operating Procedure

---

## GLOSSARY OF TERMS

**Activity (Development):** An action either planned or existing that may result in environmental impacts through pollution or resource use. To this report, the terms, activity, and development are freely interchanged.

**Affected environment:** Those parts of the socio-economic and biophysical environment impacted on by the development.

**Affected public:** Groups, organizations, and/or individuals who believe that an action might affect them.

**Alternative:** A possible course of action, in place of another, of achieving the same desired goal of the proposed project. Alternatives can refer to any of the following but are not limited to site alternatives, site layout alternatives, design or technology alternatives, process alternatives or a no-go alternative. All reasonable alternatives must be properly explored and objectively evaluated.

**Applicant:** The project proponent or developer responsible for submitting an environmental application to the relevant environmental authority for environmental authorization.

**Authorities:** The national, provincial, or local authorities, which have a decision-making role or interest in the proposal or activity. The term includes the lead authority as well as other authorities. Baseline Conditions that currently exist. Also called “existing conditions.”

**Clearing:** The clearing and removal of vegetation, whether partially or in whole, including trees and shrubs, as specified.

**Construction camp:** The area designated for key construction infrastructure and services, including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management;

---

**Contractor:** The Contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract, are in line with the Environmental Management Programme and that Method Statements are implemented as described.

**Cumulative Impacts:** Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present, or reasonably foreseeable future activities to produce a greater impact or different impacts.

**Decision-maker:** The person(s) entrusted with the responsibility for allocating resources or granting approval to a proposal.

**Decision-making:** The sequence of steps, actions or procedures that result in decisions, at any stage of a proposal.

**Development:** The building, erection, construction or establishment of a facility, structure, or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity, but excludes any modification, alteration, or expansion of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint.

**Direct impacts:** Impacts that are caused directly by the activity and generally occur at the same time and at the same place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally quantifiable.

**Environment:** In terms of the National Environmental Management Act (NEMA) (Act No 107 of 1998) (as amended), "Environment" means the surroundings within which humans exist and that are made up of:

- a) the land, water, and atmosphere of the earth.
- b) micro-organisms, plants, and animal life.
- c) any part or combination of (i) of (ii) and the interrelationships among and between them; and the physical, chemical, aesthetic, and cultural properties and conditions of the foregoing that influence human health and wellbeing.

**Environmental Aspect:** Element of an organisation's activities or products or services that interacts or can interact with the environment. An environmental aspect can cause (an) environmental impact(s). A significant environmental aspect is one that has or can have one or more significant environmental impact(s).

***Environmental Assessment (EA):*** A process to evaluate the impacts of an action on the environment and human health.

***Environmental Impact Assessment (EIA):*** The assessment of the environmental consequences of a plan, policy, program, or actual projects prior to the decision to move forward with the proposed action.

***Environmental Authorisation:*** When used in Chapter 5, means the Authorisation by a competent authority of a listed activity or specified activity in terms of this Act, and includes a similar Authorisation contemplated in a specific environmental management Act.

***Environmental Assessment Practitioner:*** In terms of NEMA and Section 2H Regulations, EAP is an individual responsible for planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instrument introduced through the EIA Regulations.

***Environmental Impact:*** Change to the environment, whether adverse or beneficial, wholly, or partially resulting an organisation's environmental aspects.

***Fatal flaw:*** Any problem, issue, or conflict (real or perceived) that could result in proposals being rejected or stopped.

***General Waste:*** Household waste, construction rubble, garden waste and certain dry industrial and commercial waste which does not pose an immediate threat to man or the environment.

***Impact:*** The positive or negative effects on human well-being and/or on the environment.

***Indirect impacts:*** Indirect or induced changes that may occur because of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken, or which occur at a different place because of the activity.

***Interested and affected parties (I&APs):*** Individuals, communities, or organizations whose interests could be favourably or negatively impacted by a plan or activity, as well as those who are concerned about a proposal or activity and its repercussions. Local communities, financiers, business associations, trade unions, clients, consumers, and environmental interest groups may be among them.

**Lead authority:** The environmental authority at the national, provincial, or local level entrusted in terms of legislation, with the responsibility for granting approval to a proposal or allocating resources and for directing or coordinating the assessment of a proposal that affects several authorities.

**Maintenance:** Means actions performed to keep a structure or system functioning or in service on the same location, capacity, and footprint.

**Mitigation measure:** Action to eliminate the cause of a non-conformity (or non-compliance in the case of an EMP) and prevent recurrence.

**No-Go Option:** In this instance the proposed activity would not take place, and the resulting environmental effects from taking no action are compared with the effects of permitting the proposed activity to go forward.

**Significance:** Significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e., magnitude, intensity, duration, and likelihood). Impact significance is the value placed on the change by different affected parties (i.e., level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgements and science-based criteria (i.e., biophysical, social, and economic).

**Stakeholders:** A sub-group of the public, including the proponent, authorities, and all interested and affected parties, is concerned with the potential impact of a proposal or activity.

**Watercourse:** A geomorphological feature characterized by the presence of a streamflow channel, a floodplain and a transitional upland fringe seasonally or permanently conveying surface water.

**Wetland:** Land where a surplus of water (i.e., waterlogging) is the key factor determining the nature of the soil development as well as the types of plants and animals living at the soil surface.

## DOCUMENT ROADMAP

This Environmental Management Plan Report (EMPr) is developed in compliance with section 24N of the NEMA, 1998, as amended and contains those requirements prescribed in the EIA Regulations, 2014, as amended, including Section 23 and Appendix 4 of GN No. R. 517 of 11 June 2021. The relevant document sections which address each of the aspects provided in Appendix 4 of the NEMA EIA Regulations 2014 (as amended) are provided in Table 1.

**Table 1: Document Roadmap**

Relevant regulation, stipulation, or condition		Relevant Document Part
<b>Appendix 4</b>		
1) An EMPr must comply with section 24N of the Act and include-		
(a)	details of -	
	(i) the EAP who prepared the EMPr; and	Section 1.4
	(ii) the expertise of that EAP to prepare an EMPr, including curriculum vitae;	Section 1.4 & Appendix A
(b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 2
(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;	Section 2, Figure 2 and 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-	Section 6
	(i) Planning and design;	Section 2.3
	(ii) Pre-construction activities;	Section 2.3
	(iii) Construction activities	Section 2.3
	(iv) Rehabilitation of the environment after construction and where applicable post-closure; and	Section 2.3
	(v) Where relevant, operational activities	Section 2.3
(e)	<i>(Item 1(1)(e) deleted by Government Notice 326 in Government Gazette 40772 dated 7 April 2017)</i>	N/A

Relevant regulation, stipulation, or condition		Relevant Document Part
(f)	a description of the proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to-	Section 6
(i)	Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	Section 6
(ii)	Comply with any prescribed environmental management standards or practices;	Section 6
(iii)	Comply with any applicable provisions of the Act regarding the closure, where applicable; and	Not applicable
(iv)	Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	Not applicable
(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 10
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 5
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 5
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 5
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 10
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 10
(m)	an environmental awareness plan prescribing the manner in which-	
(i)	The applicant intends to inform his or her employees of any environmental risk which may result from their work; and	Section 8
(ii)	Risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 8
(n)	any specific information that may be required by the competent authority	Not Applicable

## **1 INTRODUCTION**

### **1.1 Background**

Johannesburg Water SOC Ltd (JW) has appointed Zitholele Consulting (Pty) Ltd to undertake the WULA process to authorize the construction of additional stormwater infrastructure for the new Wastewater Treatment Works (WwTW) Lanseria area, Gauteng Province.

The Environmental Impact Assessment (EIA) for the proposed development of a Wastewater Treatment Works in Lanseria was conducted by Nemaï Consulting in 2017, and the Environmental Authorisation (EA) was granted on 16 November 2017, while the Water Use Licence (WUL), Licence No.: 07/A21C/ACFGI/9705, was issued by the Department of Human Settlements, Water and Sanitation (DHSWS) on 22 July 2020 for the construction and operation of the new Wastewater Treatment Works (WwTW) located adjacent to the Jukskei River within the Lanseria area. A Part 2 Amendment of Environmental Authorisation Process is underway for amendment of the approved Site Layout Plan.

The preliminary design layout i.e. the approved Site Layout Plan as per the EA, provided the Competent Authority (CA) all the information necessary for precise decision-making regarding the proposed engineering design, proposed development, and proposed infrastructure. After the EA was authorized, the approved preliminary design served as the basis for commissioning the detail design. To achieve optimized design layout, functionality, and operability, the design team required to make small adjustments to the basic design during the design phase details. As part of the authorized layout, some of the alterations include adding stormwater infrastructure and re-aligning the existing bridge to occur with the road servitude.

### **1.2 Need and Desirability**

Lanseria WwTW is proposed to be located on the northern edge of Johannesburg's jurisdiction, to serve new development areas and provide additional processing capacity to existing and developing northern suburbs of city. Diepsloot and Lanseria are earmarked for urban development and major city infrastructure has been or is being established in the area. The City of Johannesburg has reserved the southern portion of the WwTW project on North Farm for future public housing development. This area will be served by the new Lanseria WwTW. Plans are also underway to develop the area around Lanseria Airport, known as Aerotropolis. Lanseria Airport recently started operating commercial flights and so the pressure to develop near the airport is increasing. With the expected population growth in and



around Lanseria, the need for drainage systems to treat the generated wastewater also increases. The new Lanseria WwTW is expected to also serve the region.

According to the 2020 Lanseria Development Framework (LDF), the area of land required for urban expansion between 2007-2020 and 2020-2040 shows the entire region north of Johannesburg (stretching from Midrand in the east to Lanseria in west) requires about 4,900 hectares of land for urban expansion by 2020 and an additional 4,300 hectares of land for urban expansion by 2040. Thus, the Lanseria area is currently under pressure to develop businesses and businesses from developers. promote and introduce. local community too. Therefore, the new urban development boundary proposed by the LDF involves a significant expansion of the area and this node requires government support to secure the installation of key infrastructure, including drainage system (CoJ SDF, 2015/2016).

The city's mass service network will need to adapt to urban expansion and density to ensure that areas can connect to the mass network. Massive urban service capacity access will be required for residential development and will be primarily required in the central areas of the Western sub-region along K52. Currently, the area is inaccessible to WwTW north (south of Diepsloot) and therefore inaccessible to the common sewer system, which is a necessary requirement for the establishment of a town. The proposed development is intended to improve and ensure uninterrupted WwTW service for the regions due to current and future developments.

### **1.3 General objectives and purpose of the EMPr**

The purpose of this EMP is to prescribe and pre-approval generally accepted impact management outcomes and impact management actions that can be used frequently and repeatedly for the management and mitigation of impacts and risks associated with the additional stormwater infrastructure and road bridge at the Lanseria WwTW site. The general objectives of the EMPr are to:

- Identify construction activities that are likely to cause adverse impacts on the environment.
- Describe the mitigation measures and environmental specifications that must be implemented for all phases of the project to minimize the level of environmental impact and manage the associated environmental impacts to the proposed development.
- Ensure effective management of stormwater in the development area.
- Ensure that developers and contractors carry out development activities in a sustainable and environmentally friendly manner.

- Promote avoidance, and if avoidance is not possible, minimize any negative environmental impacts resulting from development activities undertaken; Manage predicted impacts that may occur, to meet acceptable standards, both as a legal and moral responsibility to the environment within which they operate.
- Ensure management practices are implemented to minimize construction-related impacts such as water quality degradation, change in flows, loss of riparian habitat and loss of aquatic ecosystem services.
- Assign roles and responsibilities to the parties involved in the development process related to the implementation of this EMPr.
- Establish a methodology for monitoring and auditing environmental management activities at all stages of development.
- Propose a mechanism to monitor compliance and report on this topic; And
- Specify the duration of the proposed measures in the environmental management program, if any.
- Ensure transparency in the operation and environmental management of the region.

This EMPr is an independent document used to prescribe management mechanisms/methods to prevent undue or reasonably avoidable adverse environmental impacts and to enhance the benefits positive environment of the development process. Therefore, it must be handed and used by JWs (applicant), contractors, sub-consultants, and project managers (PMs) and used in all phases of development. In essence, EMPr is a dynamic document and updates may be necessary during the life development.

#### **1.4 Details and expertise of Environmental Assessment Practitioner**

Zitholele Consulting (Pty) Ltd provide specialist consulting services in the fields of Water Engineering, Integrated Water Resource Management, Environmental and Waste Services, and Communication (public participation and awareness creation).

Zitholele Consulting has no vested interest in the development of the facility other than fair remuneration for services rendered, and hereby declares its independence as required by the EIA Regulations of 2014 (as amended).

**Table 2: Details of EAP who compiled the EMPr to support this WULA process**

Name of EAP	Ms Londolani Sitsula (Environmental Assessment Practitioner)
Professional registration	EAPASA: Reg. EAP. (Reg. No. 2022/6115)
Company name	Zitholele Consulting (Pty) Ltd

Company Registration	2000/000392/07
Physical address	Building 1, Maxwell Office Park, Magwa Crescent West, Waterfall City, Midrand
Postal address	P.O. Box 6002, Halfway House, 1685
Telephone	011 207 2060
Fax	086 674 6121
Email Address	<a href="mailto:londolanis@zitholele.co.za">londolanis@zitholele.co.za</a>
Name of EAP	Ms Natasha Lalie (Senior Environmental Assessment Practitioner)
Professional registration	<i>EAPASA: Reg. EAP. (Reg. No. 2021/3611)</i>
Company name	Zitholele Consulting (Pty) Ltd
Company Registration	2000/000392/07
Physical address	Building 1, Maxwell Office Park, Magwa Crescent West, Waterfall City, Midrand
Postal address	P.O. Box 6002, Halfway House, 1685
Telephone	011 207 2060
Fax	086 674 6121
Email Address	<a href="mailto:natashal@zitholele.co.za">natashal@zitholele.co.za</a>

Refer to the CVs of the EAPs in Appendix A.

## 1.5 Details of project proponent

The details of the Project Proponent/Developer are provided in Table 3 below.

**Table 3: Proponent's details**

Name of Applicant	Ms Joyce Ngobebe
Company	Johannesburg Water SOC Ltd
Company Registration	2000/029271/30
Postal address	PO Box 61542, Marshalltown, 2107
Telephone	011 688 1443
E-mail	<a href="mailto:Joyce.ngobebe@jwater.co.za">Joyce.ngobebe@jwater.co.za</a>

## 1.6 Legal Context

### 1.6.1 Legislative Requirements for this EMPr

This EMPr is aligned as far as possible with Appendix 4 of the Environmental Impact Assessment Regulations, 2014 as amended (EIA Regulations).

## **1.6.2 Applicable Legislation**

Environmental legislation in South Africa was promulgated with the aim of, at the very least, minimising and, at the most, preventing environmental degradation.

### **(a) National Environmental Management Act, 1998 (Act No. 107 of 1998)**

An Environmental Authorisation has been granted (Reference No. Gaut 002/17 – 18/E0235) by the Gauteng Department of Agriculture and rural Development (GDARD) on 16 November 2017.

### **(b) EA Amendment Application**

Chapter 5 of the NEMA EIA Regulations (GN R.982 of 8 December 2014), as amended, provides for amendment of existing an EA, provided that the EA is still valid on the date of receipt of the amendment application by the Competent Authority (CA). Chapter 5 further provides for two types of amendment applications:

- Part 1 Amendment. The proposed amendment will not change the scope of a valid EA, increase the level or nature of an impact that was initially assessed and considered during the EIA application, or relates to a change in ownership or transfer of rights and obligations; and
- Part 2 Amendment. The proposed amendment will result in a change to the scope of a valid EA where such change will result in an increased level or change in the nature of the impact, and where such level or change in nature of impact was not assessed and included in the initial application for environmental authorisation; or taken into consideration in the initial environmental authorisation; and the change does not, on its own, constitute a listed or specified activity.

JW has applied for a Part 2 amendment in terms of Regulation 31 of the Environmental Impact Assessment (EIA) Regulations of 2014 (GN R. 326), to authorize modifications to the Site Layout Plan that was approved in the EA for a new Wastewater Treatment Works (WwTW) in Lanseria area. The proposed amendment does not trigger any new listed activities, as the proposed amendments only pertain to the design layout within the authorised development footprint. The Lanseria WwTW development activities triggered the following listed activities in terms of GN R 983, 984, 985 NEMA EIA Regulation of 04 December 2014, as amended.

**(c) National Water Act, 1998 (Act No. 36 1998)**

A Water Use Licence (WUL), Licence No.: 07/A21C/ACFGI/9705, was issued by the Department of Human Settlements, Water and Sanitation (DHSWS) on 22 July 2020 for the construction and operation of the new Wastewater Treatment Works (WwTW) in Lanseria. The proposed infrastructure development falls within a 500m wetland buffer and will include river crossings. In terms of Section 21 of the National Water Act (No. 36 of 1998) (NWA), the DWS authorised the following water uses:

**Table 4: Water Uses authorised by the proposed Lanseria WwTW development**

<b>Water Use</b>	<b>Description</b>	<b>Applicable Water Uses to this project</b>
S21 (a)	Taking of water from a water resource.	<ul style="list-style-type: none"> <li>Two production boreholes to be installed for abstraction of potable water for use within the WwTW.</li> </ul>
S21 (c)	Impeding or diverting the flow of water in a water course.	<ul style="list-style-type: none"> <li>Two production boreholes to be installed within 500m of a wetland.</li> </ul>
S21 (i)	Altering the bed, banks, course, or characteristics of a watercourse. This includes altering the course of a watercourse (previously referred to as a river diversion).	<ul style="list-style-type: none"> <li>Construction of seven road bridges across riverbanks and within 500m of a wetland.</li> <li>Construction of five pipe bridges across riverbanks and within 500m of a wetland.</li> <li>Construction of an entire WwTW facility within 500m of a wetland.</li> <li>Construction of main access road within 500m of a wetland.</li> <li>Construction of pipeline associated with main access road which passes two water bodies</li> </ul>
S21 (f)	Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit.	<ul style="list-style-type: none"> <li>Treated effluent will be discharged into the Jukskei River via the final effluent discharge infrastructure.</li> </ul>
S21 (g)	Disposing of waste in a manner which may impact on a water resource.	<ul style="list-style-type: none"> <li>Emergency Storm Flow Dam - In cases of abnormal rainfall events and associated infiltration into the sewer system, the stormflow dam may be filled and may overflow into the river.</li> <li>Dry Sludge Storage Area</li> </ul>

The water uses triggered for the proposed additional stormwater infrastructure and re-alignment of the road bridge are provided in Table 5.

**Table 5: Water use activities that are triggered in terms of the National Water Act, 1998 (Act No. 107 of 1998)**

Water Use	Description	Applicable Water Uses to this project
S21 (c)	Impeding or diverting the flow of water in a water course.	There will be several new infrastructure occurring within the 500m regulated area of the wetlands, in the wetlands and in the 100m regulated area of the riparian zone as follows: <ul style="list-style-type: none"> <li>• Stormwater side drain outlets along access road to the WwTW (8)</li> <li>• Road bridges (2)</li> <li>• Proposed re-alignment of the road bridge</li> <li>• Pipe bridges (4)</li> <li>• Pipe crossings (2)</li> <li>• Stormwater culvert crossings along access road to the WwTW (11)</li> <li>• Permanent attenuation ponds (4)</li> <li>• Temporary attenuation ponds (11)</li> <li>• Stormwater infrastructure and ponds (27)</li> </ul>
S21 (i)	Altering the bed, banks, course, or characteristics of a watercourse. This includes altering the course of a watercourse (previously referred to as a river diversion).	

The Environmental Legislations applicable to the construction and operation of the additional infrastructure, are summarised in Table 66.

The list below was compiled to ensure that the applicant is aware of their legal responsibilities and liabilities during the construction and operation of the proposed development in Lanseria.

JW, and any agents or contractor's acting on its behalf, should note that obligations imposed by the EMPr are legally binding in terms of environmental statutory legislation, and in terms of the additional conditions to the general conditions of contract that pertain to this project. Non-compliance to the applicable environmental laws is a criminal offence and if prosecuted, JW will be liable for any environmental damage incurred.

**Table 6: List of Applicable Legislation**

Name of Act	Act No. and Year	Notes/remarks
The Constitution of the Republic of South Africa	108 of 1996	Includes the Bill of Rights, Environmental rights, Rights to property, administrative justice, and Access to information, <i>inter alia</i> .
National Environmental Management Act	107 of 1998	List of activities and competent authorities identified in terms of Sections 24 and 24D. NEMA Environmental Impact Assessment (EIA) Regulations 2014 (GN R.982), as amended in April 2017 (published in Government Notice No. R.326).
National Environmental Management: Protected Areas Act	57 of 2003	Provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity, natural landscapes, and seascapes.
National Environmental Management: Biodiversity Act	10 of 2004	Strategy for achieving the objectives of the United Nation's Convention on Biological Diversity, to which South Africa is a signatory.
National Heritage Resources Act (NHRA)	25 of 1999	The NHRA serves to introduce an integrated and interactive system for the identification, assessment, and management of the heritage resources of South Africa. The NHRA promotes good governance and the empowerment of civil society to preserve their heritage for future generations and states the principles of heritage resource management while making provision for legislation protecting national heritage.
Hazard Substances Act, and regulations	15 of 1973 of	Provides for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances.
Conservation of Agricultural Resources Act (CARA)	43 of 1983	To provide for control over the utilisation of the natural agricultural resources of the Republic to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.
The Promotion of Administrative Justice Act	3 of 2000	<ul style="list-style-type: none"> <li>• Definitions (Section 1).</li> <li>• Procedural Fairness (Section 3, 4 and 6).</li> <li>• Right to Reasons for Decisions (Section 5); and</li> <li>• Judicial Review (Section 6 and 8).</li> </ul>

Name of Act	Act No. and Year	Notes/remarks
Promotion of Access to Information Act (PAIA)	Act 2 of 2000	Right of access to any information held by the State or by another person and that is required for the exercise or protection of any rights.  As per the NEMA EIA Regulations, 2014, as well as the principles/objectives of the PAIA, the Basic Assessment Report as well as all supporting documentation (e.g., specialist studies) will be made available to the public.
Occupational Health and Safety Act	85 of 1993	Prescribes health and safety measures necessary to adhere to for all construction workers
National Water Act, and regulations	36 of 1998	Prevention of effects of pollution, control of emergency incidents, and water use and licensing.
All other National and Provincial Legislation and any relevant Ordinance, Regulation, By-laws and relevant National Standards and Norms.		
All relevant Provincial and Municipal bylaws. The Johannesburg Metropolitan Municipality may have certain requirements in terms of bylaws and trade permits, and a few of these may be applicable to this project: <ul style="list-style-type: none"> <li>• Water and Sanitation Bylaw</li> <li>• Waste Management Bylaw</li> <li>• Municipal Health Bylaw</li> </ul>		
Provincial noise regulations as outlined in Provincial Notice No. 5479 of 1999: Gauteng Noise Control Regulations.		
Construction Regulations of 2003, which applies to any persons involved in construction work and are therefore applicable to the construction phase. The regulations provide guidelines for safe operation during construction.		
Hazardous Chemical Substance Regulations of 1995, which stipulates the requirements for storage and handling of hazardous chemical substances and provide guidelines for the training of staff.		

## 2 PROJECT DESCRIPTION

### 2.1 Project Area

The proposed construction and operation of the new Wastewater Treatment Works (WwTW) is located immediately adjacent to Northern Farm in Lanseria on Portions 28, 29, 30, and 31 (which are now consolidated into Portion 131) of Rietfontein Farm No. 532 JQ within the jurisdiction of the City of Johannesburg Metropolitan Municipality in the Gauteng Province. The centre coordinates of the project area are 25°54'40.71"S and 27°57'9.56"E and is located



approximately 2.5 km north-east of Lanseria International Airport, and approximately 4.8 km northwest of Diepsloot township. The site can be accessed via Falkirk Road from R114 or via Ashanti Road and Riethaan Road from the R512.

The project area falls within the Jukskei River Catchment, quaternary catchment A21C, in the Limpopo Water Management Area. The properties on which the proposed development has been authorised is approximately 87.7ha in extent, while the extent of the proposed development site is approximately 47ha in extent. The locality of the proposed project area is shown in Figure 1 below.

The additional stormwater infrastructure and upgrade of the road bridge will occur within the development footprint of the proposed Lanseria WwTW.

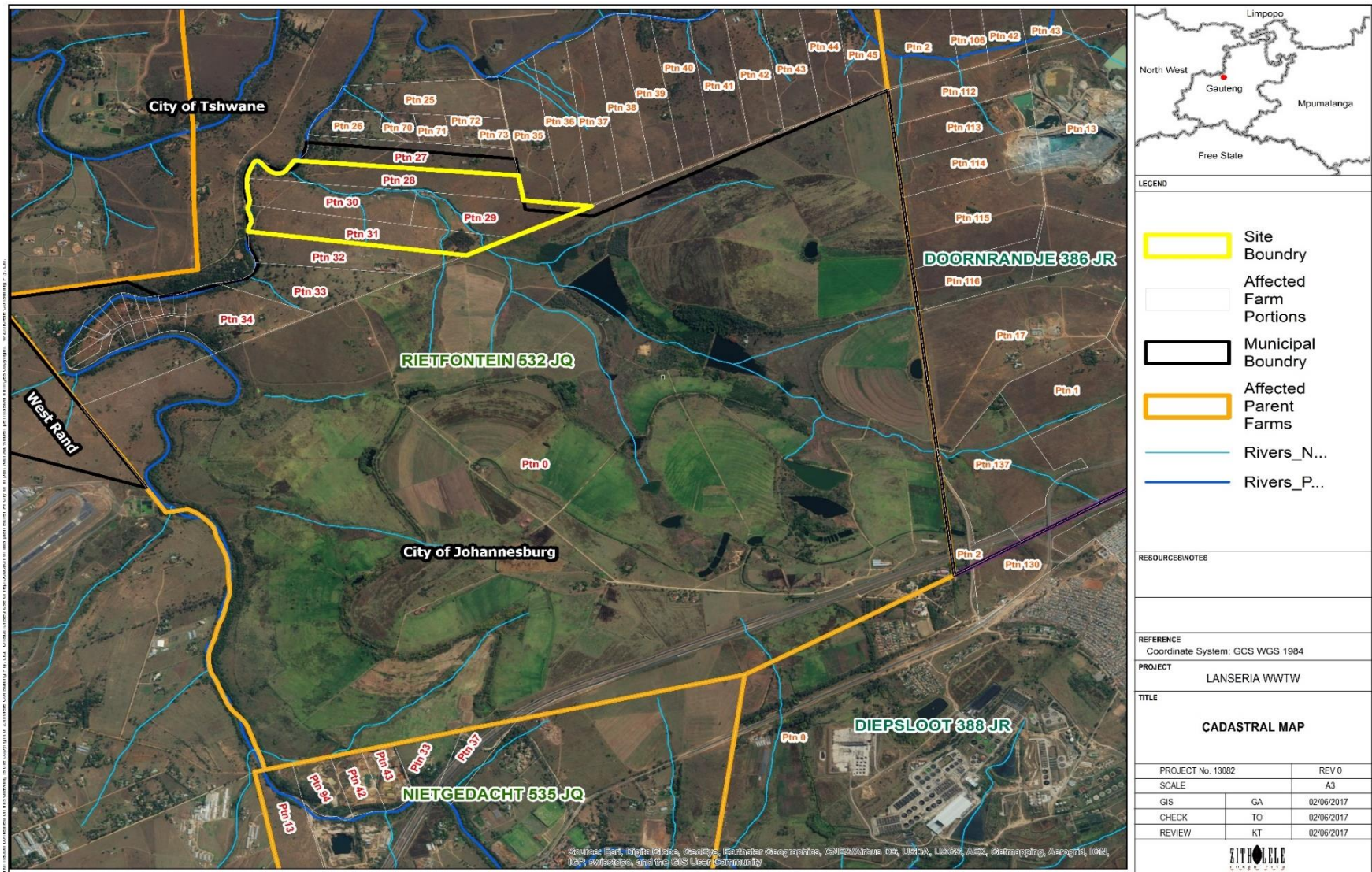


Figure 1: Project Area Locality for the proposed additional stormwater infrastructure at the WwTW at Lanseria.

## **2.2 Property Description**

### **(a) Surface infrastructure serving the site (e.g., roads, railways, power lines, etc.)**

There are two, Eskom owned, 400kV overhead powerlines (transmission lines) running parallel to each other in a north-east south-west direction through the site with a total servitude width of 82.4m. There is also an Eskom owned 88 kV sub-transmission overhead powerline running in a north-south direction, with a registered servitude width of 21.91m. Two Right of Way (RoW) servitudes are registered on the properties, on the eastern and western boundaries, to enable access for residents that live adjacent to these properties, and for service providers such as Eskom and Telkom. Telkom overhead communication cables servicing the residents in the area are located within the RoW servitude.

### **(b) Ownership of Land, Longitude and Latitude of the site, Zoning of the land**

The proposed site is in respect of Portions 28, 29, 30, and 31 (which are now consolidated into Portion 131) of Rietfontein Farm No. 532 JQ, all properties of which are owned by JW, a municipal entity that forms part of the CoJ. The northern section of the Site is located close to the municipal boundary between CoJ and City of Tshwane, but the entire site falls within the CoJ. JW is both the Applicant and the Landowner for the proposed project. The total area of the property is 87.7 ha.

### **(c) Ownership of adjacent land, Occupier of Land, Zoning of Adjacent Land**

The site falls within the Diepsloot Nature Reserve and borders the Kareebosrand Conservancy and the Rhenosterspruit Nature Conservancy to the north. The farm portions to the north and south of the above-mentioned farm portions are owned by private owners. The adjacent site is also zoned as agricultural.

### **(d) River Catchment**

The project area falls within the Jukskei River Catchment, quaternary catchment A21C in the Limpopo Water Management Area (WMA).

## **2.3 Project Activities**

This EMPr has been developed to address the management of the impacts during the construction, operational and decommissioning phases of the project. The following components of the project site were taken into consideration during the development of the EMPr:

- The lifespan of the site.
- Footprint of the facility (ground space).
- Proposed Changes to the Preliminary Design
- Services.
- Developmental phases.
- Proposed changes to the preliminary design.

### **2.3.1 Lifespan of the facility**

The facility is designed for an indefinite lifespan, decommissioning is not anticipated. The proposed development is intended to improve basic living conditions and access to services to areas that previously were without sanitation services. The scope of the project includes the phased construction of the new 150 M<sup>l</sup>/d WwTW.

Pre-Construction and Construction Phase: The proposed planning and construction of the Lanseria WwTW will be phased, as described above, over a period of 20 years.

Operational Phase: Lanseria WwTW is proposed to be in operation 5 years from the initial date of construction WwTW when the first 50 M<sup>l</sup>/day will be commissioned. The operational phase will continue for the life of the facility.

### **2.3.2 Footprint of the facility**

The properties on which the proposed development has been authorised is approximately 91ha in extent, while the extent of the proposed development site is approximately 47ha in extent. The JW process design guideline prescribes a biological nutrient removal activated sludge (BNRAS) treatment process including nitrification / denitrification and biological excess phosphorus removal.

### 2.3.3 Project Description

With the construction of the WwTW and associated infrastructure, there will be vegetation clearance on site, and increased hardened infrastructure, and as a result, stormwater runoff must therefore mimic pre-development flows to ensure erosion on site, on the wetlands and watercourses are minimised. There are two wetland types on the site i.e. valley bottom wetlands and hillslope seep wetlands. There is a riparian zone occurring on the western boundary of the site. As a result of the proposed upgrade of the main access road leading to the proposed WwTW, several stormwater culverts will be upgraded across tributaries of the Jukskei River. There will be several new infrastructure occurring within the 500m regulated area of the wetlands, in the wetlands and in the 100m regulated area of the riparian zone as follows:

- Stormwater side drain outlets along the main access road to the WwTW (8)
- Road bridges (2)
- Re-alignment of the road bridge
- Pipe bridges (4)
- Pipe crossings (2)
- Stormwater culvert crossings along the main access road to the WwTW (11)
- Permanent attenuation ponds (3)
- Temporary attenuation ponds (12)
- Stormwater infrastructure and ponds (27)

Three attenuation ponds will be constructed on site to delay storm water entering the natural water courses. Several small temporary attenuation ponds will be constructed in open areas on site where future structures will be built.

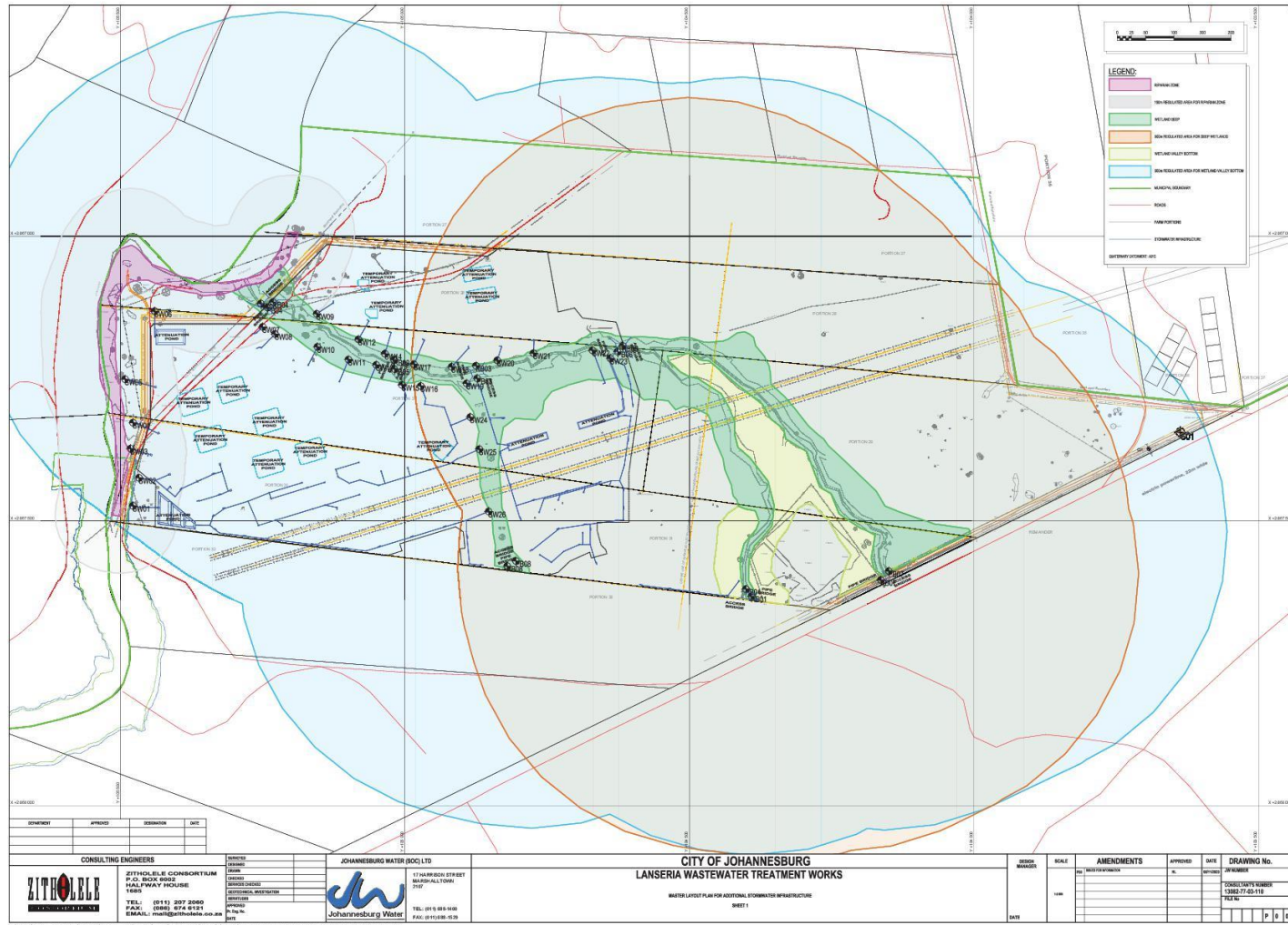


Figure 2: Master layout Plan for Proposed Additional Stormwater Infrastructure at proposed Lanseria WwTW

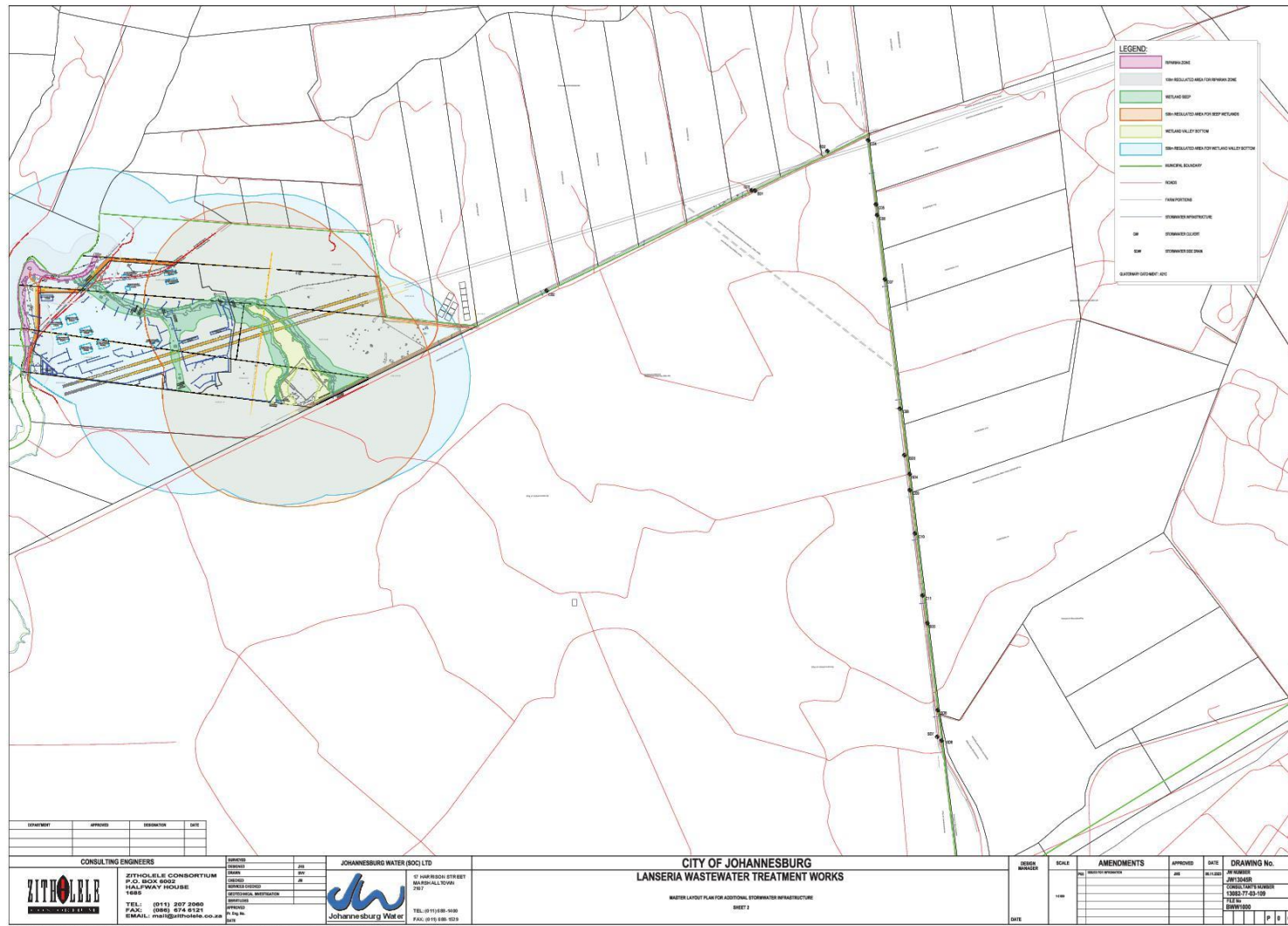


Figure 3: Master Layout Plan (Including stormwater infrastructure along access road to be upgraded)

---

#### **2.3.4. Bulk Services to the Works**

##### **(a) Electricity**

Bulk electricity to the Works will be supplied by Eskom. The bulk electrical consumption of the WwTW when fully developed is expected to be approximately 5MVA, and 1.25MVA for the first module. Application has been made for two sources of supply (normal and back-up) from two different Eskom 11kV networks, to ensure redundancy in supply. The two incoming substations will be interlocked, to ensure that the backup source of supply switches over automatically in the event of a failure on the normal supply. This arrangement may reduce the requirement for standby diesel generators for emergency power, which is a requirement described in the JW design guideline. JW confirmed that emergency power will still be required for certain equipment. These items will be determined during the hazard and operability study and included in the detail design.

##### **(b) Access Road**

An all-weather, surfaced main access road will be constructed to service the Works. An investigation of options for the provision of access to the site indicated that the most suitable option for access would be to utilise and upgrade an existing access road to the site, from the south. This existing road is called Falkirk Road, which is off the provincial road R114 and passes the entrance to Northern Farm. This section of road is surfaced. The next section of road is a gravel, farm road (which will need to be upgraded) that runs in a northerly direction adjacent to Northern Farm, until it meets Koedoe Road which runs in a westerly direction, until it reaches the south-western entrance to the site. The length of road that will need to be upgraded is approximately 6km. Several culverts will be upgraded along the upgraded access road which will cross tributaries of the Jukskei River. A Preliminary Design Report has been developed separately for the Main Access Road.

##### **(c) Portable Water Pipeline**

Potable water to the works will be fed from an existing pipeline that supplies potable water to Northern Farm. This pipeline originates at the Northern WwTW potable water reservoir, a portion of which will need to be upgraded. JW propose to re-route the existing 80mm pipe at Northern Farm around the border of the property and replace the 100mm steel pipe from the reservoir with a 200mm HDPE or uPVC pipe. A new section of pipeline approximately 6km



long will be installed from Northern Farm, along the new Main Access Road to the Lanseria Works. In addition, two boreholes will be used as a backup facility on the site.

**(d) Traffic Management**

The proposed installation will occur in the road reserve, and the methodology will be that of trenchless technology where the pipes cross the road. Where the trenchless methodology cannot be utilized, an application for open trench method will be submitted to the Johannesburg Roads Agency for approval. Adequate road signage will be placed on site, indicating the construction ahead, speed limit, etc.

**2.3.4 Development phases**

**(a) Pre-construction/Planning phase**

Activities associated with the pre-development phase include:

- Undertaking necessary amendment of environmental authorisation in terms of applicable environmental legislation.
- Appointment of a suitable contractor to undertake the construction during the installation process after an amendment of the EA has been granted.

No invasive activities that would require authorisation or a licence will therefore be undertaken during the pre-construction phase.

**(b) Construction Phase**

The key construction activities associated with the proposed development include:

- Construction of permanent and temporary attenuation ponds;
- Upgrading of culverts along the main access road to the Lanseria WwTW; and
- Internal stormwater infrastructure to be constructed at the Lanseria WwTW.

The specific components that will be constructed during this first phase and the reasons that they need to be constructed for Phase 1 are as follows:

**(c) Operation Phase**

On completion of construction, JW will be responsible for the operations and maintenance of the proposed stormwater management system, including attenuation ponds, stormwater pipes, and channels, to ensure it functions properly. There will be regular maintenance work to restore and maintain the system to its original design.

**(d) Decommissioning phase**

Johannesburg Water is not intending to decommission the WwTW and it will therefore be operated over a long-term period.

**3 DESCRIPTION OF THE RECEIVING ENVIRONMENT****3.1. Climate**

The project area is in the north-eastern portion of South Africa. The summers are usually long and warm, whilst the winters are short, cold, and very dry. Over the course of the year, the temperature typically varies from 3°C to 29°C and is rarely below -0°C or above 32°C. The warm season lasts for approximately 5.8 months, from September 25 to March 19, an average daily high temperature above 27°C. The hottest day of the year is January 1, with an average high of 29°C and low of 17°C. The cool season lasts for 2.2 months, from 31 May to 7 August, with an average daily high temperature below 21°C. The coldest day of the year is 5 July, with an average low of 3°C and high of 19°C (Weatherspark, 2017).

**3.2. Topography**

The site is covered in undulating savannah type grasslands, crossed from east to west and south to north by perennial tributaries of the Jukskei River. The altitude above mean sea level ranges from 1 330m above mean sea level in the east to 1275m in the Jukskei River channel in the west (Nemai Consulting, 2017). Class 1 ridges are located on the site. The general gradient of the site ranges from 1 in 9 to 1 in 15 towards the streams crossing the site, with a general gradient of about 1 in 11. The drainage system of rivers and streams heads towards the north-western corner of the site in deeply weathered and incised channels. Marshy wetlands occur on portions of the southern tributaries possibly as the result of groundwater seepage arising from the irrigation of treated wastewater effluent on the adjacent farm portions.

### **3.3. Geology and Soils**

A Geotechnical Investigation was undertaken by Knight Piesold Consulting to determine the nature and extent of soils and bedrock conditions and the geotechnical conditions for the proposed WwTW site and the upgrade of the access road to the site.

According to the published 1:250 00 scale geological series, sheet 2526 Rustenburg, the site is underlain by the basement granite rocks of the Halfway House Granite Suite. The Halfway House Granite Suite includes granite gneiss, amphibolite, serpentinite, and talc schist, which are products of metamorphism of basic and ultrabasic igneous rocks in the Suite. Numerous dolerite dykes intruded the granite in and around the site. A north to south striking fault occurs approximately 1,5km east of the site. The soil profiles are deeply weathered granitic, and the residual soils is relatively high in clay content, whereas thin soil cover generally comprises of a coarse-grained texture. These soils are often a collapsible soil structure.

### **3.4. Heritage Resources**

The site does not have any historical/heritage resources or structures. The site is surrounded by very low residential development and conservancies and is considered generally a quiet area except for aeroplanes that fly over the site from the Lanseria International Airport. The site is also situated on rivers adding to the natural sense of place of the sites.

### **3.5. Social characteristics**

The City of Johannesburg Local Municipality is situated in the Gauteng Province and covers an area of 1 645km<sup>2</sup>. It is the largest city in South Africa, and the provincial capital of Gauteng, the wealthiest province in South Africa (Stats SA). According to Census 2011, the population within City of Johannesburg is about 4 434 827 people with about 72,7% of the working age, 23,2% of young people and 4,1% of the elderly people. Unemployment rate in the municipality is approximately 25% with the unemployed of youth of 31,5%. Only 34,7% of the age group 20+ people in the municipality have a matric qualification.

### **3.6. Biodiversity**

The Biodiversity Company conducted a biodiversity study for the environmental authorization amendment application for the proposed Lanseria Wastewater Treatment Works, which shows that specialist studies in terrestrial ecology (including avifaunal), aquatic, wetland, surface water, hydrogeological, soil land use, and social revealed that the development's

overall footprint will be larger because of the proposed changes when compared to the original designs. Some of these alterations are situated inside riparian and wetland buffers, which heightens their relevance for the environment. The Environmental Authorization for the WwTW authorized a ridge buffer of 150m, and with the revised design, the impact within the 150m ridge buffer was significantly reduced.

The following impacts were considered:

- Destruction/ loss of wetland, riparian and ridge habitat and associated buffers;
- Destruction, further loss and fragmentation of the CR vegetation community as well as loss of the CBA important habitat;
- Loss of protected flora and fauna species;
- Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and possible poaching);
- Potential leaks, discharges and/or pollutant from the lime system and sewage leaching into the surrounding environment and water sources;
- Flooding from water due to malfunctioning of water storage tanks;
- Continued encroachment and displacement of the natural vegetation community due to alien invasive plant species and erosion; and
- The impact of stormwater on the surrounding habitats.

Potential impacts were evaluated against the data captured during the desktop review and field assessment to identify relevance to the project area. The relevant impacts associated with the proposed development were then subjected to a prescribed impact assessment methodology.

The following recommendations were made:

- A monitoring plan of bird strikes associated with the new habitat be compiled; and
- Aquatic ecology biomonitoring be to undertaken for the construction and operational phases, this includes ground water and surface water sampling and analysis to ensure that that sewage spillage and leaks are detected and managed.

---

### 3.7. Hydrology

#### (a) Streams/River

The site falls in the Quaternary Catchment A21C. The natural Mean Annual Runoff (MAR) in catchment A21C including the upstream discharges of WwTW and industrial effluent equals to  $154.77 \times 10^6 \text{m}^3$ . A further increase to an average of  $198.70 \times 10^6 \text{m}^3$  is expected if the proposed WwTW discharges 150 Mℓ/d.

The survey area falls within the Limpopo (A) Primary catchment and the Crocodile (west) Marico Water Management Area (WMA). The project area falls within the A21C quaternary catchment, which is drained toward the northwest by the Jukskei River, which is the main watercourse that drains the catchment area. The Jukskei River forms a confluence with the Crocodile (west) River to the north, continuing as the Crocodile (west) River northwards to confluence with the Marico River. This confluence forms the Limpopo River, which then runs eastwards, forming the northern border of South Africa with Zimbabwe.

#### (b) Wetlands

The Biodiversity Company conducted a wetland study within the project area and identified and delimited two types of wetlands: valley bottom and hillslope seepage systems. The study also discovered and delimited a riparian zone connected to the Jukskei River. The wetlands' state was assessed to be significantly modified, with the adjustments primarily related to regional development and local land use. A portion of the specified wetland (and buffer) areas were invaded by the proposed WwTW footprint regions, resulting in some wetland area loss. Without mitigation, it was judged that the remaining factors (impacts sources) had modest significance, with most of them having negligible significance.

Different footprint sizes will result from the adjustments, with development occurring in the wetland buffer. In addition to the impacts discovered during the review that were not initially examined, the implications of the new locations and increased infrastructure were evaluated for this part. The impact evaluation is not significantly affected by the differences in infrastructure between the various designs. The following impacts were considered:

- Loss or degradation of wetland vegetation;
- Increased bare surfaces, floodpeaks and potential for erosion;
- Introduction and spread of alien and invasive vegetation;
- Decreased flow inputs to the water resource;
- Increased sediment loads to downstream reaches; and

- Nutrient enrichment of wetlands.

The following Recommendation were made:

- The operational phase of the project should include monitoring of the water quality of the respective systems on a quarterly basis. Results should be compared with the baseline data set and the Target Water Quality Range (TWQR) for aquatic ecosystems; and
- The rehabilitation measures taken to stabilise the banks of the receiving systems (from discharge) should also be managed and measures taken to maintain these structures, or replace these structures where required.

#### 4 ENVIRONMENTAL IMPACT ASSESSED

**Table 7: Potential impacts assessed and their mitigation measures**

ACTIVITIES	POTENTIAL IMPACTS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION
<b>PRE – CONSTRUCTION PHASE</b>			
Planning & Design Phase	<ul style="list-style-type: none"> <li>Impacts on wetland and surface water resources.</li> </ul>	Construction may not commence without a water use license (based on the triggered water uses in terms of Section 21 of NWA).	Prior commencement of construction.
<b>CONSTRUCTION PHASE</b>			
<p><b>Proposed bridge and additional stormwater infrastructure:</b></p> <p>Site establishment</p> <p>Prepare access road.</p> <p>Establish construction laydown area.</p> <p>Delivery of construction material</p>	<p><b>Geology and Soil</b></p> <ul style="list-style-type: none"> <li>Unsuitable geological conditions</li> <li>Soil Compaction leading to erosion and sedimentation</li> </ul> <p><b>Topography</b></p> <ul style="list-style-type: none"> <li>Disturbance to the natural topography</li> <li>Change in elevation.</li> <li>Erosion of affected areas on steep slopes</li> </ul>	<ul style="list-style-type: none"> <li>Take every measure to ensure that the bulk of the site clearing and earth moving activities take place in winter when rainfall is lowest (and the grass sward is thinnest) to minimize environmental damage, erosion, sedimentation and contamination.</li> <li>Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash.</li> <li>Scrape the area where mixing and storage of sand and concrete occurred to clean and regrass once finished.</li> <li>Revegetate all denuded areas beyond the buildings as soon as possible.</li> <li>Provide adequate erosion control measures where required;</li> <li>No mixing of fertile soils with sub soils during construction; and</li> <li>Implement concurrent and re-vegetate all disturbed with locally indigenous species as soon as possible.</li> </ul>	Throughout the construction
<p>Transportation of equipment, materials, and personnel</p> <p>Storage and handling of material</p>	<p><b>Geohydrology</b></p> <ul style="list-style-type: none"> <li>Groundwater pollution due to spillages and poor construction practices.</li> </ul>	<ul style="list-style-type: none"> <li>Fuel containers must be placed on bunded areas with a sump drainage.</li> <li>All spills (minor and major) must be cleaned and remediated within 24 hours.</li> <li>Spill kits or absorbent materials must be readily available on site, and must include materials to absorb, breakdown, and where possible encapsulate minor material spillages.</li> <li>Bunded areas to be designed to contain at least 110% of the storing capacity.</li> </ul>	Throughout the construction

---

ACTIVITIES	POTENTIAL IMPACTS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION
Construction employment Site clearing		<ul style="list-style-type: none"><li>• Wastewater as well as spilled fuel collected within bunded areas and refuelling areas shall be disposed of or treated as hazardous waste.</li><li>• All vehicles and equipment must be inspected of leaks daily.</li><li>• Drip trays must be placed underneath any stationary equipment to prevent spillages into the ground.</li></ul>	



<p>Excavation</p> <p>Blasting</p> <p>River diversions for road bridge crossings</p> <p>Construction works for WwTW buildings and infrastructure.</p> <p>Concrete works</p> <p>Mechanical and electrical works</p> <p>Cut and cover activities.</p> <p>Stockpiling</p> <p>Waste and wastewater management</p>	<p><b>Surface Water</b></p> <ul style="list-style-type: none"> <li>• Alteration of flow regimes at river crossings due to impediments and diversions</li> <li>• Increased bare surfaces, flood peaks and potential for erosion.</li> <li>• Alteration of the hydrological regime and decreased flow inputs to the water resource</li> <li>• Increased sediment loads to the downstream reaches.</li> <li>• Loss of riparian and instream vegetation.</li> <li>• Water quality and quantity deterioration</li> <li>• The flow within the affected watercourses would need to be diverted to allow for construction activities (such as bridges) to take place.</li> <li>• Potential contaminated spills could potentially impact downstream water</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure maximise infiltration of rain water and maintain diffuse subsurface for non-developed areas.</li> <li>• Develop a sound stormwater management plan that is engineered to promote rainfall infiltration, maintain diffuse subsurface flows on slopes, minimise the development of preferential flow paths.</li> <li>• All low points, flow paths or clean water drains should be engineered to minimize erosion through the installation of small drop downs and flow attenuation structures especially out outlets into the wetland system.</li> <li>• Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g. slabs of concrete with rocks cemented in).</li> <li>• Minimise the extent of concreted / paved / gravel areas.</li> <li>• Avoid excessively compacting the ground not to be developed.</li> <li>• Introduce coarse, preferably washed, gravel in areas amongst infrastructure where vegetation is required to be cleared.</li> <li>• Alignment of the structure must be perpendicular to the channel and flows.</li> <li>• Monitor and maintain the structure, keeping clear structure clear of blockages and debris.</li> <li>• Ensure monitoring and maintenance of structures and address any erosion sources or weak points that contribute to sedimentation of the system.</li> </ul>	<p>Throughout the construction</p>
--	---	---	------------------------------------

ACTIVITIES	POTENTIAL IMPACTS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION
	<p><b>Wetlands</b></p> <ul style="list-style-type: none"> <li>• Loss or degradation of wetland vegetation</li> <li>• Increased bare surfaces, flood peaks and potential for erosion.</li> <li>• Introduction and spread of alien and invasive vegetation.</li> <li>• Decreased flow inputs to the water resource</li> <li>• Increased sediment loads to downstream reaches.</li> </ul>	<ul style="list-style-type: none"> <li>• Use the wetland shapefiles to clearly demarcate (on the ground) the edge of the buffer and wetlands. Regard these as strict no-go areas, unless authorised.</li> <li>• All activities (including driving and equipment storage) must remain outside of the wetlands identified on site that will be conserved.</li> <li>• The footprint area of the construction should be kept a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas.</li> <li>• While clearing keep a nursery of plant sods (priorities wetland plants such as sedges, rushes and grasses in an on-site nursery for use in wetland restoration efforts.</li> <li>• Use existing access roads wherever possible.</li> </ul>	<p>Throughout the construction</p>
	<p><b>Flora</b></p> <ul style="list-style-type: none"> <li>• Impacts on ridges</li> <li>• Disturbance of natural ecosystems making them vulnerable to invasion of alien species</li> <li>• Loss of sensitive ecosystems (Egoli Granite Grassland threatened ecosystem, ridges and CBAs), which provide habitat for a number of species during site clearing, setting up of construction camp, etc</li> <li>• Destruction of potential red list plants during site clearing and construction</li> <li>• Disturbance of sensitive plant species if relocated</li> <li>• Illegal harvesting of medicinal plants during construction phase</li> <li>• Disturbance to the surrounding Conservancies and Nature Reserves.</li> </ul>	<ul style="list-style-type: none"> <li>• The buffer zones mentioned in this report must be strictly adhered to, and the areas covered by the buffers be treated as environmentally sensitive. No vehicles, storage of building materials or rubble, construction or landscaping are allowed in the sensitive and buffer areas.</li> <li>• Erecting a fence with controlled access around the open spaces (ridges and their buffer zones) and natural areas will prevent access of vagrants and criminals into these areas.</li> <li>• No access roads onto ridge areas must be present and such areas must be fenced off during construction activities.</li> <li>• Avoid translocating stockpiles of topsoil from one place to sensitive areas in order to avoid translocating soil seed banks of alien species.</li> <li>• Vehicles and construction workers should under no circumstances be allowed outside the site boundaries to prevent impact on the surrounding vegetation.</li> <li>• Where possible, natural vegetation must not be cleared and encouraged to grow.</li> <li>• All stockpiles, construction vehicles, equipment and machinery should be situated away from the natural vegetation.</li> <li>• Disturbance of vegetation must be limited only to areas of construction.</li> </ul>	<p>Throughout the construction</p>

ACTIVITIES	POTENTIAL IMPACTS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION
	<ul style="list-style-type: none"> <li>Increase in spread of alien invasive plant species</li> </ul>	<ul style="list-style-type: none"> <li>Prevent contamination of natural grasslands by any pollution.</li> <li>Areas cleared of vegetation must be re-vegetated prior to contractor leaving the site.</li> <li>Construction activities should be restricted to the development footprint area.</li> </ul>	
	<p><b>Fauna</b></p> <ul style="list-style-type: none"> <li>Loss of habitat required for survival -- mammals, avifauna, amphibians, reptiles and invertebrates</li> <li>Loss of animal Life</li> </ul>	<ul style="list-style-type: none"> <li>Animals residing within the designated area shall not be unnecessarily disturbed.</li> <li>During construction, refresher training can be conducted for construction workers with regards to littering and poaching.</li> <li>The Contractor and his/her employees shall not bring any domestic animals onto site.</li> <li>Environmental Awareness should be provided to contractors regarding disturbance to animals.</li> <li>Killing of animals on site will be strictly prohibited and animal found on site must be safely removed from the construction site.</li> <li>Implementing noise monitoring measures and management.</li> <li>Avoid vegetation clearance during the breeding and migration season.</li> </ul>	Throughout the construction
	<p><b>Land Use and Capability</b></p> <ul style="list-style-type: none"> <li>Change in Land Use</li> <li>Loss of potential fertile soil through land clearance</li> <li>Loss of grazing land within construction domain</li> </ul>	<ul style="list-style-type: none"> <li>Provide adequate erosion control measures where required;</li> <li>No mixing of fertile soils with sub soils during construction; and</li> <li>Implement concurrent and re-vegetate all disturbed with locally indigenous species as soon as possible.</li> </ul>	Throughout the construction

ACTIVITIES	POTENTIAL IMPACTS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION
	<p><b>Air Quality</b></p> <ul style="list-style-type: none"> <li>• Increased ambient dust levels of spoil material and general construction activities on site</li> <li>• Exhaust emissions from vehicles and equipment</li> <li>• Greenhouse gas emissions</li> </ul>	<ul style="list-style-type: none"> <li>• Appropriate dust suppression methods must be applied.</li> <li>• Exposed soil stockpiles shall be covered, kept damp or protected using organic binding agents or alternative techniques that are not water intensive.</li> <li>• The clearing of vegetation must be kept to a minimum and only where required.</li> <li>• Avoid unnecessary movement of construction vehicles.</li> <li>• Vehicles travelling on unsurfaced roads must travel at a speed that creates minimal dust entrainment.</li> </ul>	Throughout the construction
	<p><b>Noise</b></p> <ul style="list-style-type: none"> <li>• increase the ambient noise levels within the area during the construction phase. This may impact on the people located at the adjacent properties, as well as sensitive faunal species within the study area.</li> </ul>	<ul style="list-style-type: none"> <li>• Conducting regular equipment maintenance to minimise noise generated by the operating equipment</li> <li>• Limiting the operation times to daylight hours (06h00 to 18h00) on Mondays to Fridays, Saturdays (07h00 to 14h00) and no activities to be conducted on Sundays and public holidays.</li> <li>• Maintaining a buffer of 500m between the operation area and dwellings.</li> </ul>	Throughout the construction
	<p><b>Visual Quality</b></p> <ul style="list-style-type: none"> <li>• Visual quality and sense of place to be adversely affected by construction activities.</li> <li>• Decreased visibility along roads due to poor dust management</li> </ul>	<ul style="list-style-type: none"> <li>• Minimise unvegetated areas as far as possible.</li> <li>• Conduct concurrent rehabilitation of all disturbed areas.</li> <li>• Conduct dust suppression measure to minimize the impacts of dust.</li> </ul>	Throughout the construction
	<p><b>Traffic</b></p> <ul style="list-style-type: none"> <li>• Traffic disruptions to adjacent landowners on the local road network</li> </ul>	<ul style="list-style-type: none"> <li>• Existing road infrastructure must be utilised and maintained within baseline levels.</li> <li>• existing access roads be used where at all possible. Existing access tracks must first be upgraded rather than constructing new tracks.</li> <li>• The contractor needs to properly mark all access roads. Markers shall show the direction of travel to which the road leads.</li> <li>• Roads not to be used shall be marked with a “NO ENTRY” sign.</li> <li>• All speed limits must be strictly adhered to at all times.</li> </ul>	Throughout the construction

ACTIVITIES	POTENTIAL IMPACTS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION
		<ul style="list-style-type: none"> <li>• No new roads must be constructed across any drainage line unless absolutely necessary.</li> <li>• If there are high volumes of construction traffic along site access roads, dust prevention measures must be implemented to reduce dust creation and travel into adjacent areas.</li> </ul>	
	<p><b>Socio-Economic Environment</b></p> <ul style="list-style-type: none"> <li>• Temporary job creation and supply of local material</li> <li>• sewage reticulation and WwTW services will promote residential and commercial development, which would translate into job creation and economic growth</li> <li>• Security concerns (increase in crime)</li> <li>• Permanent upgrade of the roads in the area (for the WwTW) can trigger further development/encroachment into the study area</li> </ul>	<ul style="list-style-type: none"> <li>• As far as possible, employ local residents during construction, where applicable. This will ensure a reduced dependency on temporary employment in addition to enhancing the living standards of local people.</li> <li>• Use manual labour where possible and practical.</li> <li>• Ensure recruitment measures are aimed particularly at construction workers classified as designated employees in terms of the Employment Equity Act (black people, as defined in the Act, women, and disabled people). A local employment procedure and recruitment process should be developed in consultation with local authorities and representatives. Blastrite should ensure that a transparent process of employment is followed to limit opportunities for conflict situations.</li> <li>• Ensure that the Labour Relations legislations as well as the necessary policies and procedures are taken into consideration to ensure the correct procurement procedures.</li> </ul>	Throughout the construction
	<p><b>Health and Safety</b></p> <ul style="list-style-type: none"> <li>• The dust generation with potentially particulate matter, which can be inhaled, causing respiratory diseases.</li> <li>• Occupational related injuries to employees</li> </ul>	<ul style="list-style-type: none"> <li>• All contractors and visitors must adhere strictly to the Health and Safety system and protocols on site.</li> <li>• No-go areas within the development area must be identified, demarcated and communicated to all contractors and staff to ensure unauthorised entry into these areas is prevented.</li> <li>• All construction staff, workers, and visitors must comply with the full PPE requirements at all times during the construction phase while on site.</li> <li>• All employees or sub-contractors entering site must be inducted to ensure the awareness of the developed health and safety plan;</li> <li>• Appoint a health and safety representatives during the constructions.</li> <li>• Conduct daily inspections and observations of on-site activities.</li> </ul>	Throughout the construction

ACTIVITIES	POTENTIAL IMPACTS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION
		<ul style="list-style-type: none"> <li>All incidents to be reported, recorded, investigated, and mitigated.</li> <li>Employees or sub-contractors must be informed as to what required PPE is applicable in working sections, and must always be equipped with appropriate PPE.</li> <li>Safety signs to be provided in areas considered as hazardous areas.</li> <li>Provided adequate first aid services on site.</li> <li>Promote ongoing health and safety awareness campaigns.</li> </ul>	
	<p><b>Waste generation</b></p> <ul style="list-style-type: none"> <li>Soil contamination</li> <li>Contamination of water resources</li> <li>Impacts on human health</li> </ul>	<ul style="list-style-type: none"> <li>Waste skips should be provided on site and must be removed from the site once their full capacity has been reached. The waste skips will typically contain domestic waste. No liquid waste will be placed in these skips.</li> <li>Promoting the reduction, re-use, or recycle of waste where prevention is not possible.</li> <li>Disposal of waste to local waste disposal sites. There must be a service agreement for disposal of waste from the municipality for disposal of domestic waste.</li> <li>Littering should be strictly prohibited and waste generated by the workers that reside on site must be properly stored awaiting collection and proper disposal.</li> <li>Implement waste classification and separation system.</li> <li>The Contractor should employ personnel on site responsible for preventing and controlling litter.</li> <li>Promote good housekeeping with daily clean-ups on site.</li> </ul>	Throughout the construction
	<p><b>Heritage</b></p> <ul style="list-style-type: none"> <li>Possible disturbance and destruction of heritage resources if any exists.</li> </ul>	<ul style="list-style-type: none"> <li>Conduct Identification of all possible sites of archaeological value prior to the commencement of authorised work.</li> <li>Identified sites must be clearly demarcated as no-go areas.</li> </ul>	Throughout the construction
<b>OPERATIONAL PHASE</b>			
<b>Operation of the WwTW</b>	<p><b>Surface Water</b></p> <ul style="list-style-type: none"> <li>Disruption to faunal movement across the watercourse</li> <li>Increased sedimentation from cleared and landscaped areas</li> </ul>	<ul style="list-style-type: none"> <li>Keep areas beneath the structure clear of debris. Culverts/piers must be inspected after high rainfall events.</li> <li>Minimise the physical disturbance to the watercourse.</li> </ul>	Throughout the operation.

ACTIVITIES	POTENTIAL IMPACTS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION
<b>Routine maintenance of the bridge and the Stormwater infrastructure</b>	<ul style="list-style-type: none"> <li>Changes to the flow regime</li> <li>Increased contamination due to spills and leaks of hydrocarbons</li> </ul>	<ul style="list-style-type: none"> <li>Develop a sound stormwater management plan that is engineered to promote rainfall infiltration, maintain diffuse subsurface flows on slopes, minimise the development of preferential flow paths.</li> <li>Consider the use of a coarse heavy metal-free gravel around infrastructure in cleared areas to promote infiltration and minimize surface runoff and erosion during high rainfall events.</li> <li>Ensure monitoring and maintenance of structures and address any erosion sources or weak points that contribute to sedimentation of the system.</li> <li>Discharge volumes to best replicate 'natural' flow regimes as much as is feasible.</li> </ul>	
	<b>Wetland</b> <ul style="list-style-type: none"> <li>Disturbance of wetland habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility.</li> <li>Do not store any construction materials or equipment within any of the identified wetlands or their buffers.</li> <li>Landscape and rehabilitate project area.</li> <li>Mixing of concrete must under no circumstances take place within any wetland.</li> <li>Release only clean water into the environment</li> </ul>	Throughout the operation
	<b>Flora</b> <ul style="list-style-type: none"> <li><b>Increase in spread of alien invasive plant species</b></li> </ul>	<ul style="list-style-type: none"> <li>All aggressive alien species should be removed as per the Alien Vegetation Eradication Plan</li> <li>Alien species need to be managed and controlled in terms of their respective categories</li> <li>To avoid the spread of exotic or invasive species or the unlawful collection of plants, no plant species, whether indigenous or exotic, shall be brought into or taken from site.</li> </ul>	Throughout the operation
	<b>Fauna</b> <ul style="list-style-type: none"> <li>Disturbance on faunal behavior and activities</li> </ul>	<ul style="list-style-type: none"> <li>Environmental awareness and training for workers about the animal life on site.</li> <li>Killing of animals on site will be strictly prohibited and animal found on site must be safely removed from the operation.</li> <li>Implementing noise monitoring measures and management.</li> <li>Avoid vegetation clearance during the breeding and migration season.</li> </ul>	Throughout the operation

ACTIVITIES	POTENTIAL IMPACTS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION
	<p><b>Socio-Economic Environment</b></p> <ul style="list-style-type: none"> <li>• Access to a fully functional WwTW at Lanseria with an increased capacity to provide wastewater services to residential areas that currently do not have access to basic sanitation services.</li> <li>• Increased employment opportunities</li> <li>• Local economic development</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct consultation with local communities through the appropriate channels to ensure the use of local skills and businesses where possible;</li> <li>• Ensure local employment and local services providers are appointed where possible from the local area; and</li> <li>• ensure that goods and services are procured from within the local area as far as possible.</li> </ul>	Throughout the operation
	<p><b>Health and Safety</b></p> <ul style="list-style-type: none"> <li>• The dust generation with potentially particulate matter, which can be inhaled, causing respiratory diseases.</li> <li>• Occupational related injuries.</li> </ul>	<ul style="list-style-type: none"> <li>• All contractors and visitors must adhere strictly to the Health and Safety system and protocols on site.</li> <li>• No-go areas within the development area must be identified, demarcated and communicated to all contractors and staff to ensure unauthorised entry into these areas is prevented.</li> <li>• All construction staff, workers, and visitors must comply with the full PPE requirements at all times during the construction phase while on site.</li> <li>• All employees or sub-contractors entering site must be inducted to ensure the awareness of the developed health and safety plan;</li> <li>• Appoint a health and safety representatives during the operations;</li> <li>• Conduct daily inspections and observations of on-site activities shall take place;</li> <li>• All incidents to be reported, recorded, investigated, and mitigated.</li> <li>• Employees or sub-contractors must be informed as to what required PPE is applicable in working sections, and must always be equipped with appropriate PPE;</li> <li>• Safety signs to be provided in areas considered as hazardous areas;</li> <li>• Provided adequate first aid services on site; and</li> <li>• Promote ongoing health and safety awareness campaigns.</li> </ul>	Throughout the operation
	<p><b>Waste generation</b></p> <ul style="list-style-type: none"> <li>• Soil contamination</li> <li>• Contamination of water resources</li> <li>• Impacts on human health and safety</li> </ul>	<ul style="list-style-type: none"> <li>• Waste skips should be provided on site and must be removed from the site once their full capacity has been reached. The waste skips will typically contain domestic waste. No liquid waste will be placed in these skips;</li> </ul>	Throughout the operation



ACTIVITIES	POTENTIAL IMPACTS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION
	<ul style="list-style-type: none"> <li>• Impacts on flora and fauna</li> <li>• Waste nuisance impacting on the sense of place</li> </ul>	<ul style="list-style-type: none"> <li>• Promoting the reduction, re-use, or recycle of waste where prevention is not possible;</li> <li>• Disposal of waste to local waste disposal sites. There must be a service agreement for disposal of waste from the municipality for disposal of domestic waste;</li> <li>• Littering should be strictly prohibited and waste generated by the workers that reside on site must be properly stored awaiting collection and proper disposal; and</li> <li>• Implement waste classification and separation system.</li> <li>• The Contractor should employ personnel on site responsible for preventing and controlling litter.</li> <li>• Promote good housekeeping with daily clean-ups on site.</li> </ul>	

---

## **5 ENVIRONMENTAL ROLES AND RESPONSIBILITIES**

### **5.1 Contractual obligation**

The granting of legal status to this EMPr and/or its contents is necessary to ensure their implementation and enforcement. This will be accomplished by including the EMPr and/or derivatives documents as an addendum to any contract documents for the operation of the water pipeline and by stating under specific contract terms for any tender that the EMPr and/or derivatives requirements apply and must be met. This will guarantee that the obligations are made apparent to contractors and that the environmental standards outlined in this EMPr and/or its derivatives have been considered and budgeted for in submitted tenders. The signed contract is ultimately the result of the accepted tender, making the incorporated EMPr enforceable.

### **5.2 Responsibilities and Duties**

The key-role-players for the development are the relevant Competent Authority, the Developer (JW), Project Manager, Contractor, Sub-contractor, and the Environmental Control Officer (ECO). The detailed roles and responsibilities of each of these parties are outlined below.

#### **5.2.1 Competent Authority**

The Competent Authority or Licencing Authority has the responsibility to ensure that the developer complies with the conditions of the relevant Environmental Authorisations (EAs), licences and permit for the facility, as well as the requirements of the broader environmental legislation, specifically the National Environmental Management Act (NEMA) and National Water Act (NWA) and associated regulations. Compliance would be confirmed via the following mechanisms:

- Receipt and review of the environmental reporting required in terms of the EA, licence, or permit; and
- *Ad hoc* and planned site inspection by the Competent Authority's Compliance and Enforcement unit.

The successful implementation of this EMPr requires cooperation between the developer, the appointed Project Manager or Plant Manager, and ECO.

#### **5.2.2 The Developer**

As the Developer, JW is ultimately responsible for ensuring that the EMPr and the terms of the Environmental Authorization (EA) are followed. JW is responsible for making sure that the EMPr and any conditions of the competent authority's (CA) approval are followed. The developer is required to hire an environmental control officer (ECO) to impartially supervise the EMPr's execution in accordance with the requirements of the environmental authorization (EA) and any applicable environmental laws. The Project Developer must also guarantee that

the ECO is integrated as a member of the project team while maintaining his independence, and he must grant the ECO the authority necessary for him to carry out his duties.

#### Responsibilities

- Be fully conversant with the conditions of the EA.
- Ensure that all stipulations within the EMPr are communicated and adhered to by the Contractor(s).
- Issuing of site instructions to the Contractor for corrective actions required.
- Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and
- Ensure that periodic environmental performance audits are undertaken on the project implementation.

### **5.2.3 Contractor, including appointed Sub-Contractors**

The Contractor appoints the ECO and is ultimately in charge of making sure that all work, activities, and actions related to contract delivery follow the EMPr and that Method Statements are carried out as outlined. External contractors are required to provide Method Statements outlining in detail how the impact management actions contained in the EMPr will be implemented during the development or expansion for overhead electricity transmission and distribution infrastructure activities, ensuring compliance with this EMPr while performing the specified tasks.

#### Responsibilities

- Project delivery and quality control for the development services as per appointment.
- Employ a suitably qualified person to monitor and report to the Project Developer's appointed person on the daily activities on-site during the construction period.
- Ensure that safe, environmentally acceptable working methods and practices are implemented, and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely.
- Attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones.
- Ensure that contractors' staff repair, at their own cost, any environmental damage because of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.

#### 5.2.4 Environmental Control Officer (ECO)

The ECO needs to have the necessary education and practical knowledge to carry out environmental management requirements. The ECO's main responsibility is to serve as an impartial quality control and monitoring agent for all environmental issues and their related environmental effects. In this regard, the ECO is required to perform routine site inspections, participate in routine site meetings, anticipate issues, suggest potential solutions, and be accessible to offer advice on ad hoc problems that crop up. Additionally, the ECO is expected to carry out compliance audits to confirm the monitoring reports.

The Project Manager must address any non-compliance concerns brought up by the ECO and work with the Contractor to find a solution in accordance with the terms of their contract. The Project Manager must give his or her approval for any environmental procedures, specifications, or requirements that have a financial impact (i.e., those that are judged to be a variant and not covered by the Performance Specification). As mandated by the EA, the ECO shall additionally report to the pertinent CA as necessary.

The responsibilities of the ECO will include the following:

- Be aware of the findings and conclusions of all EA related to the development.
- Be familiar with the recommendations and mitigation measures of this EMPr.
- Be conversant with relevant environmental legislation, policies, and procedures, and ensure compliance with them.
- Undertake regular and comprehensive site inspections / audits of the construction site according to the generic EMPr and applicable licenses to monitor compliance as required.
- Educate the construction team about the management measures contained in the EMPr and environmental licenses.
- Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective.
- Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements.
- In consultation with the Developer Site Supervisor order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses.
- Liaison between the DPM, Contractors, authorities, and other lead stakeholders on all environmental concerns.
- Compile a regular environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr.
- Validating the regular site inspection reports, which are to be prepared by the contractor Environmental Officer (cEO).
- Checking the cEO's record of environmental incidents (spills, impacts, legal transgressions etc) as well as corrective and preventive actions taken.

- 
- Checking of the public complaints register in which all complaints are recorded, as well as action taken.
  - Assisting in the resolution of conflicts.
  - Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor.
  - In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as non-compliance.
  - Maintenance, update, and review of the EMPr.
  - Communication of all modifications to the EMPr to the relevant stakeholders.

### **5.2.5 Safety, Health, Environment and Quality Officer (SHEQO)**

The primary role of the SHEQO, or suitably qualified and appointed representative of the Developer, is to ensure that any appointed Contractor/s and the Developer's staff complies with the environmental specifications in the EMPr. The SHEQO shall:

- Review and approve Method Statements produced by the Contractor in connection with the EMPr.
- Assume overall responsibility for the effective implementation and administration of the EMPr.
- Be familiar with the contents of the EMP, and his role and responsibilities as defined therein.
- Ensure that the EMPr is included in the Contractor's contract.
- Communicate to the Contractor, verbally and in writing, the advice of the ECO and the contents of the ECO reports.
- In conjunction with the Construction Supervisor, undertake regular inspections of the Contractor's site as well as the installation works to check for compliance with the EMPr in terms of the specifications outlined therein. Inspections shall take place at least once a week and copies of the monitoring checklist contained in the file.
- Review and approve drawings produced by the Contractor or professional team in connection with, for example, the construction site layout, etc.
- Issue site instructions giving effect to the ECO requirements where necessary.
- Keep a register of all complaints and incidents (spills, injuries, complaints, legal transgressions, etc) and other documentation related to the EMPr.
- Report to the ECO any problems (or complaints) which cannot first be resolved in co-operation with the Contractor(s).
- Implement recommendations of possible audits.
- Implement Temporary Work Stoppages as advised by the ECO, where serious environmental infringements and non-compliances have occurred.
- Facilitate proactive communication between all role-players in the interests of effective environmental management.
- Ensure that construction staff is trained in accordance with requirements of the EMP.

## 6 ENVIRONMENTAL MANAGEMENT MEASURES

**Table 8: Impact management measures as per the approved EMPr (Nemai Consulting, 2017)**

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
<b>PLANNING AND PRE-CONSTRUCTION</b>					
<b>Environmental Investigations</b>	<ul style="list-style-type: none"> <li>Implement findings of Search, Rescue and Relocation Plan.</li> <li>Obtain approval prior to relocation of sensitive fauna and flora species.</li> </ul>	<ul style="list-style-type: none"> <li>Suitable specialist(s) to identify sensitive environmental features (including watercourses, fauna, and flora) where special care needs to be taken and implement suitable mitigation measures to safeguard these features.</li> <li>A Botanist Specialist should survey any species of conservation importance that could occur.</li> <li>Threatened plant species must be searched and rescued and then following construction activities, they must be re-established at the site.</li> <li>Identify any possible Red Data fauna on sites and acquire the necessary permits to relocate fauna if avoidance is not possible.</li> <li>Training of construction workers to recognise threatened animal species to reduce the probability of fauna being harmed unnecessarily.</li> </ul>	Proponent Specialists	Approval by relevant environmental authorities	Weekly
<b>Construction Site Planning and Layout</b>	<ul style="list-style-type: none"> <li>No impacts to sensitive environmental features because of construction site planning and layout.</li> </ul>	<ul style="list-style-type: none"> <li>Conduct a pre-construction survey of the area to be affected by the development.</li> <li>Before construction commences, all sensitive habitats or features must be clearly demarcated with fencing or orange mesh netting.</li> <li>Barricading measures to be utilised should not restrict the movement of the fauna in the area.</li> <li>The Contractor to develop method statements and a Site Layout Plan to be approved by the Applicant prior to construction taking place.</li> <li>Define and communicate roles and responsibilities for the implementation of the EMPr.</li> <li>Determining and documenting the road conditions for all identified haul roads.</li> <li>Develop and implement an environmental awareness plan.</li> </ul>	Proponent ECO Contractor	Approved site plan  Barricading and signage.  Records of awareness creation.  Plant rescue and protection.	Monthly

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<ul style="list-style-type: none"> <li>The appointment of an ECO.</li> <li>The site layout plan must be approval by the Resident Engineer,</li> <li>Wetlands and rivers should be demarcated.</li> </ul>			
<b>Implementation of the Environmental Awareness</b>	<ul style="list-style-type: none"> <li>All construction workers and employees to have completed appropriate environmental training.</li> <li>A record of environmental training undertaken to be kept on site.</li> </ul>	<ul style="list-style-type: none"> <li>The Contractor must conduct project specific environmental awareness and training course on the conditions of the EMPr provided by the ECO for the employees and of the sub-contractor before the commencement of construction and as and when new staff or sub-contractors are brought on site.</li> </ul>	Contractor ECO	Records of environmental training and awareness.	When necessary
<b>Construction Phase</b>					
<b>Site Clearance and establishment</b>	<ul style="list-style-type: none"> <li>No damage is caused to sensitive environmental features outside of the demarcated construction areas, including marked and protected trees, structures, and infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>Restrict site clearing activities to construction area/ domain.</li> <li>Demolition of existing structures to be undertaken in a phased approach.</li> <li>Clearing of vegetation to be conducted in a phased manner with due consideration of the search and rescue activities of the threatened species.</li> <li>Method Statement to be developed, which will provide the details of how site clearing will be executed.</li> <li>Maintain barricading and avoid around sensitive environmental features.</li> <li>During site preparation, topsoil and subsoil are to be stripped separately from each other and must be stored separately from spoil material for use in the rehabilitation phase.</li> <li>Erosion control measures should be implemented on the topsoil and subsoil to prevent soil erosion from wind and rain.</li> </ul>	Contractor ECO	No clearing outside of construction servitude.  Intact barricading.  Contractor's method statement.	Daily, Weekly, Monthly
<b>Site Establishment</b>	<ul style="list-style-type: none"> <li>No damage to the environment outside construction area during site establishment.</li> <li>Protect environmental sensitive areas.</li> </ul>	<ul style="list-style-type: none"> <li>Locate construction camp outside sensitive environmental features.</li> <li>Ablution facilities or eating areas should ideally not be located directly adjacent to the site boundary where houses/offices as situated in a proximity where odour or noise may become a nuisance.</li> </ul>	Contractor ECO	Contractor's method statement.  Public complaints register.	Daily, Weekly. Monthly

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
	<ul style="list-style-type: none"> <li>No justifiable complaints regarding general disturbance and nuisance received from the affected parties and community members.</li> </ul>	<ul style="list-style-type: none"> <li>Facilities and structures shall be located with due cognisance of the terrain and geographical features of the project site.</li> <li>Positioning of the storage and laydown areas should aim to minimise visual impacts.</li> <li>Control the movement of all vehicles and plant (including suppliers), such that they remain on designated routes and comply with relevant agreements.</li> <li>Maintain barricading around sensitive environmental features until the cessation of construction works.</li> <li>Maintain a buffer zone around the electrical powerlines present on site to prevent damage to the powerlines and to prevent people on site from possible harm.</li> <li>Ensure noise levels are within their lawfully acceptable limits as per SANS 10103.</li> <li>Minimise disturbance from lighting of the construction camp and site.</li> <li>Limit the extent of the site to avoid any additional clearance of vegetation.</li> <li>Keep the camp and always working areas clean and tidy.</li> <li>The Contractor shall supply firefighting equipment in proportion to the fire risk presented by the type of construction and other on-site activities and materials used on site.</li> <li>The contractor must provide designated safe smoking areas.</li> <li>Every precaution should be taken, to prevent pollution of air, soil, ground, and surface water because of construction or associated activities at the construction site.</li> <li>Fuel, lubricants, transmission, and hydraulic fluids shall only be stored in the designated areas that comply with the OHS Act and Relevant Regulations.</li> <li>A copy of the EA must be kept at the property where the activity will be undertaken and to be produced to any authorised official of the Department who requests to see it and must be made available for inspection by any employee</li> </ul>		Site Plan.	



MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		or agent of the holder of the authorisation who works or undertakes work at the property.			
<b>Construction of the Camp and Eating Areas</b>	<ul style="list-style-type: none"> <li>Ensure environmental protection against pollution associated with the construction camp.</li> <li>Minimise visual impact associated with the construction camp.</li> </ul>	<ul style="list-style-type: none"> <li>Construction camp to be screened to minimise the visual impact, where practicable.</li> <li>The Contractor shall provide designated covered eating areas for all staff. Eating shall be designated and demarcated and be cleaned daily and shall provide adequate temporary shade and employees shall not be allowed to sit in the surround road reserves during lunchtime to eat.</li> <li>Open fires are forbidden at the site camp.</li> <li>Refuse bins must be placed at all eating areas.</li> <li>All waste storage containers to be labelled for the specific waste type to be contained.</li> <li>The feeding, or leaving of food for animals, is strictly prohibited.</li> <li>Sufficient vermin / weatherproof bins shall be present in this area for all waste material.</li> <li>Grey water runoff to be contained and connected to the municipal sewer lines (after relevant authorisation has been granted by Johannesburg Water).</li> <li>Provide safe potable water for domestic use.</li> <li>Prohibit the felling of trees for firewood.</li> <li>Provide medical and first aid facilities at the camp area.</li> <li>The Contractor should employ personnel on site responsible for preventing and controlling of litter to promote good housekeeping with daily clean-ups on site.</li> <li>Refresher training should be conducted to construction workers with regards to littering, ad hoc veld fires, and dumping.</li> <li>No accommodation of workforce is allowed on site.</li> </ul>	Contractor ECO	Contractor's method statement.  Public complaints register.  Site Plan.	Daily, Weekly, Monthly
<b>Management of Ablution Facilities</b>	<ul style="list-style-type: none"> <li>Prevention of environmental contamination associated with ablution facilities.</li> </ul>	<ul style="list-style-type: none"> <li>No toilet facility should be placed at sensitive environmental areas and be placed at least 100m away from the wetland, river, and riparian zone.</li> </ul>	Contractor ECO	Public complaints register.	Daily, Weekly, Monthly

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
	<ul style="list-style-type: none"> <li>Minimise visual impact associated with ablution facilities.</li> </ul>	<ul style="list-style-type: none"> <li>Provide sufficient ablution facilities at the construction camp, which conform to all relevant health and safety standards and codes.</li> <li>No pit latrines, trench drain systems or soak away systems shall be allowed. Ablution facilities to be connected into the municipal sewer system, after the relevant approval has been obtained from Johannesburg Water.</li> <li>Enough toilets shall be provided to accommodate the number of personnel working in any given area and may not be further than 100 m from any working area.</li> <li>Ensure that all staff to always use the provided toilets.</li> <li>All temporary/ portable / mobile toilets shall be secured to the ground to prevent them from toppling over due to wind or any other cause.</li> <li>Separate changing facility must be provided for each sex.</li> <li>Where chemical ablutions are used, they shall be cleaned/emptied on a regular basis before they are full and contaminate the environment.</li> <li>Informal ablutions within all riparian areas are prohibited.</li> <li>The entrances to the toilets will be adequately screened from public view.</li> <li>Sanitary hygiene bins will be provided for female staff.</li> <li>The Contractor will ensure that no spillage occurs when the toilets are cleaned or emptied and that a licensed service provider removes the contents from site.</li> <li>Where chemical toilets are used, they should be positioned in such a location that they are easily accessible for the service trucks.</li> </ul>		<p>Contractor's method statement.</p> <p>Waste disposal certificates.</p>	
<b>Management of Workshop and Equipment</b>	<ul style="list-style-type: none"> <li>No environmental contamination associated with workshops and equipment use.</li> </ul>	<ul style="list-style-type: none"> <li>Vehicles must be maintained and serviced according to the manufacturers' standards.</li> <li>Daily checklists must be completed by drivers and operators before the vehicles and equipment are used.</li> <li>Vehicles and equipment must be turned off when not in use.</li> <li>Maintenance of equipment and vehicles will be performed in in bare soils and must be conducted in designated impermeable surfaced workshops. If a workshop area is not</li> </ul>	Contractor ECO	<p>Recorded evidence of spillages.</p> <p>Vehicle and equipment checklists</p>	Daily, Weekly, Monthly

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<p>provided, maintenance should be conducted at an offsite workshop.</p> <ul style="list-style-type: none"> <li>Leaking equipment to be repaired immediately or removed from the site.</li> <li>All vehicles and equipment will be kept in good working order and serviced regularly.</li> <li>Suitable storage and disposal of hydraulic fluids and other vehicle oils.</li> <li>Emergency on-site maintenance should be done over appropriate drip trays and all oil or fuel must be disposed of according to waste regulations.</li> <li>Drip-trays must be placed under vehicles and equipment when not in use.</li> <li>No washing of plant may occur near a watercourse.</li> <li>Plant to be washed in dedicated areas where there are relevant provisions made such as impermeable bunded surface draining into an oil separator.</li> </ul>		<p>Training register.</p> <p>Contractor's method statement.</p>	
<b>Fencing and Barricades</b>	<ul style="list-style-type: none"> <li>To ensure and assist with controlled fencing and barricades in the working environment.</li> <li>Prevent animals from falling into and being trapped in open trenches.</li> <li>Limit entry to sensitive environments and private property.</li> </ul>	<ul style="list-style-type: none"> <li>The Contractor shall erect fencing when and where required and re-erect and maintain fencing and screening material.</li> <li>Temporary fencing shall remain in position either until it is replaced by permanent fencing or until completion of the works.</li> <li>Any private fences damaged by the Contractor shall be repaired as soon as possible at his/her cost and shall be of the standard of the original fence.</li> <li>Barricades should be placed around identified sensitive and no-go area.</li> <li>Barricades should be regularly checked and maintained and ensure that they are always securely in place.</li> </ul>	<p>Contractor</p> <p>ECO</p>	<p>Public complaints register.</p> <p>Agreements with landowners.</p>	<p>Monthly</p>
<b>Management of Labour Force</b>	<ul style="list-style-type: none"> <li>Ensure suitable management of labour force to prevent security-related issues.</li> <li>Optimise the use of local labour.</li> </ul>	<ul style="list-style-type: none"> <li>Prevent trespassing of construction workers onto private property. Construction workers to be prohibited from gathering at undesignated areas during breaks.</li> <li>Creating nuisances and disturbances in or near communities shall be prohibited.</li> </ul>	<p>Proponent</p> <p>Contractor</p> <p>ECO</p>	<p>Public complaints register.</p> <p>Labour-related targets.</p>	<p>Monthly</p>

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
	<ul style="list-style-type: none"> <li>Provide a work environment that is conducive to effective labour relations.</li> </ul>	<ul style="list-style-type: none"> <li>Machine / vehicle operators shall receive clear instructions to remain within demarcated access routes and construction areas.</li> <li>Create opportunities for the employment of women and the youth in line with national government priorities.</li> <li>Use local labour as far as possible.</li> <li>Develop a community labour agreement with targets for employment and for progression.</li> <li>Training of labour (portable skills transfer) to benefit individuals beyond completion of the project.</li> <li>No accommodation of labour force shall be allowed on site.</li> <li>Designated and demarcated smoking areas should be provided, with special bins for discarding of cigarette butts.</li> <li>Suitable and sufficient screened and covered change rooms with lockable storage facilities to be provided for the number of employees to be appointed.</li> <li>Local SMMEs should be given an opportunity to participate in the construction of the WwTW through procurement of services, material, or equipment.</li> <li>The principles of Expanded Public Works Programme can be used during construction.</li> <li>Employment audits should be conducted and there should be full transparency of the process.</li> <li>Spaza shops may open next to the site because of construction. These should be controlled by the contractor to limit their footprint and to ensure that Municipality - Street Trading By-Laws are complied with.</li> <li>Liaise with Ward Councillor on local employment procedures.</li> </ul>			
<b>Management of Health and Safety</b>	<ul style="list-style-type: none"> <li>Approved Health and Safety Plan.</li> <li>No reportable health and safety incidents.</li> </ul>	<ul style="list-style-type: none"> <li>The Contractor must submit a Health and Safety Plan, prepared in accordance with the Health and Safety Specification, for the Health and Safety Agent's approval prior to the commencement of work.</li> </ul>	Contractor SHE Officer	Occupational Health and Safety system	Daily, Weekly, Monthly

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
	<ul style="list-style-type: none"> <li>Compliance with the Occupational Health and Safety Act</li> </ul>	<ul style="list-style-type: none"> <li>The Contractor shall ensure compliance to the requirements of the Health and Safety.</li> <li>Specification and approved Health and Safety Plan throughout construction.</li> </ul>			
<b>Management of Emergency Procedures</b>	<ul style="list-style-type: none"> <li>No site fires to be caused by construction activities and workers.</li> <li>Approved emergency response procedures, where relevant.</li> <li>Emergency Preparedness.</li> </ul>	<p><b>Fire</b></p> <ul style="list-style-type: none"> <li>Comply with the National Veld and Forest Fire Act (No. 101 of 1998).</li> <li>Proper emergency response procedure to be in place for dealing with fires.</li> <li>Burning of waste is not permitted.</li> <li>Firefighting equipment to be strategically positioned throughout the site.</li> <li>All fire control mechanisms (firefighting equipment) shall be serviced annually and inspected monthly.</li> <li>All staff on site will be made aware of general fire prevention and control methods, and the name of the responsible person to alert to the presence of a fire.</li> <li>No fires are allowed on site, unless in dedicated areas approved by the Project Manager.</li> <li>Dedicated smoking areas to be provided and cigarette butts may not be disposed of onsite.</li> </ul> <p><b>Accidental Leaks and Spillages</b></p> <ul style="list-style-type: none"> <li>Proper emergency response procedure to be in place and communicated to designated persons for dealing with spillages and leaks.</li> <li>Ensure that the necessary materials and equipment for dealing with spills and leaks are available on site, such as the spill kits.</li> <li>Remediation of the spill areas will be undertaken to the satisfaction of the Project Manager and ECO.</li> <li>All spillages to be reported and cleaned immediately.</li> <li>In the event of a hydrocarbon spill, the source of the spillage will be isolated and contained.</li> </ul>	Contractor SHE Officer ECO	<p>Approved Emergency Response Plan.</p> <p>Training and awareness creation records.</p> <p>Signage displayed.</p> <p>Contractor's method statement.</p>	Daily, Weekly, Monthly

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<ul style="list-style-type: none"> <li>The area will be cordoned off and secured. The Contractor will ensure that there is always a supply of an appropriate absorbent material readily available to absorb, breakdown and where possible, encapsulate a minor hydrocarbon spillage.</li> <li>All staff on site will be made aware of actions to be taken in case of a spillage.</li> <li>Provide contact details of person to be notified in a case of spillages - signage to be displayed at strategic points within the construction domain (e.g., workshop, fuel storage area, hazardous material containers).</li> <li>Construction vehicles and mobile plant to be maintained in a safe operating condition to prevent any possible hydrocarbon leakages resulting in spillages.</li> <li>Drip trays to be positioned underneath the hydrocarbon substance containment components of all stagnant construction vehicles and mobile plant.</li> </ul>			
<b>Management of Access and Traffic</b>	<ul style="list-style-type: none"> <li>Ensure that all construction vehicles use only dedicated access routes to construction sites.</li> <li>Ensure proper access control.</li> <li>Prevent unlawful access to construction domain.</li> <li>Ensure the safety of all road users by implementing proper signage and traffic control measures.</li> <li>Limit construction-related nuisance to service nodes.</li> </ul>	<ul style="list-style-type: none"> <li>The Contractor must ensure compliance with all the driving, vehicle condition, licensing, and driver ability requirements.</li> <li>Permission required from the Applicant for the movement of any vehicles and/or personnel outside of designated working areas.</li> <li>No new access roads shall be developed by the Contractor other than those determined or approved in the site layout by the Engineer.</li> <li>Contractor to ensure safe access for adjacent landowners/occupiers on all adjacent access roads to the works area.</li> <li>The Contractor shall ensure safe movement of pedestrians and vehicles can without risks to health, including sufficient and suitable traffic routes and safe walkways with relevant signage.</li> <li>Access roads to be maintained in a suitable condition.</li> <li>Suitable erosion control measures to be implemented for access roads during the construction phase.</li> </ul>	SHE Officer Contractor ECO	Signage displayed and maintained.  Public complaints register.  Contractor's method statement.	Daily, Weekly, Monthly

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<ul style="list-style-type: none"> <li>Ensure that traffic safety measures such as traffic warning signs and flagmen to be implemented.</li> <li>All access roads must be clearly demarcated.</li> <li>All reasonable precautions must be taken during construction to avoid severely interrupting the traffic flow on existing roads, especially during peak periods.</li> <li>Before any work can start, the Local Traffic Department (Johannesburg Roads Agency (JRA) must be consulted about measures to be taken regarding pedestrian and vehicular traffic control and where required relevant wayleaves must be obtained.</li> </ul>			
<b>Waste Management</b>	<ul style="list-style-type: none"> <li>Minimise environmental impacts associated with waste.</li> <li>Apply waste management principles of prevent, minimise, recycle or re-use, with disposal as a last option.</li> </ul>	<ul style="list-style-type: none"> <li>Waste management activities must comply with the National Environmental Management: Waste Act (Act No. 59 of 2008).</li> </ul> <p><b>General waste</b></p> <ul style="list-style-type: none"> <li>Provide sufficient waste containments (bins and skips) and must be kept closed to reduce odour build-up and emptied regularly to avoid overfilling and other associated nuisances.</li> <li>Implement waste classification and separation (e.g. containers for glass, paper, metals, plastics, organic waste, and hazardous wastes).</li> <li>Ensure daily site clean-ups to prevent the build-up of litter.</li> <li>The Contractor will ensure that no burying, dumping, or burning of waste materials, vegetation, litter, or refuse occurs.</li> <li>All waste will be disposed of at suitable licensed disposal sites, based on the waste type (general versus hazardous).</li> </ul> <p><b>Scrap and other Solid Waste</b></p> <ul style="list-style-type: none"> <li>Littering on site and the surrounding areas is prohibited.</li> <li>Clearly marked litterbins must be provided on site.</li> <li>All bins must be cleaned of litter regularly.</li> <li>All waste removed from site must be disposed at a municipal/permitted waste disposal site.</li> </ul>	Contractor  ECO	Public complaints register.  Waste register.  Recycling targets.  Disposal certificates.  Contractor's method statement	Daily, Weekly, Monthly

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<ul style="list-style-type: none"> <li>• Excess concrete, building rubble or other material must be disposed of</li> <li>• in areas designated specifically for this purpose and not indiscriminately over the construction site</li> <li>• The entire site area and all construction sites must be cleaned of all pieces of wire, metal, wood, or other material foreign to the natural environment.</li> <li>• The area removed of solid waste must be rehabilitated immediately.</li> <li>• Waste must be reused and or recycled wherever possible.</li> </ul> <p><b>Hazardous and Liquid Waste</b></p> <ul style="list-style-type: none"> <li>• The Principal Contractor must provide adequate and approved facilities for the storage and recycling of used oil and contaminated hydrocarbons. Such facilities must be designed and sited away from sensitive environment areas.</li> <li>• All chemical spills must be contained and cleaned up by the supplier or professional pollution control personnel. Run-off from wash bays must be intercepted.</li> <li>• No hazardous materials must be disposed of in the veld or anyplace other than a registered landfill for hazardous material. Hazardous waste must be stored in containers with tight lids that must be sealed and must be disposed at an appropriately permitted hazardous waste disposal site. Such containers must not be used for purposes other than those originally designed for.</li> <li>• The Principal Contractor must maintain a hazardous material register</li> </ul>			
<p><b>Storage and Handling of Hazardous Material</b></p>	<ul style="list-style-type: none"> <li>• Ensure the protection of the natural environment and the safety of personnel on site, by the correct management and handling of hazardous substances.</li> </ul>	<ul style="list-style-type: none"> <li>• Hazardous substances must be stored and handled in accordance with the appropriate legislation and standards,</li> <li>• A copy of the Material Safety Data Sheet (MSDS) for each hazardous chemical substance stored or used on site must be available on site.</li> </ul>	<p>Contractor ECO</p>	<p>Evidence of spillages.  MSDS register. Training register.</p>	<p>Daily, Weekly, Monthly</p>



MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<ul style="list-style-type: none"> <li>• Storage and use of hazardous materials will be strictly controlled to prevent environmental contamination and must adhere to the requirements stipulated on the MSDS.</li> <li>• Appropriate signages must be placed in hazardous area.</li> <li>• Where flammable liquids are being used, applied, or stored the workplace must be effectively ventilated.</li> <li>• No person may smoke in any place in which flammable liquid is used or stored.</li> <li>• Install an adequate number of fire-fighting equipment in suitable locations around the flammable liquids store.</li> <li>• Where flammable liquids are decanted, the metal containers must be bonded or earthed.</li> <li>• Staff that will be handling hazardous materials must be trained to do so.</li> <li>• Any hazardous materials (apart from fuel) must be stored within a lockable store on an impermeable floor. Suitable ventilation to be provided.</li> <li>• All storage tanks containing hazardous materials must be placed in bunded containment facilities provided with impermeable surfaces. The bunded area must be able to contain at least 110% of the total volume of the stored hazardous material.</li> <li>• Fully stocked spill kits must be available for the clean-up of hazardous material spillages.</li> <li>• Provide secondary containment where a risk of spillage exists.</li> <li>• Drip trays to be placed under parked construction vehicles, equipment, and other receptacles of hazardous material to prevent spillages.</li> <li>• In the event of spillages of hazardous substances, the appropriate clean up and disposal measures must be implemented.</li> <li>• Spill reporting procedures to be displayed at all locations where hazardous substances are being stored.</li> </ul>		<p>Disposal certificates.</p> <p>Contractor's method statement.</p>	

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<ul style="list-style-type: none"> <li>Hazardous materials will be disposed of at registered sites or handed to registered hazardous waste disposal facilities for disposal/ recycling.</li> <li>Hazardous chemical substances containers be clearly marked with the contents and main hazardous category e.g. "Flammable" or "Corrosive".</li> </ul>			
<p><b>Management of Pollution Generation Potential</b></p>	<ul style="list-style-type: none"> <li>Ensure that all possible causes of pollution are mitigated as far as possible to minimise impacts to the surrounding environment</li> </ul>	<p><b>General</b></p> <ul style="list-style-type: none"> <li>Accidental pollution incidents shall be reported to the ECO immediately. The pollution incident to be cleaned-up by the Contractor or a nominated clean-up organization immediately.</li> </ul> <p><b>Water</b></p> <ul style="list-style-type: none"> <li>All fuel, chemical, oil, etc. spills must be confined to areas where the drainage of water can be controlled. Use appropriate structures and methods to confine spillages such as the construction of berms and pans.</li> <li>Oil absorbent fibres must be used to contain oil spills.</li> <li>Water shall not be pumped directly from excavations into municipal stormwater drains.</li> <li>Such water must first be pumped into a filtration structure e.g., silt sock, to filter through prior to release.</li> </ul> <p><b>Air</b></p> <ul style="list-style-type: none"> <li>Speed limits must be implemented in all areas, including public roads and private property to limit the levels of dust pollution.</li> <li>Dust must be suppressed on access roads and construction sites during dry periods by the regular application of water or biodegradable soil stabilisation agent. Water used for this purpose must be used in quantities that must not result in the generation of run-off.</li> <li>Waste must be disposed of, as soon as possible at a municipal transfer station, skip or on a permitted landfill site.</li> <li>Waste must not be allowed to stand on site to decay, resulting in malodours.</li> </ul>	<p>Contractor ECO</p>	<p>Public complaints register.</p> <p>Evidence of pollution.</p> <p>Contractor's method statement.</p> <p>Disposal certificates.</p> <p>Proof of notification of adjacent landowners.</p>	<p>Daily, Weekly, Monthly</p>

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<p><b>Soil</b></p> <ul style="list-style-type: none"> <li>• Topsoil should be temporarily stockpiled, separately from subsoil and bedrock material, when areas are cleared.</li> <li>• Stockpiled topsoil should not be compacted and should be replaced as the final soil layer.</li> <li>• No vehicles are allowed access onto the stockpiles after they have been placed.</li> <li>• Topsoil stockpiles must not be contaminated with oil, diesel, petrol, waste, or any other foreign matter, which may inhibit the later growth of vegetation and microorganisms in the soil.</li> <li>• All cut and fill surfaces need to be stabilized with appropriate material or measures when major civil works are complete.</li> <li>• All equipment must be inspected regularly for oil or fuel leaks before it is operated.</li> <li>• Leakages must be repaired on mobile equipment or containment trays placed underneath immobile equipment until such leakage has been repaired.</li> <li>• Soil contaminated with oil must be appropriately treated and disposed of at a permitted landfill site or the soil can be regenerated using bio-remediation methods.</li> <li>• Channelling water into existing surface drainage system must reduce runoff.</li> </ul> <p><b>Noise</b></p> <ul style="list-style-type: none"> <li>• Construction activities generating output levels of 85 dB or more will be confined to the hours during normal working hours unless adjacent landowners have been given adequate notice.</li> <li>• Noise control measures must be implemented. All noise levels must be controlled at the source. All employees must be given the necessary hearing protection equipment. Interested and affected parties must be informed of the excessive noise factors.</li> <li>• The Contractor must inform all adjacent landowners of any after-hour construction activities and any other activity that</li> </ul>			

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<p>could cause a nuisance. Normal working hours must be clearly indicated to adjacent landowners.</p> <ul style="list-style-type: none"> <li>• Maintenance of equipment and operational procedures: Systematic maintenance of all forms of equipment, training of personnel to adhere to operational procedures that reduce the frequency of occurrence and magnitude of individual noisy events.</li> <li>• Conduct parameter noise monitoring</li> </ul> <p><b>Dust</b></p> <ul style="list-style-type: none"> <li>• Appropriate dust suppression measures or temporary stabilising mechanisms to be used when dust generation is unavoidable (e.g., dampening with water, chemical soil binders, straw, brush packs, chipping), particularly during prolonged periods of dry weather. Dust suppression to be undertaken for all bare areas, including construction area, access roads, borrow pits, site yard, etc.</li> <li>• Fine materials must be covered during transportation.</li> <li>• Speed limits to be strictly adhered to.</li> <li>• The Contractor will take preventative measures to minimise complaints regarding dust nuisances (e.g. screening, dust control, timing, and pre-notification of affected parties).</li> <li>• Conduct dust monitoring.</li> </ul> <p><b>Lights</b></p> <ul style="list-style-type: none"> <li>• Prior to construction the position and type of lighting will be planned to ensure unnecessary light pollution will be eliminated.</li> <li>• All lighting installed on site must not lead to unacceptable light pollution to the surrounding community and natural environment (e.g. use of down-lights).</li> <li>• Where bulk hauling of spoil material is required to or from the site the Contractor must ensure loading bays of trucks used are covered with tarpaulins to prevent dust along driving routes to and from site.</li> </ul>			

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<p><b>Erosion</b></p> <ul style="list-style-type: none"> <li>• Protect areas of the construction site that are susceptible to erosion through suitable measures (e.g., watering, planting, retaining structures, commercial anti-erosion compounds).</li> <li>• Care must be taken to prevent carrying of sediment onto roadways and watercourses.</li> <li>• Any erosion channels caused by construction activities to be suitably stabilised and rehabilitated.</li> <li>• All efforts to prohibit ponding on surface and ensure stormwater runoff is channelled from the site must be made. The method used will be appropriate to the expected stormwater flows and the topography and geology of the site.</li> </ul> <p><b>Cement and Concrete Batching -</b></p> <ul style="list-style-type: none"> <li>• Cement mixing to take place on an impervious surface.</li> <li>• Batching operations to take place in a designated area, which will be always kept clean.</li> <li>• Location of batching plant to be approved by the Project Manager, with due consideration of the relevant management measures.</li> <li>• Ensure separation of clean and dirty water from batching plant.</li> <li>• Wastewater from batching operations to be suitably disposed of.</li> <li>• Waste concrete and cement sludge to be removed on a regular basis (to prevent overflowing) and to be disposed of at a suitable facility.</li> <li>• Unused cement bags will be stored in an area not exposed to the weather and packed neatly to prevent hardening or leakage of cement.</li> <li>• Used cement bags will be stored to prevent windblown dust and potential water contamination. Used bags will be disposed of adequately at a licenced waste disposal facility.</li> <li>• Limit concrete batching to single sites where possible.</li> <li>• Concrete transportation must not result in spillage.</li> </ul>			

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<ul style="list-style-type: none"> <li>• Cleaning of equipment and flushing of mixers will not result in pollution, with all contaminated wash water entering the wastewater collection system.</li> <li>• Suitable screening and containment will be in place to prevent windblown contamination from cement storage, mixing, loading and batching operations.</li> <li>• All contaminated water and fines from exposed aggregate finishes will be collected and stored in sumps and will be adequately disposed of.</li> <li>• All visible remains of excess concrete will be physically removed on completion of the plastering or concrete pouring and disposed of in an acceptable manner.</li> <li>• Any spilled concrete to be cleaned up immediately.</li> </ul> <p><b>Pollution control</b></p> <ul style="list-style-type: none"> <li>• Remove from site all pollution containment structures.</li> <li>• Remove from site all temporary sanitary infrastructure and wastewater disposal systems.</li> <li>• Take care to avoid leaks, overflows and spills and dispose of any waste in the approved manner.</li> </ul> <p><b>Sewage</b></p> <ul style="list-style-type: none"> <li>• The Contractor shall provide sanitation facilities at all camps, offices, workshops and construction sites for staff and visitors.</li> </ul> <p><b>Wastewater</b></p> <ul style="list-style-type: none"> <li>• All runoff from fuel depots, workshops, truck washing areas and wash water from concrete vehicles and other equipment shall be collected and directed through oil traps before discharging into a watercourse.</li> <li>• The Contractor shall provide suitable retention and filtration structures, which shall be properly maintained, for the collection of wastewaters.</li> </ul>			

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
<b>Management of Topsoil</b>	<ul style="list-style-type: none"> <li>Adequate volume of recovered topsoil from disturbed areas to be stored for future use.</li> <li>No visual evidence of erosion from topsoil stockpiles.</li> <li>No visual evidence of erosion from areas where topsoil has been reinstated.</li> </ul>	<ul style="list-style-type: none"> <li>Topsoil from the construction camp should be stored for post-construction rehabilitation and landscaping work and should not be disturbed more than is necessary.</li> <li>The Contractor shall calculate the quantity of topsoil required for rehabilitation and landscaping and ensure sufficient topsoil is stored and preserved for such purpose. The depth of topsoil to be replaced shall be approved by the landscape architect.</li> <li>Determine the average depth of the topsoil prior to excavations.</li> <li>Identify suitable areas to store topsoil.</li> <li>Stockpiled topsoil should not be compacted and should be replaced as the final soil layer.</li> <li>No vehicles are allowed access onto the stockpiles after they have been placed.</li> <li>Remove topsoil from areas to be affected by construction activities.</li> <li>Topsoil to be adequately protected from contamination from construction activities and by aggregate, cement, concrete, fuels, litter, oils, domestic and industrial waste.</li> <li>Protect stored topsoil from compaction.</li> <li>Wind and water erosion-control measures to be implemented to prevent loss of topsoil.</li> <li>Do not store topsoil in drainage lines or areas exposed to strong winds or heavy rain.</li> <li>Following the construction phase, the topsoil should be used in rehabilitation and landscaping of affected areas and landscaping around the development.</li> </ul>	Contractor	Contractor's method statement.	Daily, Weekly, Monthly
<b>Management of Excavation</b>	<ul style="list-style-type: none"> <li>No damage to sensitive environmental features outside construction area during excavations.</li> </ul>	<ul style="list-style-type: none"> <li>Construction activities to remain within the designated construction areas.</li> <li>Subsoil and overburden should be stockpiled separately to be returned for backfilling in the correct soil horizon order.</li> <li>Suitable barricading to be erected around open excavations/trenches, as per the Construction Regulations (2014). Provide signage as a warning of open excavations.</li> <li>Divert runoff away from excavations, where necessary.</li> </ul>	Contractor ECO	Barricading of excavations.  Excavation register.	Daily, Weekly, Monthly

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<ul style="list-style-type: none"> <li>• Trench lengths will be kept as short as practically possible.</li> <li>• Trench walls are to be stabilised using battering, shoring, and bracing or similar techniques depending on the stability of the trench sides (where relevant).</li> <li>• Inspect open trenches at least daily basis to ensure that animals have not become trapped.</li> <li>• Such animals will be safely removed and released, where possible. Special equipment for handling of venomous snakes should be available on site to ensure safe removal.</li> <li>• Filing of trenches to make provision for subsidence</li> </ul>		Contractor's method statement.	
<b>Management of Visual Aspects</b>	<ul style="list-style-type: none"> <li>• Minimise impacts to the aesthetics / visual quality.</li> <li>• Ensure that the visual appearance of the construction site is not an eyesore the adjacent areas.</li> </ul>	<p><b>General housekeeping</b></p> <ul style="list-style-type: none"> <li>• All construction and operational areas must be always kept in a neat and orderly condition.</li> <li>• An efficient removal system of waste and rubble must be ensured during all development phases.</li> <li>• All operational facilities, including vehicles, should be actively maintained.</li> <li>• Any areas for material storage, waste sorting and other potentially intrusive activities must be screened from view as far as considered feasible.</li> </ul> <p><b>Development footprint</b></p> <ul style="list-style-type: none"> <li>• The development footprints and disturbed areas surrounding the proposed project infrastructure should be kept as small as possible and the areas cleared of natural vegetation and topsoil must be kept to a minimum.</li> <li>• Direct loss of or damage to valuable natural visual resources such as the Crocodile and Jukskei Rivers should be avoided.</li> <li>• The extent of all development footprint areas and permanent/ temporary structures must be limited to what is essential.</li> <li>• As far as possible, existing roads are to be utilised, to limit cumulative impacts from roads and traffic.</li> <li>• The height of any temporary structures such as topsoil stockpiles should be kept as low as possible.</li> </ul>	Contractor ECO		Daily, Weekly, Monthly



MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<p><b>Infrastructure placement</b></p> <ul style="list-style-type: none"> <li>• Infrastructure should not be placed on ridgelines or other locations where they would be silhouetted against the sky.</li> <li>• Any stockpiles generated during the construction phase must be shaped and rounded to blend in with the surrounding undulating landscape and to minimise visual contrast. Such stockpiles, if vegetated and shaped appropriately, may be positioned in such a manner as to screen the construction activities from view.</li> <li>• Where infrastructure is sited within view of visually sensitive areas, it must be placed as far away as possible or within lower-lying areas where it may be screened by topography. Where full screening of infrastructure components is not possible, siting should take advantage of partial screening opportunities.</li> <li>• As far as possible, surface infrastructure should be placed in areas that have already been disturbed.</li> <li>• New roads are to follow the contours of the landforms to make it less visually prominent and to reduce the need for cut and fill activities. Siting of roads should avoid steep side slopes which may contribute towards erosion.</li> </ul> <p><b>Infrastructure appearance</b></p> <ul style="list-style-type: none"> <li>• Stockpiles should be vegetated with indigenous grasses to blend more easily and for screening purposes.</li> <li>• The use of permanent signage and project construction signs should be minimised and visually unobtrusive.</li> </ul> <p><b>Screening</b></p> <ul style="list-style-type: none"> <li>• It must be ensured that existing vegetation is retained during the construction phase to act as visual screens with reference to existing tall trees and larger shrubs with care also taken to retain existing vegetation along the site boundaries.</li> <li>• It must be ensured, wherever possible, that existing natural vegetation is to be retained during the construction and</li> </ul>			

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<p>operational phases of the project and incorporated into the concurrent site rehabilitation especially in line of sight from sensitive receptors.</p> <p><b>Rehabilitation</b></p> <ul style="list-style-type: none"> <li>• Concurrent/ progressive rehabilitation must be implemented and disturbed areas must be vegetated with indigenous veld grass as soon as areas become available during the construction phase.</li> <li>• Indigenous and locally occurring plant species selected for use in re-vegetation should be selected taken quick growth rates into consideration to cover bare areas and prevent soil erosion.</li> <li>• Upon decommissioning, it is vital that vegetation on slope be reinstated to blend with the natural environment.</li> </ul>			
<p><b>Management of Flora</b></p>	<ul style="list-style-type: none"> <li>• Preserve protected flora species outside of construction areas.</li> <li>• Control alien plants and noxious weeds.</li> </ul>	<ul style="list-style-type: none"> <li>• Newly cleared soils will have to be re-vegetated and stabilised as soon as construction has been completed.</li> <li>• No vehicles, machinery, storage, structures, construction, or landscaping are allowed in the sensitive and buffer zones.</li> <li>• Implement concurrent rehabilitation.</li> <li>• Appropriate measures should be implemented to prevent potential soil pollution through fuel and oil leaks and spills.</li> <li>• Vehicles and construction workers should under no circumstances be allowed outside the site boundaries to prevent impact on the surrounding vegetation.</li> <li>• Where possible, natural vegetation must not be cleared and encouraged to grow.</li> <li>• All stockpiles, construction vehicles, equipment and machinery should be situated away from the natural vegetation.</li> <li>• Disturbance of vegetation must be limited only to areas of construction.</li> <li>• Prevent contamination of natural grasslands by any pollution.</li> <li>• Areas cleared of vegetation must be re-vegetated prior to contractor leaving the site.</li> </ul>	<p>Proponent Contractor ECO</p>	<p>Permits. Successful rehabilitation. Contractor's method statement.</p>	<p>Daily, Weekly, Monthly</p>

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<ul style="list-style-type: none"> <li>• No fires are allowed on site.</li> <li>• Construction activities should be restricted to the development footprint area.</li> <li>• Areas which could be deemed as no go should be clearly marked.</li> <li>• Proliferation of alien and invasive species is expected within the disturbed areas, and they should be eradicated and controlled to prevent their spread into the Nature Reserve.</li> <li>• No vehicles should be allowed to drive through the reserve during the construction activities.</li> <li>• No dumping of any form is permitted in the Nature Reserve</li> <li>• No damage and/or removal/trapping/snaring of indigenous plant material for cooking and other purposes will be allowed in the Nature Reserve.</li> <li>• Construction camp should not be located within the Nature Reserve.</li> <li>• All areas to be affected by the proposed project in the Nature Reserve will be rehabilitated by indigenous vegetation.</li> <li>• The buffer zones of sensitive features must be strictly adhered to, and the areas covered by the buffers be treated as environmentally sensitive. No vehicles, storage of building materials or rubble, construction or landscaping are allowed in the sensitive and buffer areas.</li> <li>• Erecting a fence with controlled access around the open spaces (ridges and their buffer zones) and natural areas will prevent access of vagrants and criminals into these areas.</li> <li>• No access roads onto ridge areas must be present and such areas must be fenced off during construction activities.</li> <li>• Avoid translocating stockpiles of topsoil from one place to sensitive areas to avoid translocating soil seed banks of alien species.</li> <li>• Implement the findings of the Search, Rescue and Relocation Plan.</li> </ul>			

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
<p><b>Management of fauna</b></p>	<ul style="list-style-type: none"> <li>Ensure the protection of animals</li> </ul>	<ul style="list-style-type: none"> <li>Animals residing within the designated area shall not be unnecessarily disturbed.</li> <li>During construction, refresher training can be conducted to construction workers with regards to littering and poaching.</li> <li>The Contractor and his/her employees shall not bring any domestic animals onto site.</li> <li>Toolbox talks should be provided to contractors regarding disturbance to animals.</li> <li>Emphasis should be placed on talks regarding snakes.</li> <li>Allow for safe animal passage through and specifically out of the construction site.</li> <li>Any fauna (mammal, bird, reptile, and amphibian) that becomes trapped in the trenches or in any construction or operational related activity may not be harmed and must be placed rescued and relocated by an experienced person.</li> <li>No vehicles should be allowed to drive through the Nature Reserve during the construction activities.</li> <li>No hunting, trapping or any other method of catching of any animal or bird may be performed in the Nature Reserve.</li> <li>Illegal hunting is prohibited in the Nature Reserve.</li> <li>No dumping of any form is permitted in the Nature Reserve</li> <li>No damage and/or removal/trapping/snaring of indigenous plant or animal material for cooking and other purposes will be allowed in the Nature Reserve.</li> <li>Construction camp should not be located within the Nature reserve.</li> </ul>	<p>Proponent Contractor ECO Specialist</p>	<p>Permits (if applicable).  Contractor's method statement.</p>	<p>Daily, Weekly, Monthly</p>
<p><b>Watercourse Management</b></p>	<ul style="list-style-type: none"> <li>Minimise the habitat unit destruction and potential loss of wetland/aquatic-dependent biodiversity.</li> <li>Unaltered downstream flow regime.</li> <li>Downstream water quality to remain within</li> </ul>	<p><b>Road Upgrade</b></p> <ul style="list-style-type: none"> <li>Concrete pipes must be strategically positioned under the road to drain surface water, this will ensure the road prism does not act as a barrier to water flow.</li> <li>The footprint area of the road should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas.</li> <li>All construction activities and access must make use of the existing road.</li> </ul>	<p>Contractor ECO</p>	<p>Public complaints register.  Water monitoring programme -- discharges.  Disposal certificates</p>	<p>Daily, Weekly, Monthly</p>

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
	<p>acceptable ranges, as determined through baseline monitoring.</p> <ul style="list-style-type: none"> <li>Ecological category not to be influenced by construction activities.</li> </ul>	<ul style="list-style-type: none"> <li>The construction vehicles and machinery must make use of existing road.</li> <li>Construction must be conducted from the road itself and not the adjacent areas.</li> <li>Exposed road surfaces awaiting bitumen must be stabilised to prevent the erosion of these surfaces. Signs of erosion must be addressed immediately to prevent further erosion of the road.</li> <li>Silt traps and fences must be placed in the preferential flow paths along the road to prevent sedimentation of the watercourse.</li> <li>Temporary storm water channels should be filled with aggregate and/or logs (branches included) to dissipate flows.</li> <li>The contractors used for the project should have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly.</li> <li>A suitable storm water plan must be compiled for the road. This plan must attempt to displace and divert storm water from the road and discharge the water into adjacent areas without eroding the receiving areas. It is preferable that run-off velocities be reduced with energy dissipaters and flows discharged into the local watercourses.</li> </ul> <p><b>Culvert construction mitigation measures</b></p> <ul style="list-style-type: none"> <li>It is preferable that culverts be prefabricated and transported to the site. This will prevent contamination of watercourses from mixing, spillages etc. Alternatively, fabrication must be conducted in designated working areas.</li> <li>The removal and/or installation of culverts must take place from the existing road.</li> <li>Removed culverts may be re-used should the specifications be suitable for the relevant crossing requirements. Culverts not identified for re-use must be disposed of in appropriate waste facilities.</li> </ul>		<p>Contractor's method statement.</p>	

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<ul style="list-style-type: none"> <li>• Where possible, as many culverts as possible must be incorporated into the design. An increase in the number of culverts will help to spread flows across the river system, avoiding incisions in the landscape caused by concentrated flows. Care must be taken not to spread flows outside of the existing channel path.</li> <li>• The material surrounding and holding the culverts in place should include a coarse rock layer that has been specifically incorporated to increase the porosity and permeability to accommodate flooding and very low flows.</li> <li>• The culverts used in the design should be as large as possible, partially sunken and energy dissipating material must be placed at the discharge area of each culvert to prevent erosion of these areas.</li> <li>• The use of larger culverts will prevent the build-up of debris by allowing the free movement of debris through the large culverts.</li> <li>• Culverts should avoid inundation (damming) of upstream areas by facilitating streamflow and catering properly for both low flows and high flows.</li> <li>• It is imperative that the new culvert cater for fish, sediment, and debris migration, especially during very low flows.</li> <li>• Surface run-off from the roads flowing down the embankments often scours the riverbanks on the sides of the culvert causing sedimentation of the channel. This should be catered for with adequate concreted stormwater drainage depressions and channels with energy dissipaters that channel these flows into the river in a controlled manner.</li> <li>• The culvert installations should further consider the scouring action of high flows and gabion structures or similar should be placed on both sides of the culvert on the embankments both upstream and downstream. This will serve as retention of the soils from scouring around and underneath the culvert structures aiding in the protection of the structure.</li> <li>• Large aggregate outsourced or from the project area (if available) can be used for energy dissipation in the channel</li> </ul>			

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<p>downstream of the culverts to reduce the likelihood of scouring the riverbed and sedimentation of the catchment.</p> <ul style="list-style-type: none"> <li>• The downstream side of the culvert should be at the same level as the riverbed to allow for upstream migration of fish and other biota and not form a barrier to upstream migration.</li> </ul> <p><b>Bridge upgrade mitigation measures</b></p> <ul style="list-style-type: none"> <li>• The footprint area of the bridge must be kept to a minimum. The designated area should be demarcated to avoid unnecessary disturbances and encroachment into adjacent areas.</li> <li>• Portions of the entry/exit road for the bridge must include a coarse rock layer that has been specifically incorporated to increase the porosity and permeability to accommodate flooding.</li> <li>• The crossing should make use of spanned piers with minimal instream piers such as already in place for the existing bridge.</li> <li>• Piers should be constructed on the riverbanks or bedrock (if present) and not within the channel bed, nor within the preferential flow path of the Jukskei River Tributary to avoid obstructing flows.</li> <li>• The height of the bridge should accommodate for the 1:100-year flood events.</li> </ul> <p><b>Potable Water Pipeline installation mitigation measures</b></p> <ul style="list-style-type: none"> <li>• Pipeline trenches and sandy bedding material may produce preferential flow paths for water across the project area perpendicular to the general direction of flow instead of angle. This risk can be reduced by installing clay plugs at intervals down the length of the trench to force water out of the trench and down the natural topographical gradient.</li> <li>• Pipelines crossing drainage areas, should preferably span the drainage lines above ground. This prevents disruptions to sub surface flow dynamics and allows the pipeline to be monitored for leaks and subsequent waste of potable water.</li> </ul>			

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<ul style="list-style-type: none"> <li>• Pipelines underground crossing rivers and streams should be buried at a sufficient depth below ground level such that the pipelines do not interfere with surface water movement or create obstructions, where flows can cause erosion.</li> <li>• When a pipeline spans a river, it should be attached to any existing crossing or bridge structures such as the existing bridge on the Jukskei River Tributary. This will limit the need to disturb new areas of the river system with the construction of new structures.</li> <li>• If pier support structures are needed for the pipeline to span a wide drainage line or river, then piers should be placed outside of preferential flow paths with the least number of pier structures used as possible.</li> <li>• During the excavation of trenches, flows should be diverted around active work areas where required. Water diversion must be temporary and re-directed flow must not be diverted towards any stream banks that could cause erosion.</li> </ul> <p><b>General mitigation measures</b></p> <ul style="list-style-type: none"> <li>• The wetland and riparian conservation buffer areas must be avoided where feasible.</li> <li>• The construction vehicles and machinery must make use of existing access routes as much as possible before adjacent areas are considered for access.</li> <li>• Laydown yards, camps and storage areas must be beyond the aquatic areas.</li> <li>• Where possible, the upgrade of the road must take place from the existing road and not from within the aquatic systems.</li> <li>• Disturbance of the instream and riparian habitats by heavy machinery outside of the demarcated WwTW footprint should be avoided at all costs.</li> <li>• contractors used for the project should have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly.</li> </ul>			



MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<ul style="list-style-type: none"> <li>• It is preferable that construction takes place during the dry season as much as possible (multiple seasons) to reduce the erosion potential of the exposed surfaces.</li> <li>• Temporary storm water channels and preferential flow paths should be filled with aggregate and/or logs (branches included) to dissipate and slow flows limiting erosion.</li> <li>• Contamination of the river system with unset cement, cement powder or sewerage spills should be negated as it is detrimental to aquatic biota.</li> <li>• Prevent uncontrolled access of vehicles through the river system that can cause a significant adverse impact on the hydrology and alluvial soil structure of these areas.</li> <li>• All chemicals and toxicants to be used for the proposed project activities must be stored outside the channel system and in a bunded area.</li> <li>• All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced and fuelled in designated areas.</li> <li>• All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping".</li> <li>• Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation).</li> <li>• All removed soil and material must not be stockpiled within the system. Stockpiling should take place outside of the riparian and instream areas. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.</li> <li>• Erosion prevention and sediment control measures (riparian and instream) are imperative and need to be implemented throughout the entire project footprint of the WwTW</li> </ul>			

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<p>installations, water pipeline, access roads and soil dump sites. Temporary and permanent erosion control methods may include silt fences, flotation silt curtains, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching.</p> <ul style="list-style-type: none"> <li>• Erosion and sedimentation into the channel must be minimised through the effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed banks.</li> <li>• Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil.</li> <li>• Large trees and other debris often collect upstream against the bridge pylons or culverts, damming up the channel with risk of flooding and damaging the river crossing and its banks. This debris should be cleared routinely with appropriate disposal of the debris. Timber can be sold or donated to local communities.</li> <li>• During the WwTW construction, all rubble generated must be removed from the site and not dumped in the instream or riparian habitats, rather it must be adequately managed. Separation and recycling of different waste materials should be supported.</li> <li>• Adequate channel / bed protection with energy dissipaters should be placed in the channel both at and immediately downstream of the treated water release point to reduce the likelihood of scouring the riverbed and sedimentation of the catchment.</li> <li>• A spill containment plan is required to be in place prior to construction to minimize the potential impacts of spills or leaks of hazardous substances. This would include during the start-up and operation and potential sewerage spills.</li> <li>• Have action plans on site, and training for contractors and employees in the event of spills, leaks, and other impacts to the aquatic systems.</li> </ul>			

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<ul style="list-style-type: none"> <li>• Quarterly vegetation rehabilitation surveys need to be conducted of the vegetation within the project footprint for a period of at least a year after construction has been completed to assess vegetation regrowth and recovery.</li> <li>• An alien invasive plant management plan needs to be compiled and implemented post construction to control current invaded areas and prevent the growth of invasives on cleared areas.</li> <li>• An aquatic monitoring survey needs to be conducted after the construction and upgrade activities so that impacts can be assessed, and adaptive management practices implemented if necessary. Several sensitive aquatic biotas should be specifically monitored to identify fluctuation in abundances and diversity, including fish and macroinvertebrates. The frequency of the monitoring programme should be conducted shortly after construction and upgrade of the WwTW, pipeline and access roads, respectively.</li> </ul> <p><b>Site area mitigation</b></p> <ul style="list-style-type: none"> <li>• The minimum buffer zones 30m for the wetland areas must be adhered too, where possible. This buffer zone should be marked to avoid encroachment within the buffer area.</li> <li>• The avoidance and protection of the wetland and riparian areas must be included into a site induction. Contractors and employees must all undergo the induction and made aware of the wetland areas to be avoided.</li> <li>• The plan must ensure that clean and dirty water are separated, that only clean water is diverted into the wetland systems and that the discharge of water will not result in scouring and erosion of the receiving systems.</li> <li>• Dirty water must be treated and within acceptable DWS drinking water standards (or aquatic ecosystem standards) before being discharged into the wetlands. (This is not a mitigation measure for the discharge of treated wastewater).</li> </ul>			

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<ul style="list-style-type: none"> <li>Vegetation should be cleared in a phased approach, minimising the extent of exposed areas. Sparsely vegetated areas should be cleared first, with the densely vegetated areas being cleared last. Only indigenous vegetation should be used for re-vegetation purposes. Alternatively, vegetation should first be cleared on the upper slopes of the catchment, before progressing downslope towards the valley bottom wetland.</li> <li>Energy dissipaters must be incorporated into the design for discharge locations to prevent scouring and erosion of the receiving systems. Boulders encountered during the construction phase of the project may be used for this.</li> <li>The banks of the valley bottom wetland are vulnerable to collapse and these banks downstream of the discharge locations should be stabilised, this may include the use of gabions. It is advised that a wetland specialist with rehabilitation experience be consulted for this.</li> <li>In the event that services or structures are required to traverse the wetland areas, these should span the wetland areas, avoiding the placement of piers or pylons within the wetland and buffer areas.</li> <li>In the event that access within wetland or buffer areas is required for construction, temporary platforms must be placed within / across the wetlands to raise activities from the wetland surface area. These structures must then be removed after construction.</li> </ul>			
Management of Water	<ul style="list-style-type: none"> <li>Minimise environmental impacts associated with stormwater as well as water services for construction workers.</li> <li>Minimise stormwater runoff from the site onto neighbouring roads.</li> </ul>	<ul style="list-style-type: none"> <li>All construction activities to comply with the National Water Act (Act No. 36 of 1998).</li> <li>During the construction stage, water will be required for various purposes, such as concrete batching, washing of plant and equipment in dedicated areas, dust suppression, potable use by construction workers, etc. Water tankers will supply water to the site.</li> <li>Subsurface lateral flow of water leads to the interception of such water once foundations are sunk into the soils and weathered rock / hard plinthite. Adequate drainage</li> </ul>	ECO Contractor	Public complaints register.  Water monitoring programme -- discharges.  Disposal certificates.	Daily, Weekly, Monthly

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
	<ul style="list-style-type: none"> <li>Minimise water use through recycling and water efficient practices.</li> </ul>	<p>structures should be constructed to prevent damp problems in structures arising within the soil profiles and landscape start filling with water once rainfall increased during summer months.</p> <ul style="list-style-type: none"> <li>In many areas it has been found that the water moving downslope in the fractured rock is under positive pressure (due to gravity) with a consequent squirting out from severed preferential flow structures. This implies that in some areas water ingress into foundations and basements can occur from below (leading to the expression of a "wet basement syndrome"). Structures constructed in areas with such risks should have additional water removal mechanisms implemented at the structure / ground interface. These can include dedicated containment and drainage features. Where cut and fill operations take place with a consequent large volume of "overburden" material over the soil a specific capillary break layer with associated drainage should suffice.</li> <li>Surface sealing of the landscape through roads, parking areas, roof covered areas and general soil compaction leads to accelerated and increased surface water runoff. To mitigate the potential large volumes over a large area numerous small containment structure with choked outflows should be constructed throughout a site. The fewer these structures are the larger other structures must be to contain the said water. As a minimum requirement these structures should be adequate and enough to contain the standard storm water runoff from a site before it reaches the wetland /drainage feature area.</li> <li>Several soft engineering approaches exist for the successful mitigation of storm water. If these are incorporated into the design and layout of development sites impacts on the wetlands and drainage features can be successfully mitigated.</li> <li>In terms of both the NWA (National Water Act) and NEMA (National Environmental Management Act) landowners have a duty to protect water resources, watercourses, and</li> </ul>		Contractor's method statement.	

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<p>wetlands. In addition, CARA (Conservation of Agricultural Resources Act) and the municipal bylaws address storm water aspects that are of importance to landowners and managers. Insufficient attention to storm water related impacts during the design phase of a development can lead to administrative and criminal liabilities for the developer / landowner post development.</p> <ul style="list-style-type: none"> <li>• Important: In the absence of adequate management of storm water, soil and wetland impacts in terms of erosion will be inevitable therefore exposing the relevant entities involved with the development to unacceptable punitive administrative action or even criminal prosecution.</li> </ul>			
<p>Management of Rehabilitation, Landscaping and Operation</p>	<ul style="list-style-type: none"> <li>• Adequate reinstatement and rehabilitation of construction areas</li> <li>• Conduct concurrent or progressive rehabilitation of areas affected by construction activities that are situated outside of the construction footprint</li> </ul>	<p><b>Removal of structures and infrastructure</b></p> <ul style="list-style-type: none"> <li>• After the construction phase, the area disturbed outside of the pipeline servitude must be rehabilitated by appropriate landscaping, levelling, topsoil dressing, land preparation, alien plant eradication and vegetation establishment.</li> <li>• Clear and completely remove from site all construction plant, equipment, storage containers, temporary fencing, temporary services, and fixtures.</li> <li>• Ensure that all access roads utilised during construction which are outside of the pipeline servitude and not earmarked for use during the operational phase, are returned to a state no worse than prior to construction.</li> </ul> <p><b>Inert waste and rubble</b></p> <ul style="list-style-type: none"> <li>• Clear the site of all inert waste and rubble, including surplus rock, foundations, and batching plant aggregates. After the material has been removed, the site shall be re-instated and rehabilitated.</li> <li>• Remove from site all domestic waste and dispose of in the approved manner at a registered waste disposal site.</li> </ul>	<p>Contractor ECO OHSE</p>	<p>Rehabilitation plan.  Contractor's method statement.</p>	<p>Daily, Weekly, Monthly</p>

		<p><b>Hazardous waste and pollution control</b></p> <ul style="list-style-type: none"> <li>• Remove from site all pollution containment structures.</li> <li>• Remove from site all temporary sanitary infrastructure and wastewater disposal systems.</li> <li>• Take care to avoid leaks, overflows and spills and dispose of any waste in the approved manner.</li> </ul> <p><b>Landscaping</b></p> <ul style="list-style-type: none"> <li>• Programme the backfill of excavations so that subsoil is deposited first, followed by the topsoil. Compact in layers for best results.</li> <li>• Monitor backfilled areas for subsidence (as the backfill settles) and fill depressions using available material.</li> <li>• Ensure that no excavated material or stockpiles are left on site and that all material remaining after backfilling is landscaped or removed from site and disposed of at a suitable licensed waste disposal site.</li> </ul> <p><b>Topsoil replacement and soil amelioration</b></p> <ul style="list-style-type: none"> <li>• Execute top soiling activity prior to the rainy season or any expected wet weather conditions.</li> <li>• Execute topsoil placement only after all construction work has ceased.</li> <li>• Replace and redistribute stockpiled topsoil together with herbaceous vegetation, overlying grass, and other fine organic matter in all disturbed areas of the construction site, including temporary access routes. Replace topsoil to the original depth.</li> <li>• 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.</li> <li>• The suitability of substitute material will be determined by means of a soil analysis addressing soil fraction, fertility, pH, and drainage.</li> </ul>			
--	--	---	--	--	--

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<ul style="list-style-type: none"> <li>• Do not use topsoil suspected to be contaminated with the seed of alien vegetation (e.g., black wattle). Alternatively, the soil is to be appropriately treated.</li> <li>• Ensure that stormwater run-off is not channelled alongside the gentle mounding, but that it is taken diagonally across it.</li> <li>• Shape remaining stockpiled topsoil not utilised elsewhere in an acceptable manner to blend in with the local surrounding area.</li> <li>• Newly cleared soils will have to be re-vegetated and stabilised as soon as construction has been completed and there should be an on-going monitoring program to control and/or eradicate newly emerging invasives.</li> <li>• Machines should remove the stone material and transported to another location and reused if it is required, removed correctly to a licensed facility.</li> <li>• The geotextile base material, and other foreign material should also then remove during rehabilitation.</li> </ul> <p><b>Ripping and scarifying</b></p> <ul style="list-style-type: none"> <li>• 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 determined</li> <li>• based on the site conditions immediately before these works begin.</li> <li>• 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.</li> <li>• Rip and/or scarify along the contour to prevent the creation of down-slope channels.</li> <li>• Do not rip and/or scarify areas under wet conditions, as the soil will not break up.</li> </ul> <p><b>Planting</b></p> <ul style="list-style-type: none"> <li>• The areas that have been denuded and disturbed because of the construction on site must be vegetated with indigenous vegetation as soon as possible.</li> </ul>			



MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<ul style="list-style-type: none"> <li>• No exotic plants may be used for rehabilitation purpose, only indigenous plants of the area may be utilised.</li> <li>• Plants should be located from other undisturbed areas, and this along with the original seedbank within the replaced topsoil will assist with stabilising soils and re-vegetation of the area.</li> <li>• All planting work is to be undertaken by suitably experienced personnel, making use of the appropriate equipment.</li> <li>• Transplanting entails the removal of plant material and replanting the same plants in another designated position.</li> <li>• Transplant trees and shrubs into designated positions.</li> <li>• Establish further specifications for transplanted plants.</li> <li>• Plant all trees, shrubs, and individual plants in designated positions.</li> <li>• Planting should preferably be done during the rainy season.</li> <li>• After planting, each plant must be well watered, adding more soil upon settlement if necessary.</li> <li>• Establish further specifications for nursery plants.</li> <li>• Tree seedling material should be fresh and of local origin. Resist using plants from far afield as they may not be best suited to local climatic or soil conditions.</li> <li>• Small seedlings are likely to transplant more successfully than will large ones. These should be potted and kept under nursery conditions until they are large enough to plant out.</li> </ul> <p><b>Grassing</b></p> <ul style="list-style-type: none"> <li>• Suitably trained personnel must undertake grassing by making use of the appropriate equipment and grass species as specified by the terrestrial ecologist.</li> <li>• Sodding may be done at any time of the year, but seeding must be done during the summer when the germination rate is better.</li> <li>• Hydroseeding with a winter mix will only be specified where re-grassing is urgent and cannot wait for the summer.</li> <li>• Establish further specifications for sods, runners, and hand seeding.</li> </ul>			

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
		<p><b>Maintenance</b></p> <ul style="list-style-type: none"> <li>Monitor the re-growth of invasive vegetative material for at least one year after construction.</li> </ul>			
<b>Operation Phase</b>					
<b>Energy Use</b>	<ul style="list-style-type: none"> <li>Strive to meet Green Building Principles.</li> <li>Achieve an energy efficiency WwTW.</li> </ul>	<ul style="list-style-type: none"> <li>Layout of the WwTW to make maximum use of gravity flow, and to limit pumping to where it is necessary.</li> <li>Use of energy efficient equipment.</li> <li>Use of efficient pumping technology and ensuring the pump flows and the pump are matched correctly.</li> <li>Introducing energy monitoring systems.</li> <li>Appropriate selection of aeration type for the BNR Reactor.</li> <li>Provision for future biogas to electrical energy installation.</li> <li>Use passive design strategies to minimise energy consumption of the buildings.</li> <li>Ensure that a renewable energy strategy is followed, where the facility should generate as much as it uses.</li> <li>Provide low wattage lighting (e.g. LEDs) for site lighting as well as building lighting.</li> </ul>	Proponent	Visual inspections	Daily, Weekly, Monthly
<b>Management of Waste</b>	<ul style="list-style-type: none"> <li>No littering on construction site.</li> <li>Maintain a clean and tidy construction site.</li> <li>100% record of all waste generated and disposed at waste disposal facilities.</li> <li>Valid disposal certificates for all waste disposed.</li> <li>Provision of adequate waste containers that are easily accessible and maintained.</li> </ul>	<ul style="list-style-type: none"> <li>Implement a waste management hierarchy of reduce, re-use, recycle, treatment and disposal.</li> <li>All occupants must be encouraged to apply best practice in terms of waste management.</li> <li>Recycling facilities to be provided on site (bins for organic, plastic, tins, paper, garden waste and composting).</li> </ul>	Proponent	Public complaints register. Waste register. Recycling targets. Waste disposal certificates.	Daily, Weekly, Monthly

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
	<ul style="list-style-type: none"> <li>Waste bins to be removed and cleaned weekly.</li> </ul>				
<b>Water Use and Conservation</b>	<ul style="list-style-type: none"> <li>Minimise water use through recycling and water efficient practices</li> </ul>	<ul style="list-style-type: none"> <li>Implement measures to minimise the loss of water at any point.</li> <li>Ensure efficient fitting and fixtures.</li> <li>Ensure water metering and monitoring.</li> <li>Use leak detection and monitoring systems for all potable water sources on site.</li> </ul>	Proponent	Public complaints register.  Water monitoring programme	Daily, Weekly, Monthly
<b>Management of Stormwater</b>	<ul style="list-style-type: none"> <li>Minimise environmental impacts associated with stormwater.</li> <li>Minimise stormwater runoff from the site onto neighbouring roads</li> </ul>	<ul style="list-style-type: none"> <li>Implement stormwater management plan for the development.</li> <li>Prevent water quality deterioration of the receiving watercourses from stormwater discharges.</li> <li>Prevent erosion associated with stormwater runoff.</li> <li>No illegal discharges into the stormwater system to be allowed.</li> </ul>	Proponent	Public complaints register.  Water monitoring programme	Daily, Weekly, Monthly
<b>Management of Health and Safety</b>	<ul style="list-style-type: none"> <li>Provide and maintain a safe and healthy working environment to workers and the public</li> </ul>	<ul style="list-style-type: none"> <li>The Applicant shall ensure compliance to the requirements of the Health and Safety specifications.</li> <li>Employee non-compliances must undergo training in Health and Safety of WwTW to minimise the likelihood and severity of health risks and infection.</li> </ul>	SHE	Occupational Health and Safety system.	Daily, Weekly, Monthly
<b>Maintenance of the WwTW infrastructure</b>	<ul style="list-style-type: none"> <li>Manage environmental impacts associated with WwTW maintenance.</li> <li>Restrict operation and maintenance activities to the WwTW.</li> <li>Safeguarding of sensitive environmental features and existing services.</li> </ul>	<ul style="list-style-type: none"> <li>Infrastructure Maintenance Plan of the WwTW to be compiled and submitted to relevant authorities for approval prior operational phase of the WwTW.</li> <li>Sewage infrastructure must be properly managed, maintained and operated throughout the life of the project.</li> <li>Periodic inspections of the WwTW infrastructure should be implemented to identify system failure which could lead to contamination of soil, groundwater, and watercourses.</li> <li>Leaks and failures of the sewage infrastructure must be fixed immediately, and areas rehabilitated as needed.</li> <li>Adjacent landowners should be notified in advance.</li> </ul>	Proponent	No movement outside of WwTW unless the landowner has been notified.  Public complaints register.	Daily, Weekly, Monthly

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
	<ul style="list-style-type: none"> <li>Prevent failure of sewage infrastructure (such as pump stations) and the lack of infrastructural maintenance with poor operation.</li> </ul>	<ul style="list-style-type: none"> <li>During maintenance related activities, damage to access roads, fencing and/or private property, will be restored to its original condition.</li> <li>Restrict operation and maintenance activities to the WwTW.</li> <li>All vehicle traffic will be restricted to access roads, where this is not possible the landowner will need to be notified.</li> </ul>			
Management of Odour and Pests	<ul style="list-style-type: none"> <li>Prevent improper management and operation of the WwTW</li> </ul>	<ul style="list-style-type: none"> <li>The source of odour must be investigated immediately, and appropriate corrective measures taken.</li> <li>Ensure that screenings are correctly and securely kept prior to disposal. The application of lime to the screenings may be required.</li> </ul> <p>Development of dedicated odour management plan for the facility covering the following items:</p> <ul style="list-style-type: none"> <li>A summary of the site, wastewater treatment works process, odour sources and the location of receptors.</li> <li>Details of the site management responsibilities and procedures for reporting faults, identifying maintenance needs, replenishing consumables, complaints procedure.</li> <li>Odour-critical plant operation and management procedures (e.g. correct use of plant, process, materials, checks on plant performance, maintenance, and inspection).</li> <li>Maintenance and inspection of plant (both routine and emergency response).</li> <li>Spillage management procedures.</li> <li>Record keeping -- format, responsibility for completion and location of records.</li> <li>Odour complaints action procedure; and</li> <li>Emergency breakdown and incident response planning including responsibilities and mechanisms for liaison with the local authority.</li> </ul>	Proponent	Public complaints register.  Odour Management Plan.	Daily, Weekly, Monthly

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
Pollution Control Measures	<ul style="list-style-type: none"> <li>• Ensure leaks are detected and repaired.</li> <li>• Ensure that possible causes of pollution are mitigated as far as possible to minimise environmental and social impacts to the receiving environment.</li> </ul>	<ul style="list-style-type: none"> <li>• Containment and Rehabilitation Plan to be in place for pollution related impacts.</li> <li>• Proper emergency response procedure to be in place to address leaks along the pipeline servitude.</li> <li>• All major incidents to be recorded by the ECO and must be reported to GDARD and other relevant authorities.</li> <li>• The groundwater monitoring boreholes should be tested for potential sewage leaks or any potential pollution.</li> <li>• Effluent quality must be monitored by an accredited laboratory. Green Drop status standards and guidelines must be achieved.</li> <li>• Effluent from the WwTW must meet the conditions of the WUL for water quality.</li> <li>• Appropriate corrective action must be taken if contamination is detected or if effluent quality does not meet discharge standards.</li> <li>• The disposal of sludge must be undertaken in accordance with the guidelines and recommendations in the "Permissible utilisation and disposal of sewerage sludge" obtainable from the Department of Water and Sanitation (DWS), "The National Norms and Standards for assessment of waste for landfill disposal" and Category C of the Waste Act (1998) and may not be disposed of onsite unless a licence is in place.</li> <li>• Ensure regular water quality monitoring and timely maintenance of all components of the WwTW.</li> <li>• Spillages of hazardous material (such as chlorine and lime) to be appropriately cleaned.</li> <li>• Large spillages of hazardous material to be cleaned and remediated by a competent service provider.</li> <li>• Hazardous waste to be appropriately disposed of.</li> <li>• An operational and management plan should be in place to ensure matters such as maintenance, disaster management, communication, and risk management of the plant.</li> </ul>	<p>Relevant authorities</p> <p>Proponent</p>	<p>Operational and Management Plan.</p> <p>Containment and Rehabilitation Plan.</p> <p>Incident Register and Report.</p>	<p>Daily, Weekly, Monthly</p>

MANAGEMENT ACTION	MANAGEMENT OUTCOME	MITIGATION MEASURES	RESPONSIBLE PERSON	MONITORING REQUIREMENTS	MONITORING FREQUENCY
On-going Consultation with I&APs	<p>Maintain a record of all complaints and claims against the project and ensure that these are timeously and effectively verified and addressed.</p> <ul style="list-style-type: none"> <li>Adhere to agreements made with adjacent landowners and community members regarding communication.</li> </ul>	<ul style="list-style-type: none"> <li>Establish lines of communications with adjacent landowners.</li> <li>Establish processes and procedures to effectively verify and address complaints and claims received from I&amp;APs.</li> <li>Complaints or liaison with adjacent landowners about environmental aspects, compensation, disturbance to activities or animals, or damage to property outside the WwTW, must be recorded and reported to the correct person and a record of the response is to be entered in the complaints register.</li> <li>Provide the relevant contact details to adjacent landowners for queries / raising of issues or complaints.</li> <li>A complaint register must be placed at an area accessible to the public.</li> <li>Residents should be afforded to engage with the plant manager or other representative when required.</li> </ul>	Proponent	Public complaints register.	Daily, Weekly, Monthly
<b>DECOMMISSIONING</b>					
Post to the economic lifespan of the WwTW, decommissioning and rehabilitation will comply with the appropriate environmental legislation and best practices at that time.					

---

## **7 ENVIRONMENTAL AWARENESS PLAN**

Environmental awareness training is required for all personnel performing active duties on site. This includes all employees working on the site including temporary labourers, contractors, and subcontractors. The Environmental Awareness Plan is intended to describe the method that will be adopted by the proponent to inform any person acting on their behalf, including an agent, sub-contractor, employee, or any person rendering a service, of any environmental risk which may result from the implementation of the project activities and the way risks must be managed to avoid adverse environmental consequences.

Environmental awareness training should cover:

- The importance of the EMPr;
- Specific details of the EMPr;
- Employees role in compliance with the EMPr;
- Environmental effects associated with the activities;
- Training targeted at specific personnel, e.g. example operators of heavy machinery;
- The environmental impacts, actual or potential, of their work activities;
- The environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures;
- Emergency preparedness and response requirements;
- The potential consequences of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities;
- Environmental legal requirements and obligations;
- The importance of not littering;
- The importance of using supplied toilet facilities;
- The need to use water and electricity sparingly; and
- Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible.

Training should be conducted by a suitably qualified person and if necessary, in more than one language to ensure it is understood by all workers. Copies of the environmental training must be available on site in languages appropriate to the work force. Records of the training sessions including attendance registers, nature of training and date of training should be kept ensuring all parties have received the necessary training and for auditing purposes.

In addition to training, general environmental awareness must be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. Environmental awareness and training are an important aspect of the implementation of the EMPr. Once the awareness plan and training material are available, the entire workforce and project management team should undergo an environmental awareness training course.

Environmental awareness training is critical for the workforce to understand how they can play a role in achieving the objectives specified in the EMPr. All visitors to the site (including project team members which are not based onsite), must undergo Environmental Induction before being permitted to the construction and associated area. The Environmental Induction should be structured to provide a condensed version of the comprehensive Environmental Awareness Training that will be provided to the workforce / onsite staff.

Environmental awareness could be fostered in the following manner:

- Induction for all workers on site, before commencing work;
- Refresher courses as and when required.
- Toolbox talks, focusing on environmental issues (task- and area specific), where workers might be alerted to environmental concerns associated with their tasks for that day or the area/habitat in which they are working; and
- Courses must be given by suitably qualified personnel and in a language and medium understood by workers/employees.
- Erect signage and barricading (where necessary) at appropriate points in the construction domain, highlighting sensitive environmental features (e.g. grave sites, protected trees); and
- Place posters containing environmental information at areas frequented by the construction workers (e.g. eating facilities).

The Environmental Awareness Plan should be drawn up by the Developer, in consultation with the ECO, and should be kept for implementation and audit purposes. The Environmental Awareness Plan should be a dynamic document (or set of documents) which should be updated as changes to the project, environment, staff etc. occur.

## **7.1 Communication Plan**

### **7.1.1 Internal Communication**

Communication strategies need to be established for the internal communication between the various levels and functions of the organisation, and receiving, documenting, and responding to environmental risks for each phase of the project will take place for the management, administrative and worker sectors of the site, as well as contractors.



---

### **7.1.2 External Communication Strategies**

The Developer shall conduct processes for external communication on its significant environmental aspects. Communication from external interested and affected parties may be received by email, fax, telephonically or by mail. Where required, a written response will be sent, on receiving such communication, by the appropriately appointed individual under signature of the Site Manager, to the respective interested and / or affected party. All telephonic or facsimile correspondence received on the site must be forwarded to the relevant department for action. All events or concerns will be captured and actioned on an existing and / or future database. The following communication channels can be used to communicate environmental issues to the external parties:

- E-mail: E-mail communication received must be stored, with replies, in an appropriate folder on a server. E-mail messages, relevant to environmental management, should be kept for a minimum of two years before deletion.
- Mail: Correspondence received by mail must be filed, along with the response
- Impact Assessments will be available on request from an external party by the Site Manager.
- Queries from Interested and Affected Parties: Response to queries about environmental impacts and aspects will be addressed by the relevant department and approved by the Site Manager.

## **7.2 Evaluation of the Environmental Awareness Plan**

The evaluation will entail the auditing of the operation in both the construction and operation phase once activity has commenced. This will be to assess the effectivity of the environmental awareness and training plan and id if it is sufficient to make all those involved in the project aware of those risks that may occur as well as the necessary mitigation required to minimize these risks.

### **7.2.1 Emergency Incident Reporting**

Environmental incident reporting is an essential component of communication at the Project. Employees are obligated to report any environmental problems, incidents, or pollution so that the appropriate litigator action can be taken as soon as possible. If an Environmental Incident occurs, it must be reported in accordance with the Incident Reporting Procedure. A plan for emergency preparedness and response must be developed.

### **7.2.2 Induction**

All full-time employees and contractors must attend an induction program. Employees are inducted. Any contractor working on the project must complete Environmental Health and Safety induction training. Environmental concerns and project-related issues will be addressed during the induction sessions. Employees will be informed about all environmental implications and aspects, as well as mitigation actions. The induction workshops will be tailored to the level of employee attending, ensuring that all staff have a thorough understanding of environmental issues and pollution.

### **7.2.3 On the Job Training**

On-the-job education is an important aspect of environmental awareness. Employees will be educated about the expected environmental problems and concerns specific to their occupation. Employees will be trained on how to respond in the event of an environmental problem or source of pollution. The training will be ongoing, and all fresh staff will receive the same level of training as current employees.

### **7.2.4 Hazardous Substances**

Individuals dealing with potentially hazardous situations and risks that could result in hazardous spills, pollution incidents, excessive dust, or other forms of environmental damage should receive job-specific training on the risks and potential consequences of their appointment and work situation, as well as how to avoid environmental impacts and respond during an environmental incident or emergency.

### **7.2.5 Dust mitigation**

Individuals dealing with potential situations and risks that could result in excessive dust should receive appropriate job-specific training on the risks and potential consequences of their appointment and work situation, as well as how to avoid environmental impacts and respond during an environmental incident or emergency.

### **7.2.6 Fire Incidents**

Individuals dealing with potentially hazardous situations and risks that could result in fire incidents or emergencies should receive adequate job-specific training on the risks and potential consequences of their appointment and work situation, as well as how to avoid environmental impacts and respond during an environmental incident or emergency.

### **7.2.7 Pollution Incidents or Forms of Environmental Damage**

Any incident or form of environmental degradation must be managed according to the Incident management procedure. Individuals dealing with potential situations and risks that could result in pollution incidents or other forms of environmental damage should receive job-specific training on the risks and potential consequences of their position and work situation, how to avoid environmental impacts, and how to respond during an environmental incident or emergency.

### **7.2.8 Waste Management**

Site personnel and contractors responsible for the operation and safe handling of the various waste streams will receive appropriate job-specific training on the risks and potential consequences of their appointment and work situation, how to avoid environmental impacts and how to respond during an environmental incident or emergency. JW must ensure that training and awareness programmes cover the safe transportation, handling, storage, transfer, handling, use and disposal of all waste streams, and the location of waste receptacles for each waste stream. All waste management activities must be done in accordance with the JW procedures and in terms of registers dealing with storage of waste in specific areas. Staff awareness training programme will accommodate training, on which bin to use for organic waste and on sealing the lid on the bin once organic waste has been discarded.

### **7.2.9 Water Management**

All individuals responsible for active water management will receive job-specific training on the risks and potential repercussions of their appointment and work situation, as well as how to avoid environmental impacts and respond during an environmental incident or emergency.

---

### 7.3 Emergency Response Plan

An Environmental Emergency Response Plan defines the process to follow to respond rapidly and effectively to and manage emergency situations that may arise because of the Project. This plan must be initiated when an emergency:

- Cannot be immediately brought under control;
- Has the potential to extend beyond site boundaries;
- Has the potential to significantly impact on the environment and/or community; and
- Requires assistance from External Emergency Services.

This plan outlines response actions for potential incidents of any size. It details response procedures that will minimize potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to an emergency event. The plan will ensure that Contractors comply with all procedures described in this document.

#### 7.3.1 Intent

A Work Method Statement should be prepared prior to the commencement of any activities, detailing how this plan is to be implemented as well as details of relevant responsible parties for the implementation. The method statement must also reflect conditions of the IFC Performance Standard 1 and include the following:

- Areas where accidents and emergency situations may occur;
- Communities and individuals that may be impacted, as read in the specialist studies;
- Response procedure;
- Provisions of equipment and resources;
- Designation of responsibilities; and
- Communication, both internally and externally.

The purpose of this plan is to define the emergency response structure and process of the Project. The objectives of the plan are:

- To ensure communication of all vital information as soon as possible;
- To provide clear guidance in the management of emergencies that have the potential to impact on life, property, environment, and community;
- Clearly define roles and responsibilities;
- To facilitate the reorganization and reconstruction activities so that normal operations can be resumed;

- For employees to be able to take prompt effective action to reduce the risk of injury, minimize environmental impact and property damage likely to result from emergencies; and
- To specify the emergency communication process necessary to establish links with key site personnel.

## 7.4 Risk Management

Relevant Environmental, Health and safety induction and training will be undertaken will all employees and contractors prior to the commencement of the project activities. It is standard practice for employees and the employees of contractors that will be working on a new project or at a new site to attend an induction course where the nature and characteristics of the project and the site are explained.

**Table 9: Risk Management**

Aspects	Management Measures
Soils and Land Capability	<ul style="list-style-type: none"> <li>• All equipment refueling, servicing and maintenance activities should only be undertaken within appropriately bunded designated areas;</li> <li>• Any fluids drained from the machinery during servicing should be collected in leak-proof containers and taken to an appropriate disposal or recycling facility; and</li> <li>• A spill must be given the highest priority, and clean-up turn-around time must be as fast as possible.</li> </ul>
Water Resources	<ul style="list-style-type: none"> <li>• Ensure all paddocks and stormwater systems are desilted prior to commencing with construction; and</li> <li>• Adhere to the stormwater management plan.</li> </ul>
Health and Safety	<ul style="list-style-type: none"> <li>• Chemical toilets used during construction must be regularly cleaned;</li> <li>• Contact details of emergency services will be clearly displayed on the site; and</li> <li>• All staff will be made aware and be familiar with the procedures for notification in the event of an emergency.</li> </ul>
Waste Management	<ul style="list-style-type: none"> <li>• The WMP must be implemented in terms of the classification, separation, and appropriate storage and/or containment using the color-coding system;</li> <li>• The 'Reuse, Recycle and Reclaiming' waste management approach must be adapted throughout the project to reduce waste and prevent pollution; and</li> <li>• If these activities result in damage or accumulation of contaminated slimes on the bare soil, the contaminated soil must be stripped and disposed of as hazardous waste.</li> </ul>

## 8 IMPLEMENTATION REQUIREMENTS OF THE EMPR

### 8.1 General requirements during the operation

The following measures must be implemented during the operational phase:

- 
- Proper and continuous liaison between JW, all contractors and landowners must take place to ensure that everyone is always informed of construction activities.
  - JW/Contractor must adhere to all conditions of contract, including the EMPr.
  - Proper site management and regular monitoring of site works.
  - Proper documentation and record keeping of all complaints and actions taken.
  - Regular site inspections and good control over the operational process throughout the construction and operational period.
  - Environmental audits to be carried out.

## **8.2 Stormwater Monitoring and Management Plan**

The development of hard surfaces will give rise to greater volumes and velocity of runoff waters during high peak flows. This water will drain into the roads and stormwater management system. Localised flooding may result in negative impacts on bed and banks of the stream course due to the cumulative effects. The proponent must monitor and manage the impacts on the stormwater management systems as per the approved Stormwater Management Plan.

## **8.3 Site Documentation / Reporting**

The following is a list of documentation amongst others, which must be held on site and must be made available to the ECO and/or authorities on request:

- Site daily diary /instruction book/ Incident reports;
- Records of all remediation / rehabilitation activities;
- Copies of ECO reports (management and monitoring);
- EMPr;
- Complaints register;
- Method statements; and
- Environmental Authorisation and Water Use License (WUL).

The standard JW site documentation shall be used to keep records on site. Additionally, all non-compliances of the EA and the WUL will be notified within 48 hours to the Director: Environmental Impact Evaluation and the appropriate DWS official. For the purposes of monitoring and auditing, all records must be kept on-site and easily accessible. These records might be required by an environmental audit team for use when they visit the site to conduct an audit. All parties must sign the paperwork to verify its validity. To ensure that any issues are dealt with quickly and amicably, the ECO must constantly monitor all work locations. When

the ECO is not available, a designated responsible person shall keep abreast of all works to ensure no problems arise.

## 9 MONITORING

Monitoring is necessary to make sure that the receiving environment at the study area is appropriately protected against the potential impacts that have been identified as well as to make sure that the EMP standards are implemented and followed to the letter during the construction phase.

### 9.1.1 Baseline Monitoring

By assessing the deviation from the baseline conditions and the importance of the detrimental consequences that result, baseline monitoring aims to ascertain the state of the receiving environment prior to construction and serves as a benchmark for measuring the project's residual effects. Table 10 shows the environmental parameters to be used in the baseline monitoring.

**Table 10: Baseline Monitoring Requirements**

Environmental Parameter	Monitoring Locations	Requirements
Water Quality	All major watercourses to be affected by the project, Sites to be located at suitable locations up- and downstream. Water Quality of the construction sites and in-stream works. In situ water quality monitoring to be conducted.	Comply with relevant works, to be determined in consultation standards - SANS 5667.
Air Quality	Dust fallout units to be located taking into consideration significant receptors of air pollution, sensitive receptors, and dominant wind direction.  Particulate matter (PM10) – strategic monitoring points (s) to be selected.	Dust fallout – comply with ASTM D1739; SANS 1929, SANS 69  Particulate matter (PM10) – comply with the National Ambient Air Quality Standards.
Noise	Noise monitoring sampling sites to be located taking into consideration significant sources of noise, sensitive receptors, and dominant with dust fallout sites (where relevant)	Comply with SANS 10103:2008

### 9.1.2 Compliance Monitoring

Compliance monitoring will commence in the pre-construction phase, where those conditions in the EA that need to be adhered to prior to project implementation will need to be checked and recorded. Compliance monitoring will be completed at the end of the defects liability period to check the performance of rehabilitation measures and whether the related objectives have been met.

The ECO will undertake weekly monitoring against the requirements stipulated in the EMPr and EA. Compliance monitoring with the EA and EMPr must be conducted in accordance with Regulation 34 of GN No. R 982 (04 December 2014) in terms of the following:

The proponent must, for the period during which the EA and EMPr, remain valid -

- Ensure that the compliance with the conditions of the EA and EMPr is monitored; and
- Submit an environmental monitoring reports to the CA.

The environmental monitoring report must -

- Be prepared by an independent person with the relevant environmental monitoring expertise;
- Provide verifiable findings, in a structured and systematic manner, on –

i. The level of performance against and compliance of an organization or project with the provisions of the requisite EA or EMPr; and

ii. The ability of the measures contained in the EMPr, to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity:

- Contain the information set out in Appendix 7 of GN No. R 982 (04 December 2014); and
- Be conducted and submitted to the CA at intervals as indicated in the EA.

A document handling system must be established to ensure accurate updating of EMPr documents, and availability of all documents required for the effective functioning of the EMPr. Supplementary EMPr documentation could include:

- Method Statements;
- Site instructions;
- Emergency preparedness and response procedures;
- Record of environmental incidents;
- Non-conformance register;
- Training records;
- Site inspection reports;
- Monitoring reports;
- Auditing reports; and
- Public complaints register (single register for maintained for overall site).

The Contractor shall also develop and submit a Site Layout Plan illustrating the planned site layout, access routes, storage facilities, site camp area, parking areas, etc. This Site Layout Plan must first be approved by the Engineer and ECO prior to site establishment activities commencing.



### **9.1.3 Undertaking audits**

The Developer or PM shall appoint a qualified and experienced external environmental auditor to undertake at frequency as determined by the Competent Authority (CA) stipulated in the relevant Environmental Authorisation. The audits are to verify the projects compliance with the EMPr and conditions of the Environmental Authorisation.

The audit reports must be forwarded to the Competent Authority by the ECO a frequency stipulated in the Environmental Authorisation (EA). Evidence of the following as key performance indicators, must be included in the audit reports where required:

- Comments from the public relating to the project during construction.
- Environmental incidents, such as oil spills, concrete spills, etc. and actions taken (litigation excluded).
- Incidents leading to litigation and legal contraventions.
- Environmental damage that needs rehabilitation measures to be taken.

Copies of all monitoring reports, EMPr and contractor method statements documentation must be kept on site and be made available to the Department or officials upon request.

### **9.1.4 Compliance with the EMPr**

The Developer and/or its agents are deemed not to have complied with the EMPr and remedial action if:

- There is evidence of a contravention of the EMPr clauses within the boundaries of the site or extensions;
- Environmental damage ensues due to negligence; and
- The Developer fails to comply with corrective or other instructions issued by the PM, within a time specified by the PM.

### **9.1.5 Non-Compliance**

The Contractor is deemed NOT to have complied with the EMPr if:

- Damage to the environment due to non-compliance to EMPr requirements;
- The Contractor fails to comply with corrective or other instructions issued by the ECO within the specified time allocation, and
- The Contractor fails to respond adequately to complaints from the public in line with requirements of this EMPr.

## 9.2 Implementation of Corrective Action

Checking and corrective action forms part of the environmental management function and is aimed at ensuring that the necessary environmental management activities are being implemented and that the desired outcomes are achieved. When non-conformities do occur that have a negative impact on the environment, these should be rectified by the implementation of corrective actions issued by the PM, in consultation with the ECO, within a reasonable or agreed period. All corrective actions need to be documented and the outcome photographed and included in the next report. Broadly, the mechanisms for addressing non-compliance that are provided for in the environmental specifications and associated contract documentation can be divided into the following categories:

- Controlling performance via the certification of payments;
- Requiring the Project Manager to “make good”, at their own cost, any unjustifiable environmental degradation;
- Implementing a system of penalties to dissuade environmentally risky behaviours;
- Removing environmentally non-compliant staff/ plant from the site, or suspending part or all of the activities on-site;

## 9.3 Environmental Contact Person

**Table 11: Details of a contact person**

Contact Person	Ms. Joyce Ngobebe
Designation	Environmental Manager
Telephone	011 688 1443
E-mail	joyce.ngobebe@jwater.co.za

## 9.4 Emergency Numbers

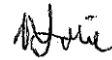
- Police: 10111
- Ambulance 10177
- Netcare 911 082 911
- ER24 084 124
- Crimestop 08600 10 111

---

**ZITHOLELE CONSULTING (PTY) LTD**



Londolani Sitsula  
**Environmental Assessment Practitioner**



Natasha Lalie  
**Project Manager**

**APPENDIX A: EAP CVs**



## Londolani Sitsula

### KEY EXPERIENCE

Londolani is an experienced environmental consultant with extensive experience in environmental management systems, sustainability, and waste management. She has a thorough understanding of the potential environmental and social impacts of project activities in a variety of settings, and solid working knowledge of applicable regulatory programs and guidelines.

Londolani has experience in conducting Environmental Impact Assessments, waste management and water use license applications, environmental site inspections and compliance audits, as well as ensuring environmental compliance and monitoring while upholding the most exacting standards of individual and team excellence.

### PROJECT EXPERIENCE

**2023 Mining Right Application for Sand and Aggregates R 320 000**  
Scoping and Environmental Impact Report and Water Use Licence Application for the mining of Sand (general), Silica Sand, Quartzite and Dimension Stone in respect of Portion 30 of the Farm Boschoek 385 IR in Heidelberg, Gauteng Province.

**2023 Mining Right Application for Sand and Aggregates R 320 000**  
Water Use License application for the mining of coal in Respect of the Farm Panfontein 437 IR in Midvaal, Gauteng Province.

**2023 Reclamation of the tailings residues, processing of the waste rock and decommissioning of the waste facilities R 135 000**  
Waste Management License Application for the reclamation of the tailings residues, processing of the waste rock and decommissioning of the waste facilities, in the remaining extent of Portion 70 Blyvooruitzicht 116IR in Carltonville, Gauteng Province.

**2023 Prospecting Right Application for Industrial Minerals R 191 500**  
Basic Assessment for the proposed prospecting project is in respect of Portion 11,15, 16, 17 a Portion of Portion 2 and a Portion of Portion14 of the farm Onbekend 398 JR as well as Portion 8, 9, 13, 14, 15, 16, 17, 19, 43 and the R/E of portion 3 of the farm Kameelzynkraal 547 JR in Bronkhorstspruit in the Gauteng Province.

### Professional Registrations:

- (EAPASA) Environmental Assessment Practitioners Association of South Africa

### Position:

- Environmental Assessment Practitioner

### Occupation:

- Senior Environmental Scientist

### Specialisation:

- Environmental Impact Assessments
- Water Use Licence Applications
- Waste Management Licence Applications
- Prospecting and Mine Closure Certificate Applications
- Duty of Care in terms of Section 28 of NEMA applications
- Prospecting, Mining rights and Permits Applications
- Environmental Compliance Audits
- Financial Provision Review
- GIS

### Education:

- BES, Mining and Environmental Geology, 2017, University of Venda.

<b>2023</b>	<b>Hekpoort Mining Right application for Sand (general)</b>	<b>R 55 000</b>
	Public Participation Process for a Scoping Process for the proposed mining development in respect of Portion 358 of the farm Hekpoort 504 JQ in Krugersdorp, Gauteng Province.	
<b>2023</b>	<b>Caracode Stone, Aggregates and Sand Mine Operation</b>	<b>R 45 000</b>
	Environmental Audit and Financial Provision Review for the mining of stone, aggregate and sand (general) in respect of Portion 117 of the Remainder of Farm Doornrandjies 386 JR in Pretoria.	
<b>2022</b>	<b>Benoni Gold, Sand and Aggregates Mine Operation</b>	<b>R 45 000</b>
	Environmental Audit for the mining of sand aggregate and gold in respect of the Remainder of Portion 1 and 82 of the Farm Kleinfontein 76 IR, Remainder of Portion 1 of the Farm Modderfontein 76 IR, Remaining Extent of the Farm Benoni 77 IR and Portion 103 of the Farm Rietfontein 115 IR in Benoni, Gauteng Province.	
<b>2022</b>	<b>Mining Permit Application for Sand (general)</b>	<b>R 130 000</b>
	Basic Assessment for the proposed mining of sand (general) situated in the Remainder of the Farm Kleinklipkop 287 JR in Cullinan, Gauteng Province.	
<b>2022</b>	<b>Blits Sand Mine Operation</b>	<b>R 45 000</b>
	Environmental Audit and Financial Provision Review for the mining of sand (general) situated in the Remainder of the Farm Kleinklipkop 287 JR in Cullinan, Gauteng Province.	
<b>2022</b>	<b>Maphasedi Prospecting Right Application</b>	<b>R 165 000</b>
	Basic Assessment for the proposed prospecting activities in respect of the Farm Bullamon 398 in Kuruman, Northern Cape Province.	
<b>2022</b>	<b>Gomezza Prospecting Right Application</b>	<b>R 170 000</b>
	Basic Assessment for the proposed prospecting activities in respect of the Farm Weymouth No.425 in Kuruman, Northern Cape Province.	
<b>2022</b>	<b>Gomezza Prospecting Right Application</b>	<b>R 170 000</b>
	Basic Assessment for the proposed prospecting activities in respect Portion 1 and 4 of the Farm Zeekoebar No. 9 in Kuruman, Northern Cape Province.	
<b>2022</b>	<b>Gomezza Prospecting Right Application</b>	<b>R 185 000</b>
	Basic Assessment for the proposed prospecting activities in respect of the Farms Severn No. 36, Burnham No. 60, Cannock No. 59, Tamar No. 37, Kirkby No. 58, Duse No. 38, Holt No. 57, Cork No. 39, Bromley No. 40, Nu Bromley No. 62, Leominster No. 56, Jebolo No. 758, Tierbos No. 731 in Kuruman, Northern Cape Province.	
<b>2022</b>	<b>Roodepoort Duty of Care and Remediation</b>	<b>R 30 000</b>
	Rehabilitation and clean-up in terms of Section 28 of the National Environmental Management Act, (act 107 of 1998) duty of care and remediation of environmental damage on a Portion of the Farm Roodepoort 237 1 IQ in Roodepoort, Gauteng Province.	
<b>2022</b>	<b>Carltonville Duty of Care and Remediation</b>	<b>R 30 000</b>
	Rehabilitation and clean-up in terms of Section 28 of the National Environmental Management Act, (act 107 of 1998) duty of care and remediation of environmental damage on the footprint area as per the sales agreement with the liquidators in Carletonville, Gauteng Province.	
<b>2022</b>	<b>Decommissioning and Rehabilitation of a Tailings Dump</b>	<b>R 110 000</b>
	Waste Management License for the proposed decommission and rehabilitation of existing tailings dump on Portion of Portion 34 of the farm Weltevreden 118 IR in Brakpan, Gauteng Province.	
<b>2021</b>	<b>Closure Certificate for a Prospecting Right</b>	<b>R 45 000</b>
	Application for a Closure Certificate in terms of Section 43 of the MPRDA for the prospecting of clay situated in Portion 2 of the Farm Uitval 280 IQ in Westonaria, Gauteng Province.	
<b>2021</b>	<b>Closure Certificate for a Prospecting Right</b>	<b>R 45 000</b>
	Application for a Closure Certificate in terms of Section 43 of the MPRDA for the prospecting of clay situated in Portion 1 of the Farm Zuurbekom 297 IQ in Westonaria, Gauteng Province.	
<b>2021</b>	<b>Johannesburg Duty of Care and Remediation</b>	<b>R 30 000</b>



Rehabilitation and clean-up operations in terms Section 28 of the National Environmental Management Act 107 of 1998 (NEMA), the duty of care for the removal of Waste Keyser Mine Dump situated on Nadine Road on the Stand 00000226-00064-00 of the Farm Paardekral 226 IR in Johannesburg, Gauteng Province .

## EMPLOYMENT RECORD

2023 - Present	Zitholele Consulting	Environmental Assessment Practitioner
2021 - 2023	Vahlengwe Mining Advisory and Consulting (VMAC)	Senior Environmental Consultant
2017 - 2019	Department of Mineral Resources and Energy (DMRE)	Intern: Mine Economics
2017 - 2017	Selahle Consultancy and Projects (SCP)	Environmental Assistant