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ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

The proposed Upgrading of the existing Bushkoppie Wastewater Treatment Works (WwTW) located within the Gauteng Province

GDARD Reference No.: Gaut 002/19-20/E0028.

Report No: 19043-46-Rep-001-BK BA & WULA EMPr-Rev0

Submitted on behalf of :

Johannesburg Water SOC Limited
17 Harrison Street
Marshalltown
Johannesburg
2107

25 October 2019 19043

DOCUMENT CONTROL SHEET

Project Title: **EMPr for the proposed upgrading of the existing Bushkoppie Wastewater Treatment Works (WwTW) located within the Gauteng Province**

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DOCUMENT APPROVAL

ACTION	DESIGNATION	NAME	DATE	SIGNATURE
Prepared	Junior EAP	Jessica Morwasehla	09 September 2019	
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Approved	Civil Engineer	Neil Govender	03 October 2019	

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ACROYNYMS

Acronym	Description
BA	Basic Assessment
BAR	Basic Assessment Report
CA	Competent Authority
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EO	Environmental Officer
GDARD	Gauteng Department of Agriculture and Rural Development
GDB	Grit Drying Bed
JW	Johannesburg Water
MS	Method Statement
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
OHS	Occupational Health and Safety Act 85 of 1993
PAIA	Promotion of Access to Information Act 2 of 2000
PM	Project Manager
PPE	Personal Protection Equipment
PPP	Public Participation Process
WwTW	Wastewater Treatment Works

GLOSSARY OF TERMS

Term	Description
Alien species	A species that is not indigenous to the area or out of its natural distribution range.
Alternatives	Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.
Alternatives	Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.
Ambient sound level	Background noise level already present in the environment (in the absence of noise generated by any other proposed development).
Assessment	The process or collecting, organising, analysing, interpreting and communicating information which is relevant.
Commencement	The start of any physical activity, including site preparation and any other activity on site resulting in the furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.
Commissioning	Commissioning commences once construction is completed. Commissioning covers all activities including testing after all components of the power station are installed.
Construction	Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity. Construction begins with any activity which requires Environmental Authorisation.
Construction Activity	A Construction activity is any action taken by the Contractor, his subcontractors, suppliers or personnel during the Construction process.
Contractor	Any legal entity or consortium contracted to undertake the activity associated with the proposed project.
Decommissioning	Means to take out the active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned.
Development	Means the building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthwork or borrow pits, that is necessary or 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.
Development footprint	Means any evidence of physical alteration as a result of the undertaking of any activity.
Environment	Environment means the surroundings within which humans exist and that are made up of – (i) the land, water and atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
Environmental Aspect	Element of an organization's activities or products or services that can interact with the environment.
Environmental Control Officer (ECO)	The person to be appointed by the Contractor, with the approval of the Engineer, to oversee the construction activities and to ensure that all environmental specifications and EMPr obligations are met during these

Term	Description
	phases. The ECO will be responsible for the monitoring, reviewing and verifying of compliance with the EMPr by the Contractor.
Environmental Assessment Practitioner	Individual responsible for the planning, management, coordination or review of Environmental Impact Assessments, Strategic Environmental Assessments, Environmental Management Programmes or any other appropriate environmental instruments introduced through regulations.
Environmental Impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.
Habitat	The place in which a species or ecological community occurs naturally.
Hazardous waste	Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment (Van der Linde and Feris, 2010; pg 185).
Heritage	That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000
Indigenous	All biological organisms that occurred naturally within the study area prior to 1800
Interested and Affected Party	Interested and Affected Party for the purposes of Chapter 5 of the NEMA and in relation to the assessment of the environmental impact of a listed activity or related activity, means an interested and affected party contemplated in Section 24(4)(a)(v) of the NEMA and which includes - a) Any person, group of persons or organisation interested in or affected by such operation or activity; and b) Any organ of stale that may have jurisdiction over any aspect of the operation or activity.
Maintenance	Means actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint.
Pollution	Pollution means any change in the environment caused by - (i) substances; (ii) radioactive or other waves; or (iii) noise, odours, dust or heat, emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future.
Pre-construction	The period prior to the commencement of construction, which may include activities (e.g. geotechnical surveys) which do not require Environmental Authorisation.
Significant impact	An impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.
Waste	Any substance, whether or not that substance can be reduced re-used, recycled and recovered; that is surplus, unwanted, rejected, discarded, abandoned or disposed of which the generator has no further use for the purposes of production. Any product which must be treated and disposed of, that is identified as waste by the minister of Environmental affairs (by notice in the Gazette) and includes waste generated by the mining, medical or other sectors, but: A by-product is not considered waste, and portion of waste, once re-used, recycled and recovered, ceases to be waste.

1 INTRODUCTION AND BACKGROUND

Johannesburg Water is proposing, as part of upgrading and refurbishment of the Bushkoppie WwTW to construct two new Primary Sedimentation Tanks (PSTs); construction of grit drying beds (GDB); the construction of new wash water pump station (WWPS) and associated infrastructure to assist the Works with the processing of the sewage inflow it receives. The project site is located within the existing Bushkoppie Wastewater Treatment Works which is situated on the Farm Misgund 322 IQ in the southern areas of Johannesburg, Gauteng Province. The site can be accessed via Stockwell Ave which is located on the western boundary of the study area. (refer to **Error! Reference source not found.**).

Figure 1-1: Location of the Bushkoppie WwTW

The proposed upgrading and refurbishment of the facility will take place on a property that is approximately 562.5532 hectares in extent. It will also entail construction of the following infrastructure and facilities:

- Construction of two new 35m diameter Primary Sedimentation Tanks (PSTs): ~1995m^2 ;
- Construction of a– New Blower Building for Module 2 Head of Works (HoW): ~63m^2 ;
- Trash screen and bunded area: ~212m^2;
- Construction of grit drying beds (GDB): ~6106m^2;
- The relocation of the lime silo to a new position: 75m^2;
- Construction of a new Primary Sludge Pump Station: ~64m^2;
- Construction of new terrace including retaining walls for new PSTs: ~210m long with a maximum height of 4.5m;
- Construction of new wash water pump station (WWPS): ~195m^2;
- Installation of a Wash water storage tank: 75m^2 (240m^3); and
- Associated ancillary works.

The activities required for the proposed upgrading of infrastructure within the existing Bushkoppie WwTW fall within the ambit of the National Environmental Management Act (107 of 1998) and as such require Environmental Authorisation (EA) before the activities can proceed.

2 GENERAL OBJECTIVES AND PURPOSE OF EMPr

The application of the Basic Assessment (BA) process, for the proposed project, serves as a pre-decision-making Environmental Management Tool for determining and evaluating the significance of the environmental consequences that the implementation of the project activities will have. The environmental consequences (i.e environmental impacts) and mitigation measures formulated to manage these impacts assist in informing the Competent Authority (CA) to make an informed decision. Mitigation measures provided from this document if accepted by the CA they are translated into the enforceable EA conditions.

Johannesburg Water (applicant) together with the contractors appointed to undertake the development activities will be required to:

- Manage and operate their activities with due care and diligence;
- Avoid and/or limit any adverse impacts they may have on the environment by the proper design and construction of the proposed development;
- Control predicted impacts that may occur so as to meet acceptable standards, both as a legal and a moral responsibility to the environment within which they operate; and
- Ensure transparency in their operation and environmental management of the site.

This Environmental Management Programme (EMPr) serves as a stand-alone document to be issued to and used by Johannesburg Water (applicant), the contractor/s, sub-consultants and project managers (PMs) /supervisors during the construction and operational phases of the project. By its very nature, the EMPr is a dynamic document and updating may be required over the life of the development.

3 DOCUMENT ROADMAP

The EMPr document has been structured and collated to conform to Section 19(4) read with Appendix 4 of the National Environmental Management Act 107 of 1998 (NEMA) (as amended) Environmental Impact Assessment (EIA) Regulation 2014. The relevant document parts which addresses each of the aspects provided in Appendix 4 of the NEMA EIA Regulation 2014 is provided in **Table 3-1**. This has been done to ensure that the Competent Authority (CA) (i.e. GDARD) is provided with a comprehensive document that can be translated into a working / dynamic document during the Construction and Operational Phases of the proposed project.

It should be noted that obligations imposed by the EMPr are legally binding in terms of the environmental statutory legislation. Non-compliance to environmental law is a criminal offence and if prosecuted Johannesburg Water (JW) will be liable for any environmental damage incurred.

Table 3-1: Document Roadmap

Relevant regulation, stipulation or condition			Relevant Document Part
- **Appendix 4**			
1. An EMPr must comply with section 24N of the Act and include-			
(a)	details of -		
	(i)	the EAP (Environmental Assessment Practitioner) who prepared the EMPr; and	Section 5
	(ii)	the expertise of that EAP to prepare an EMPr, including curriculum vitae;	Section 5
(b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;		Section 4
(c)	prepared map at an appropriate scale which superimpose 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 4
(d)	assessment description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-		
	(i)	Planning and design;	Section 10
	(ii)	Pre-construction activities;	Section 10
	(iii)	Construction activities	Section 10
	(iv)	Rehabilitation of the environment after construction and where applicable post closure; and	Section 17
	(v)	Where relevant, operational activities	Section 10
(e)	a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);		Section 10
(f)	a description of the proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to-		
	(i)	Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	Section 10 & 15
	(ii)	Comply with any prescribed environmental management standards or practices;	Section 7
	(iii)	Comply with any applicable provisions of the Act regarding 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 implantation of the impact management actions contemplated in paragraph (f);		Section 10, 14, 15 & 16
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);		Section 15
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;		Section 9 & 15
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;		Section 15
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);		Section 11 & 15 & 16
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;		Section 16

Relevant regulation, stipulation or condition			Relevant Document Part
(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 13
	(ii)	Risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 15
(n)	any specific information that may be required by the competent authority		Not Applicable

4 PROJECT DESCRIPTION

4.1 Study Area

Description of the Study Area

The project site is located within the existing Bushkoppie WwWT, which is situated on the Farm Misgund 322 IQ in the southern areas of Johannesburg. The site can be accessed via Stockwell Ave which is located on the western boundary of the study area. It is located south of the settlement of Eldorado Park in Soweto under the jurisdiction of the City of Johannesburg Municipality, Gauteng Province. The site is approximately 13148m^2 in extent.

Table 2: Description of the proposed site

	Description
Farm Name	Farm Misgund 322 IQ
Farm Portion	Portion 2
SD Code	T0IQ00000000032200002
Extent of the Project site	~562.5532ha
Development Footprint	~13148m^2
Central Co-ordinates	26° 18’41.57” S 27° 55’50.95” E
Land Zoning	Urban Development Zone
Nearest Suburbs	Southern side of the site Eldorado Park, Devland and Naturena. North- northeast of the Zakariyya Park.

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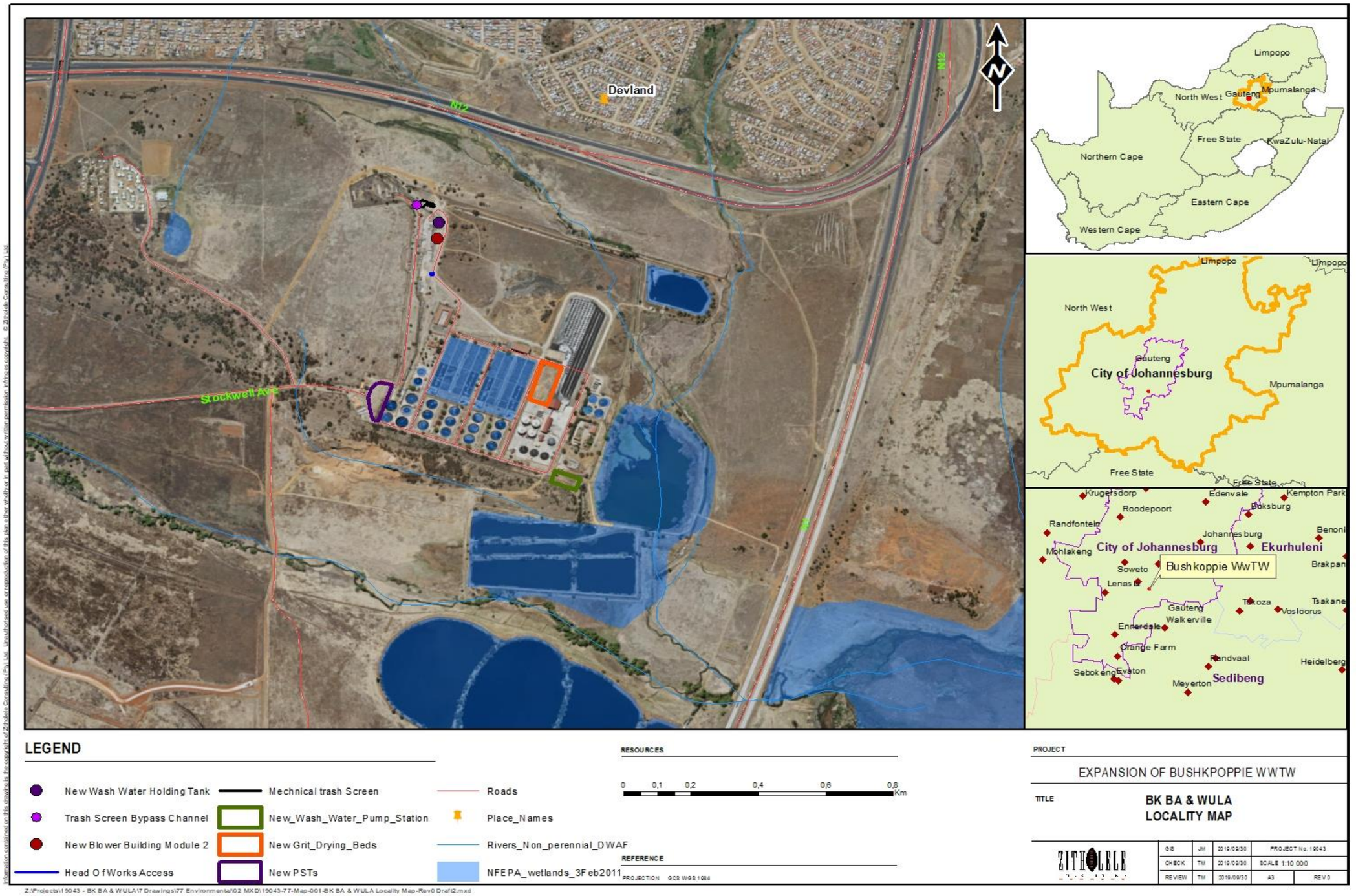


Figure 4-1: Location of the proposed new infrastructure

4.2 Project Activities

The proposed upgrade entails construction of the following infrastructure and facilities:

- Construction of two new 35m diameter Primary Sedimentation Tanks (PSTs): ~9995m^2;
- Construction of a– New Blower Building for Module 2 Head of Works (HoW): ~63m^2;
- Trash screen and bunded area: ~212m^2;
- Construction of grit drying beds (GDB): ~61064m^2;
- The relocation of the lime silo to a new position: 75m^2;
- Construction of a new Primary Sludge Pump Station: ~64m^2;
- Construction of new terrace including retaining walls for new PSTs: ~210m long with a maximum of 4.5m high;
- Construction of new wash water pump station (WWPS): ~195m^2;
- Installation of a wash water storage tank: 75m^2 (240m^3); and
- Associated ancillary works.

Need and desirability

The Bushkoppie Wastewater Treatment Works is situated on the Farm Misgund 322-IQ within the jurisdiction of City of Johannesburg Municipality, Gauteng Province. Bushkoppie WwTW receives wastewater from the southern areas of Johannesburg via the South Eastern Outfall sewer and from the south western areas of Johannesburg, Soweto and parts of Roodepoort through the Bushkoppie Phase 1 and 2 outfall sewers. Due to the large volume of grit and solids in the incoming wastewater, there is a strain on the preliminary treatment resulting in many process units not performing as required. The proposed upgrade is required to improve process performance, effluent quality from the plant and assist with ongoing operations.

4.3 Description of Project Component

4.3.1 Pre-Construction and Construction process for the proposed development

The construction of the proposed development will be undertaken in the following steps:

- Undertaking and completion of proposed development concept;
- Undertaking Environmental Authorization application and environmental impact assessment process;
- Pre-Construction site work, such as geotechnical investigations;
- Undertaking of and compliance with pre-construction activities and conditions in terms of the Environmental Authorization;
- Site preparation (Vegetation clearance);
- Demolishing of the existing infrastructure;
- Civil work and construction: Casting of new foundations and plinths for the proposed development;
- Construction of the PSTs and associated infrastructures;

- Construction and/or installation of water supply, interconnecting pipework and storm water management infrastructure; and
- Testing and commissioning.

The construction phase for the proposed project will take approximately 1 years.

4.3.2 Operational activities

During the operational and maintenance phase of the project, the applicant will ensure that operation and maintenance activities are carried out by suitably qualified individuals as the activities are specialized. For the activities to be carried out during operational phase refer to project activities discussed above.

4.3.3 Decommissioning activities

Decommissioning of the proposed activities is neither envisioned nor feasible at this stage. Relevant legislation will be applied once the project has reached the decommissioning phase.

5 DETAILS AND EXPERTISE OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

In terms of the National Environmental Management Act, (Act 107 of 1998) as amended (NEMA) and EIA Regulations (2014), the proponent/developer must appoint an Environmental Assessment Practitioner (EAP) to undertake a BA and/or Public Participation Process (PPP) for listed activities regulated in terms of the aforementioned act. In this regard, Johannesburg Water has appointed Zitholele Consulting (Pty) Ltd as the EAP on this project to undertake the BA process for the proposed project, in accordance with the aforementioned regulations.

Zitholele is an empowerment company formed to provide specialist consulting services primarily to the public sector in the fields of Water Engineering, Integrated Water Resource Management, Environmental and Waste Services, Communication (public participation and awareness creation) and Livelihoods and Economic Development.

Zitholele Consulting has no vested interest in the proposed project and hereby declares its independence as required by the EIA Regulations (2014, as amended).

This EMPr report has been compiled by the following persons who have the relevant expertise and experience in environmental management (see attached CV in **Appendix A**):

Table 5-1: Details of EAP on this project

Name and Surname	**Tebogo Mapinga**
Highest Qualification	BSc (Zoology & Physiology)
Professional Registration	Pr.Sci.Nat. (115518)
Company Represented	Zitholele Consulting (Pty) Ltd.
Physical Address	Building 1, Maxwell Office Park, Magwa Crescent West, Waterfall City, Midrand
Postal Address	P O Box 6002, Halfway House, 1685
Contact Number	011 207 2060
Facsimile	086 674 6121
E-mail	tebogom@zitholele.co.za
Name and Surname	**Jessica Morwasehla**
Highest Qualification	BSc (Environmental and Resource Studies)
Company Represented	Zitholele Consulting (Pty) Ltd.
Physical Address	Building 1, Maxwell Office Park, Magwa Crescent West, Waterfall City, Midrand
Postal Address	P O Box 6002, Halfway House, 1685
Contact Number	011 207 2060
Facsimile	086 674 6121
E-mail	jessicam@zitholele.co.za

Specialist Teams

Specialists were appointed to undertake the relevant assessments to identify assess impacts and propose appropriate mitigation and management measures for the identified impacts. The specialist assessments, that were commissioned include:

- Wetland Assessment – Limosella Consulting Pty Ltd
- Aquatic Fauna and Water Quality Assessment – Limnology (Pty) Ltd
- Heritage Impact Assessment – Heritage Contracts and Archaeological Consulting (HCAC)

6 DETAILS OF PROJECT PROPONENT

The details of the project proponent/Developer are provided in **Table 6-1** below.

Table 6-1: Proponent's details

Applicant name:	Johannesburg Water SOC Limited
Contact person:	Russell Dodding
Responsible position:	Project Manager
Physical address:	17 Harrison Street, Marshalltown, Johannesburg, 2107
Telephone:	011 688 1685
E-mail:	Russell.dodding@jwater.co.za

7 LEGISLATIVE FRAMEWORK

7.1 Legislative Requirements for the EMPr

In terms of Section 19(4) read with Appendix 4 of the Environmental Impact Assessment Regulations, 2014 as amended (EIA Regulations); the EMPr must comply with Section 24N of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) as amended and include.

The implementation of the EMPr for the proposed activity is a requirement by the NEMA EIA Regulations (2014) and is likely to similarly be a condition in the Environmental Authorisation (assuming such), issued by the GDARD. As such, failure to comply with this EMPr will constitute an offence and the client and their Contractor may be liable to penalties and/or legal action. Therefore, it is important for all the responsible parties to understand their duties and undertake them with duty and care.

7.2 Other Applicable Legislation

The client is responsible for compliance with the provisions for duty of care and remediation of damage in accordance with Section 28 of NEMA and its obligations regarding the control of emergency incidents in terms of Section 30 of NEMA. Accordingly, the GDARD must immediately be notified of an incident as defined in subsection 30(1) (a) of NEMA.

Various environmental legislation and policies relate to the proposed activities, including the following listed in **Table 7-1**.

Table 7-1: List of Applicable Legislation

Title of legislation, policy or guideline:	Administering authority:	Promulgation Date:
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended).	National & Provincial	27 November 1998
The Constitution of the Republic of South Africa (Act 106 of 1998)	The Judiciary	18 December 1996
NEMA Environmental Impact Assessment (EIA) Regulations 2014, as amended in April 2017 (published in Government Notice No. R.326)	Gauteng Department of Agriculture and Rural Development (GDARD)	4 December 2014, amended on the 07 April 2018
National Water Act 36 of 1998 (NWA)	Department of Water and Sanitation (DWS)	20 August 1998
Water Service Act 108 of 1997	DWS	19 December 1997
National Environmental Management Waste Act 59 of 2008 (as amended) (NEMWA),	GDARD	10 March 2009 29 November 2013

National Norms and standards for the Storage of Waste (GNR.926 of 29 November 2013)		
National Environmental Management: Biodiversity Act 10 of 2004	GDARD	07 June 2004
National Heritage Resources Act 25 of 1999	The South African Heritage Resources Agency (SAHRA)	28 April 1999
Applicable by-laws of the City of Johannesburg Metropolitan Municipality.	City of Johannesburg Metropolitan Municipality	-

7.3 List of activities associated with the project

The activities that are associated with the proposed project trigger activities listed in Government Notice No. R.983 and R985 (2014). As set out in Regulations 19 of the National Environmental Management Act (NEMA) Environmental Impact Assessment Regulations, 2014, the proposed project is subjected to a BA Process (Government Notice No. R.982). Johannesburg Water SOC Limited has therefore appointed Zitholele Consulting (Pty) Ltd as the independent EAP to undertake the BA Process for the proposed project.

The BAR will be submitted to the GDARD for licensing of the listed activity triggered as indicated in **Table 7-2** below:

Table 7-2: Detailed description of the listed activity associated with the project

Indicate the number of the relevant Government Notice:	**Activity No (s) (relevant notice): e.g. Listing notices 1, 2 or 3**	**Describe each listed activity as per the wording in the listing notices:**
GN 983, 08 Dec 2014 as amended	Activity 34 (Listing Notice 1)	The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amendment or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution. Exclusions are not applicable.
GN 985, 08 Dec 2014 as amended	Activity 12 (Listing Notice 3)	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance is required for maintenance purposes undertaken in accordance with a maintenance management plan.

8 ORGANISATION STRUCTURE

The organisational structure identifies and defines the responsibilities and authority of the various role-players (individuals and organisations) involved in the project. All instructions and official communications regarding environmental matters shall follow the organisational structure shown in Error! Reference source not found. below.

The organisational structure reflected in **Error! Reference source not found.** has been d eveloped to ensure that:

- There are clear channels of communication;
- There is an explicit organisational hierarchy for the integration project; and
- Potential conflicting or contradictory instructions are avoided.

In terms of the defined organisational structure reflected in **Error! Reference source not found.** below, all instructions that relate to environmental matters will be communicated to the Contractor via the Environmental Officer (EO). The only exception to this rule would be in an emergency situation. An emergency is defined as a situation requiring immediate action and where failure to intervene timeously would, in the reasonable opinion of the Environmental Control Officer (ECO), result in unacceptable environmental degradation. In emergency situations instructions may be given directly to the Contractor. The detailed roles and responsibilities of the various role-players identified in the organisational structure are outlined in **Section 9**.

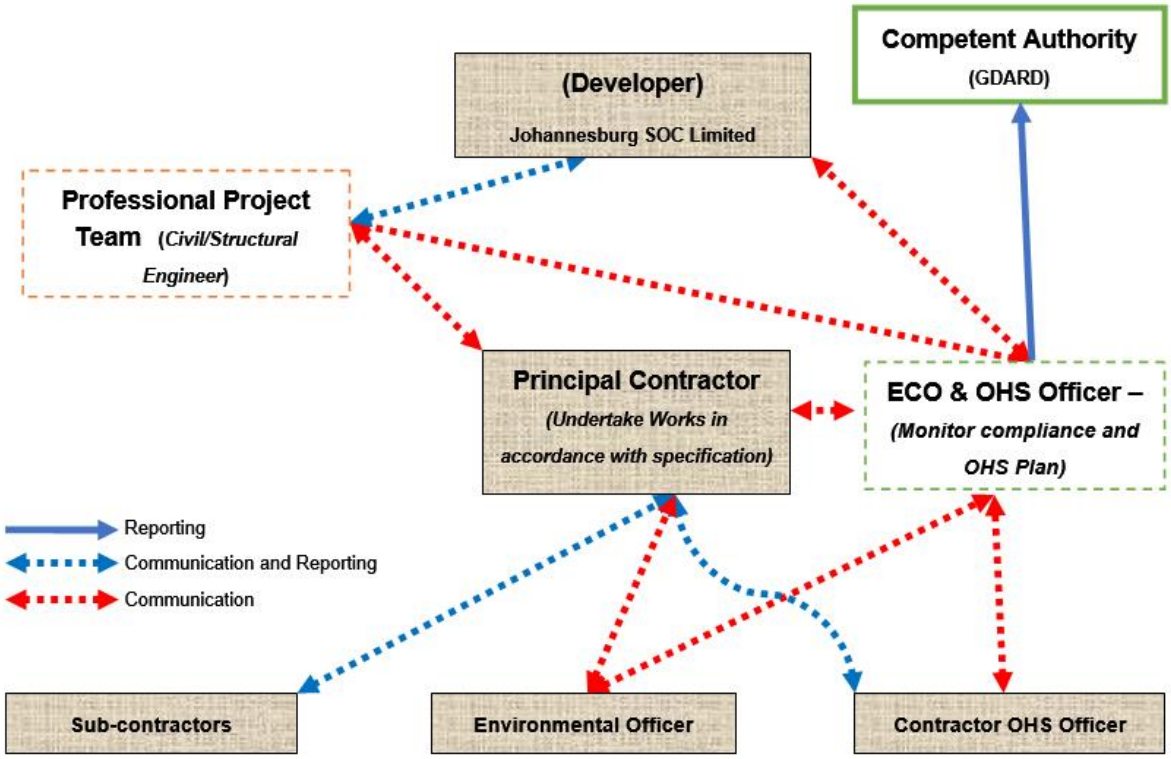


Figure 8-1: Organisational Structure of Environmental Reporting

9 ENVIRONMENTAL ROLES AND RESPONSIBILITIES

The key-role-players for the integration project are the GDARD, the Developer, the ECO and the Contractor. The detailed roles and responsibilities of each of these organisations are outlined below.

9.1 Gauteng Department of Agriculture and Rural Development

As the CA, the GDARD has the responsibility to ensure that the developer complies with the conditions of the EA for this proposed project (once received) as well as the requirements of the broader environmental legislation, specifically the NEMA. Compliance would be confirmed via the following mechanisms:

- Receipt and review of the environmental reporting required in terms of the EA; and
- *Ad hoc* and planned site inspection by the GDARD Compliance and Enforcement.

The successful implementation of this EMPr requires cooperation between the developer, the appointed project management consultant, the appointed contractors and the appointed ECO.

9.2 General roles and responsibilities

General roles and responsibilities have been outlined below (**Table 9-1**) and the project team is required to comply with the conditions defined herein.

Table 9-1: Roles and Responsibilities

Responsible Agent	Role/Responsibility
Developer	The Developer has overall responsibility for ensuring that its operations are undertaken in an environmentally sound and responsible manner, and in particular, reflects the requirements and specifications of the EMPr and recommendations from the relevant authorities. The responsibilities of the Project Developer will be to: • Appoint or designate a suitably qualified Project Manager (PM) to manage the implementation of the proposed development; • Establish and maintain regular and proactive communications with the designated/ appointed PM, Contractor(s) and ECO; and • Ensure that the EMPr is reviewed and updated as necessary. <u>Reporting Structure:</u> The Developer will liaise with and/or take instruction from the following: • Authorities; • ECO; and • General Public.
Project Professional Team (Engineer)	• Enforce the environmental specification on site; • Assess the Contractor's environmental performance in consultation with the Environmental Control Officer from which a brief monthly statement of environmental

Responsible Agent	Role/Responsibility
	performance is drawn up for record purposes and to be reported to project meetings; and • Ensure the documentation, is conjunction with the Contractor, the state of the site prior to construction activities commencing.
The Principal Contractor (Including sub-contractors)	The contractor is required to: • Be fully conversant with the EMPr and all conditions of the EA and WUL. • Supply method statements timeously for all activities requiring special attention as specified and / or requested by the Developer, ECO and/or Engineer during the duration of the Contract. • Be conversant with the requirements of this environmental specification/EMPr. Brief all his/her staff about the requirements of the environmental specification. • Comply with requirements of the ECO/EO in terms of this specification and the project specification, as applicable, within the time period specified. • Ensure any Sub-Contractors/Suppliers who are utilized within the context of the contract comply with the environmental requirements of the project, in terms of the specifications. The Contractor will be held responsible for non-compliance on their behalf. • Bear the cost of any delays, with no extension of time granted, should he or his Sub-Contractors / Suppliers contravene the said specifications such that the Engineer orders a suspension of work. The suspension will be enforced until such time as the offending party, procedure, or equipment is corrected. • Bear the costs of any damages / compensation resulting from non-adherence to the said specifications or written site instructions. • Comply with all applicable legislation. • Ensure that he informs the Engineer timeously of any foreseeable activities which will require input from the Environmental Officer. • The Contractor will conduct all activities in a manner that minimizes disturbance to the natural environment as well as directly affected residents and the public in general. • Appoint a fulltime EO to interpret the EA, EMPr and all other environmental project related reports on behalf of the Construction Contractor.

Responsible Agent	Role/Responsibility
	• Ensure that all facets of the work undertaken are properly and competently directed, guided and executed during construction according to the EMPr; Adherence to laws and standards relevant to the construction of the facility.
ECO	ECO should be a suitably qualified person and should: • Be fully conversant with the EMPr, • Monitor the implementation of the EMP during the construction and rehabilitation phases; • Be familiar with the recommendations and mitigation measure of the associated EMPr for the project. • Ensure site protection measures are implemented on site; • Monitor principal contractor, subcontractors, and the Developer for compliance with the EMPr at all times during the construction and rehabilitation phases of the project. • Monitor all site activities monthly for compliance; • Conduct monthly audits of the site according to the EMPr, and report findings to the Developer/Contractor then the Competent Authority; • Attend all monthly site meetings; • Recommend corrective action for any environmental non-compliance at the site; • Compile a monthly report highlighting any non-compliance issues as well as progress and compliance with the EMPr prescription; • Conduct training with the contractor on the EMPr and general environmental awareness from the start of the project, thereafter, conduct a refresher environmental training once every year; • Order the Contractor to suspend part or all of the works if the Contractor and/or any sub-contractors, suppliers, etc. fail to comply with any aspect of either the EMPr or EA; and • Submit monthly environmental audit reports to GDARD (or as per conditions of EA) during the construction phase.
Occupational Health and Safety (OHS) Officer	The OHS Officer will be responsible for undertaking of the following: • Compilation of a comprehensive project Health and Safety Risk Assessment (HSRA) • Compilation of health and safety specifications based on risks identified; • Reviewing and approval of health and safety plan(s) submitted by appointed Principal Contractor(s);

Responsible Agent	Role/Responsibility
	• Conducting monthly health and safety inspections and compiling monthly OHS reports; • Conducting monthly health and safety audits with audit reports; • Assisting the Developer/Contractor in the investigation of major accident/incidents; • Monitoring of site activities for compliance to the Occupational Health and Safety Act (OHSA) and Regulations; • Establishment and monitoring of project health and safety file; • Monitoring the Principal Contractor(s') health and safety performance; and • Preparation of project close-out reports and submission of project health and safety files to the Client.
Safety, Health and Environmental (SHE) Officer	The Safety, Health and Environmental Officer will: • Be fully conversant with the EMPr; • Be fully conversant with all relevant environmental legislation applicable to the project, and ensure compliance with them; • Compilation of Method Statements together with the Principal Contractor that will specify how potential environmental impacts in line with the requirements of the EMPr will be managed, and, where relevant environmental best practice and how they will practically ensure that the objectives of the EMPr are achieved; • Convey the contents of this EMPr to the construction site staff and discuss the contents in detail with the Contractor; • Undertake regular and comprehensive inspection of the site and surrounding areas in order to monitor compliance with the EMPr; • Take appropriate action if the specifications contained in the EMPr are not followed; • Monitor and verify that environmental impacts are kept to a minimum, as far as possible; • Order the removal from the construction site of any person(s) and/or equipment in contravention of the specifications of the EMPr; • Report any non-compliance or remedial measures that need to be applied to the appropriate environmental authorities, in line with the requirements of the EMPr; • Submitting a report at each site meeting which will document all incidents that have occurred during the period before the site meeting;

Responsible Agent	Role/Responsibility
	• Ensuring that the list of transgressions issued by the ECO is available on request; and • Maintain an environmental register which keeps a record of all incidents which occur on the site during construction. These incidents include: o Public involvement / complaints. o Health and safety incidents. o Incidents involving hazardous materials stored on site. o Non-compliance incidents.

10 ENVIRONMENTAL ISSUES IDENTIFIED

Specialist assessments were conducted for the proposed Project and a summary of the findings have been included below:

10.1 Wetland Assessment:

No wetlands were recorded within the proposed development site. However, two wetland systems were recorded on the larger study area, within the 500m DWS regulated area outside the WWTW site. The southernmost wetland (Klip River) is classified as a Floodplain wetland and the wetland in the central and northern section is classified as an unchannelled valley bottom wetland which drains into the Klip River. This wetland has numerous impoundments, within and adjacent to, the wetlands. It is likely that these impoundments are hydrologically connected to the wetlands and thus has some impacts on the systems. These impoundments are artificial as confirmed by the absence of any impoundments on early historical imagery of 1951 of the area. These historical imageries further indicated the prolonged agricultural impacts on the watercourses. The proposed development site is however well buffered from the wetlands and the wetlands only encroaches into the 500m buffer zone south of the proposed PSTs and associated infrastructure.

10.2 Aquatic Fauna and Water Quality Assessment:

The proposed upgrade of the WwTW is welcomed in order to mitigate the risk of pollution events into a system already highly polluted. This is emulated by the water quality analysis completed for the site. The South African Scoring System (SASS) Present Ecological State PES using MERAI was calculated to E/F. No fish was observed at the sample points-this is possibly due to heavy sewage pollution into the system and altered water quality. Raised Ca and Mg concentrations in combination with increased salts shows the water to be in poor condition.

All environmental assessments (including biodiversity assessments) must always be based on the three main aspects of the National Environmental Management Act, 1998 (Act No. 107 of 1998). These main aspects are the social, the economic, and the environmental aspects of

the proposed development. It is also of concern that these aspects must be in balance and that if one outweighs another, good reasoning be sought to ensure the balance is restored. It must be clearly noted that any development on the study site will have an impact on the aquatic ecosystems and must be authorised in terms of Section 21 of the National Water Act (1998).

10.3 Heritage and Palaeontology Assessment

From a heritage perspective the study area is degraded and there is a low likelihood that any sites of significance will be impacted on by the proposed project.

Overall, the impact of the proposed activity is expected to be **MODERATE TO LOW** as the study site is already heavily impacted by the surrounding activities and land use. The activities will further be mitigated to acceptable levels. A summary of the anticipated environmental impacts associated with each of the project lifecycle phases of the proposed project that were identified during the BA Process is presented in **Table 10-1** and

Table 10-2.

Table 10-1: Summary of Pre-Construction, Construction and Operation Phase Impacts

Proposal

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
PRE-CONSTRUCTION				
Appointment of construction contractor	**5 – Moderate**	• Adopt a local employment policy to maximise the opportunities made available to the local labour force.	**5 – Moderate**	• No improvement on the unemployment conditions in the area and livelihood of the surrounding communities.
CONSTRUCTION PHASE				
➢ **ECOLOGY**				
Loss of plant species of conservation concern due to site clearance.	**1-Low**	• Ensure that vegetation clearing is only in the boundary of the proposed site.	**1- Low**	• Loss of vegetation outside the boundary of the proposed site.
Vegetation and habitat disturbance due to pollution and littering.	**4- Moderate**	• The Contractor should employ personnel on site responsible for preventing and controlling of litter. • Promote good housekeeping with daily clean-ups on site. • Refresher training can be conducted to construction workers with regards to littering, ad hoc veld fires and dumping. • No fires are allowed on site.	**1- Low**	• Loss of vegetation and habitat in the surrounding area.
Soil erosion and dust pollution due to site clearing and vehicle movements.	**3 - Moderate**	• Appropriate measures should be implemented in order to prevent potential soil pollution through fuel and oil leaks and spills and then compliance monitored by an appropriate person. • Make sure construction vehicles are maintained and serviced to prevent oil and fuel leaks. • Emergency on-site maintenance should be done over appropriate drip trays and all	**0 - Low**	• Pollution of water resources and land. • Loss of natural habitats for the biodiversity occurring in the area.

		oil or fuel must be disposed of according to waste regulations. Drip trays must be placed under vehicles and equipment when not in use.		
Potential impact on vegetation and habitat disturbance due to the accidental introduction of alien species.	**3 - Moderate**	• The Contractor implements suitable methods during the construction phase to limit the introduction and spread of alien invasive plant species. • Promote awareness of all personnel. • The establishment of pioneer species should be considered with the natural cycle of rehabilitation of disturbed areas, which assists with erosion control, dust and establishment of more permanent species. This can be controlled during construction phase and thereafter more stringent measures should be implemented during the rehabilitation and post rehabilitation.	**1 - Low**	• Loss of natural habitats for the biodiversity occurring in the area.
Impact on aquatic fauna	**10 - High**	• No further coliform pollution can be released into the system from the WwTW. • Wastewater entering the site is already contaminated by coliforms. Management of this is required as the service provided by the site is specifically the treatment of wastewater. • Implementation of an early warning system to prevent incidences of flooding inundating machinery and decrease risk to human health. • Allowance must be made for overtopping of the banks of the system during flooding events.	**5 - Moderate**	• Loss of aquatic fauna due to pollution of the water courses around the area.
➢ **WATER RESOURCES**				
Change in water flow regime	**11 - High**	• Design of watercourse crossings should ensure no nett negative effect on local or regional hydrology	**4- Moderate**	• May lead to changes in water velocity and the benthic (bottom) structure of the stream/riverbed,

		• Construction methods should be carefully reviewed to ensure the least impact to the watercourse is ensured. • Effective stormwater management should be a priority during the construction phase. This should be monitored as part of the EMP. High energy stormwater input into the watercourses should be prevented at all cost. • Sediment control should be effective and not allow any release of sediment pollution downstream. This should be audited on a weekly basis to demonstrate compliance with upstream conditions. • Where necessary, corrective action should be determined by a team of specialists including engineers, hydrologists and ecologists.		e.g., coarse substrates such as gravels and boulders may be covered by sand and silt, which affects the fish and invertebrates that live there.
Changes in sediment entering and exiting the system	**11 - High**	• Consider the various methods and equipment available and select whichever method(s) that will have the least impact on watercourses. • Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas. • Runoff from the construction area must be managed to avoid erosion and pollution problems. • Implementation of best management practices • Maintain buffer zones to trap sediments	**4- Moderate**	• Sediment deposits in rivers can alter the flow of water and reduce water depth.

		• Monitoring should be done to ensure that sediment pollution is timeously adressed.		
Loss and disturbance of watercourse habitat and fringe vegetation.	**4 - Moderate**	• No development or maintenance infrastructure is allowed within the delineated watercourse or associated buffer zones. • Demarcate the watercourse areas and buffer zones to limit disturbance, clearly mark these areas as no-go areas. • Monitor the establishment of alien invasive species within the areas affected by the construction and take immediate corrective action where invasive species are observed to establish. • Operational activities should not take place within watercourses or buffer zones, nor should edge effects impact on these areas. • Operational activities should not impact on rehabilitated or naturally vegetated areas.	**3- Moderate**	• Loss of aquatic habitat in watercourses in the area.
Changes in water quality due to foreign materials and increased nutrients.	**7 - Moderate**	• Provision of adequate sanitation facilities located outside of the watercourse or its associated buffer zone. • Implementation of appropriate stormwater management around the excavation to prevent the ingress of run-off into the excavation and to prevent contaminated runoff into the watercourse. • The development footprint must be fenced off from the watercourses and no related impacts may be allowed into the watercourse e.g. water runoff from cleaning of equipment, vehicle access etc. • After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land shall	**5 - Moderate**	• Loss of aquatic habitat in watercourses in the area.

		be left in a condition as close as possible to that prior to use. • Maintenance of construction vehicles / equipment should not take place within the watercourse or watercourse buffer. • Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects. • Control of waste discharges and do not allow dirty water from operational activities to enter the watercourse • Treatment of pollution identified should be prioritized accordingly.		
➢ **SOCIAL**				
Increased employment opportunities and economic growth	**16 - High (+)**	• Leverage this through procurement policies that favour local suppliers and businesses.	**16- High (+)**	
Creation of temporary skilled and unskilled job opportunities directly on the project	**16 - High (+)**	• Leverage this through recruitment policies that favour local labour	**16 - High (+)**	• Creating temporary skilled and unskilled job opportunities.
Termination of temporary employment	**16 - High (-)**	• N/A	**16 - High (-)**	• Loss of temporary employment.
➢ **HERITAGE**				
Destruction of Heritage Resources	**1 - Low**	• Where artefacts of cultural significance or fossil material is found on-site, work must cease and reported to the site manager. • It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area. • The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist or	**0 - Low**	• Loss of heritage resources

		palaeontologist for an assessment of the finds who will notify the SAHRA		
➢ **PALAEONTOLOGY**				
Destruction the palaeontological resources	**3 - Moderate**	• Where artefacts of cultural significance or fossil material is found on-site, work must cease and reported to the site manager. • It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area. • The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist or palaeontologist for an assessment of the finds who will notify the SAHRA.	**2 - Low**	• Loss of palaeontological resources.
OPERATION PHASE				
➢ **ECOLOGY**				
Disturbance of faunal species	**3 - Moderate**	• The disturbance of fauna should be minimized. • Animals residing within the designated area shall not be unnecessarily disturbed.	**3 - Low**	• Displacement of animals.
➢ **WATER RESOURCES**				
Altering the surface flow dynamics.	**4 - Moderate**	• Design of watercourse crossings should ensure no nett negative effect on local or regional hydrology. • Operational activities should not take place within watercourses or buffer zones, nor should edge effects impact on these areas. • Operational activities should not impact on rehabilitated or naturally vegetated areas. • Discharged storm water must be released in a controlled manner with a diffuse flow pattern and be accompanied by energy dissipating interventions to prevent erosion.	**2 - Low**	• Decrease in the quality of water and alteration of the drainage pattern.

➢ **SOCIAL**				
Continuous treatment of sewage for the region	**17 – High (+)**	• Control this through maintenance and refurbishment of the plant.	**18 – High (+)**	• The Plant will not be able to contain the growing demand of sewage treatment in a developing country like South Africa.

Table 10-2: Summary of Decommissioning Phase Impacts

NB: The impacts below have been determined for the decommissioning of the proposed construction site. All activities relating to the future decommissioning of the proposed development and the associated infrastructure does not form part of this application and as such would be subject to a separate Environmental Authorisation Process.

Id.	Impact	Description	Nature of Impact (Negative / Positive)	Management Objective / Principle	Level of Mitigation
Decommissioning Phase					
The development is permanent and will not be decommissioned. Only the construction site at the end of the construction period will need decommissioning and rehabilitation.					

11 APPROACH TO CORRECTIVE ACTION

11.1 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 ECO and PM within a reasonable or agreed period of time. 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 Contractor 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 site, or suspending part or all of the activities on site;
- To confirm, upon receipt of the Tender, that the Contractor has made sufficient allowance in his Tender Price for meeting the various environmental requirements; and
- During the tender adjudication process for each Contract, each Contractor should be scored in terms of the aforementioned considerations and allocated an environmental competency score. This score should form a key consideration in the final decision-making regarding the award of the various contracts.

12 MONITORING PROCEDURE

12.1 Monitoring

A monitoring programme will be in place not only to ensure compliance with the EMPr through the contract/work instruction specifications, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required.

As part of the contract or work instruction, JW will stipulate the period and frequency of monitoring required. This will be determined from applicable permits and authorisations from authorities. The Project Manager will ensure that the monitoring is carried out.

12.2 Method Statements

A Method Statement (MS) must be compiled for every activity undertaken by the Contractor which poses a risk to the environment (natural, biophysical and social), and includes the following:

- The MS should be submitted at least 48 hours notice perios prior to the commencement of work to the ECO;
- A MS describes the scope of the intended work in a step by step description to ensure that the ECO / EO understand the Contractors intentions. This will enable them to assist in devising any mitigation measures which would minimise environmental impact during these tasks;
- The ECO may require changes to a MS if it does not comply with the specification or if, in the reasonable opinion of the ECO, the proposal may result in, or carries a greater than reasonable risk of damage to the environment in excess of that permitted by the EMPr or any legislation;
- The Contractor shall carry out the activities in accordance with the approved MS;
- Approved MS shall be readily available on the site and shall be communicated to all relevant personnel;
- Approval of the MS shall not absolve the Contractor from any of his obligations or responsibilities in terms of the contract;
- No claim for delay or additional cost incurred by the Contractor shall be entertained due to inadequacy of a MS;
- For each instance where it is requested that the Contractor submit a MS to the satisfaction of the ECO, the format should clearly indicate as a minimum the following:
    - Responsible person (Name and Identity Number) and an alternative (Name and Identity Number);
    - The applicable requirements provided in all legislation and policies which have a bearing on the proposed activities (refer to **Table 7-1**);
    - Training Requirements;
    - Timing of activities as per the Project / Construction Schedule;
    - Materials, plant and equipment to be used;
    - Proposed construction procedure, including the order in which the activities making up the procedure will be carried out, designed to implement the relevant environmental specifications;
    - The system to be implemented to ensure compliance with the above;
    - Person Protection Equipment (PPE) required;
    - A detailed description of the process of work, methods and materials;
    - Emergency Procedures;
    - Response in the case of a non-compliance; and
    - Other information deemed necessary by the ECO.
- All MS must be signed by the Engineer; and
- Work may not commence until the MS has been approved by the ECO. All MS will form part of the EMPr documentation and are subject to all terms and conditions contained within the EMPr main document.

A Method Statement details how and when a process will be carried out, detailing possible dangers/risks, and the method of control required must be prepared by the Contractor.

- **Site Layout**: The graphical representation with detailed notes of the location, layout and method of establishment of the construction camp must be provided and must include the following:
    - All Contractor's buildings, and/or offices;
    - Lay down areas;
    - Vehicle and plant storage areas, including wash areas;
    - Workshops, if required and approved by ECO;

- Fuel storage and dispensing areas, if required and approved by ECO;
- Cement/concrete batching areas, if required and approved by ECO (including the methods employed for the mixing of concrete and particularly the containment of runoff water from such areas and the method of transportation of concrete);
- Other infrastructure required for the running of the project.

- **Access Routes**: Details, including a drawing, showing where and how the access points and routes will be located and managed must be provided in a MS. Details of fences and gates affected or used during the construction activities, including a drawing showing the location of fences and access gates must be provided.
- **Pollution control**: Expected solid waste types, quantities, methods and frequency of collection and disposal as well as location of disposal sites must be identified and stated in a MS. The MS shall further include methods of minimising, controlling, collecting and disposing of contaminated water, and details of any hazardous substances/materials to be used, together with the transport, storage, handling and disposal procedures for the substances.
- **Safety considerations**: The Contractor shall provide details identifying what safety precautions will be implemented to ensure the safety of all staff, and the general public at large, on site during the life of the project. This will include protective clothing requirements for all types of construction activities on site, including protection against dust, noise, falling objects, and work associated with electricity and working at heights.
- **Emergency procedures**: The Contractor shall provide details regarding all relevant emergency procedures that will be implemented for fire control and accidental leaks and spillages of hazardous substances (including fuel and oil). The Contractor shall further include details of risk reduction measures to be implemented including firefighting equipment, fire prevention procedures and spill kits.
- **Waste management control**: The Contractor shall provide details regarding how solid and liquid waste generated on the construction site and site camp will be collected, stored, transported and disposed of. Details of any service provider(s) appointed to manage this task must also be provided.
- **Storm water and erosion control**: The Contractor shall provide details of how storm water emanating within or adjacent to the construction site may impact on construction activities. Details on how the Contractor will deal with storm water runoff and potential erosion within the construction footprint and servitude must be provided. Details of any service provider(s) appointed to manage this task must also be provided.

Other Method statements to be generated as a minimum includes:

- Bunding;
- Construction site and office/yard establishment;
- Cement mixing / concrete batching/bentonite mixing;
- Contaminated water;
- Dust;
- Environmental monitoring;
- Erosion control;
- Fire, hazardous and/or poisonous substances;
- Fuels and fuel spills (may form part of the item above);
- Storage, handling and decanting of diesel (may form part of the item above);
- Personnel, public and animal safety;
- Rehabilitation of modified environment(s);

- Solid and liquid waste management;
- Sources of materials (including MSDSs);
- Top-soil management;
- Wash areas.

12.3 Envrionmental awareness Plan

In keeping with Section 1(n) of Appendix 4 of the NEMA EIA Regulations this part of the EMPr describes the approach that will be adopted for Environmental Awareness Plan during the Construction Phase of the proposed project. The Environmental Awareness Plan is intended to describe the method that will be adopted by the JW 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 manner in which risks must be managed in order to avoid adverse environmental consequences. Providing Environmental Awareness Training is considered an effective tool for ensuring that the onsite personnel understand how they can play a role in achieving the objectives specified in the EMPr.

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 so as 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;
- Daily toolbox talks at the start of each day with all workers coming on site, where workers might be alerted to particular 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.

The Environmental Awareness Plan should be drawn up by the PM, in consultation with the ECO and EO 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 and *etc.* occur.

12.4 Training

The applicable training will be as follows:

- The EO shall be appropriately trained in environmental management and shall possess the skills necessary to impart environmental management skills to all personnel involved in the construction of the proposed mixed business and residential development;
- The PM and EO shall ensure, on behalf of the Developer, that the employees (including construction workers, engineers, and long-term employees) are adequately trained and understand the management measures provided in the EMPr; and
- All employees shall have an induction presentation on environmental awareness. The cost, venue and logistics shall be for Johannesburg Water's account.

Where possible, training must be conducted in the predominant mother language spoken by the employees. The induction and training shall, as a minimum, include the following:

- The importance of conformance with all the specifications of the EMPr and other environmental policies and procedures;
- The significant 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 EMPr and other environmental policies and procedures;
- The potential consequences of departure from specified operating procedures; and
- The mitigation measures required to be implemented when carrying out their work activities.

12.5 Environmental Authorisation

The ECO shall convey the contents of this EMPr and the conditions of the EA and discuss the contents in detail with the Developer's PM and Contractors. This formal induction training shall be done with all main and sub-contractors. Record of the training dates, people who attended and discussion points shall be kept by the ECO.

13 ENVIRONMENTAL MANAGEMENT MEASURES

The management measures documented in each of the sub-sections below have been compiled using the following information:

- Impact Assessment and mitigation measures documented in the BAR for the proposed establishment of a mixed business and residential development and its operations; and
- Mitigation and management recommendations provided by the specialist studies and EAP.

The mitigation and management measures relating to each anticipated impact are described in **Table 13-1** and **Table 13-2**.

In addition to the above-mentioned information sources, the EMPr should be updated to include the conditions documented in the EA to be received upon approval of the BAR. The Developer should appoint an EAP to amend the EMPr should amendments be required by GDARD.

13.1 Planning Phase

To mitigate the negative environmental impacts, a number of measures will have to be addressed in the design of the project's layout during the planning phase. An inspection must be carried out on the design layout before commencement of the proposed upgrading in order to ensure that the mitigation measures have been incorporated in the design. the developer must obtain any additional environmental permits required (e.g. water use license) before the commencement of construction activities. Copies of permits/licenses must be submitted to the GDARD.

The developer and contractor should plan the placement of lay-down areas and temporary construction accommodation in order to minimise vegetation clearing. A comprehensive rehabilitation plan should be developed for the site

Fourteen (14) days written notice must be given to the Department that the activity will commence. The notification must include a date on which the activity will commence as well as the reference number.

ECO to be appointed prior to the commencement of any authorised activities. Once appointed the name and contact details of the ECO must be submitted to the Director: Compliance Monitoring at the DEA.

It is important that on-going communication with affected and surrounding landowners; and the surrounding communities is maintained during the construction and operational phases of the Project. Adequate planning needs to be undertaken in this regard. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible. a grievance mechanism procedure must be compiled and implemented for the public during both the construction and operational phases of the WwTW. This procedure should include details of the contact person who will be receiving issues raised by interested and affected parties, and the process that will be followed to address issues.

13.2 Construction Phase

Table 13-1: Impacts, Management/ Mitigation Measures during Pre-Construction and Construction Phase

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
1.	Economic benefit to local economy	It should be encouraged that majority of the labour be sourced from within the local pool where possible and if the relevant skills are not available then these should be sought out from surrounding local municipalities or provincial basis where possible. It is likely that the Contractor will be appointed by the project Developer who will hire the necessary employees	Developer / Contractor	Not Applicable	Not Applicable.
2.	The creation of employment opportunities and skills development opportunities during the construction phase for the country and local economy	Enhancement measures: In order to enhance the local employment and business opportunities associated with the construction phase the following measures should be implemented: It is recommended that if practical, a local employment policy is adopted to maximise the opportunities made available to the local labour force (Sourced from City of Johannesburg Municipality). The recruitment selection process should seek to promote gender equality and should aim to optimise the employment of women wherever possible. Efforts need to be employed to enhance indirect local employment/entrepreneurship opportunities by supporting local entrepreneurs as far as possible, where appropriate.	Developer / Contractor	Duration of Construction Phase.	Monthly ECO Audits

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
3.	Impacts on affected and surrounding landowners and land uses	Develop and implement a grievance mechanism for the construction, operational and decommissioning phases of the Project for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	Developer / Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)	An incident reporting system should be used to record non-conformances to the EMPr.
4.	Soil erosion and dust pollution due to site clearing and vehicle movements.	Plant vegetation, such as herbs, pioneer species and small trees, as ground cover to prevent soil erosion. Mulch the soil by putting dead leaves and shredded wood on the soil to prevent the soil eroding. Dust suppression should be done every day to prevent dust pollution.	Contractor / EO / Developer / ECO	Duration of Construction Phase.	Complaints register must be kept at the construction site. No. of dust complaints received will be used to measure the effectiveness of the dust impact mitigation. No. of noise complaints received will be used to measure the effectiveness of the noise impact mitigation.
5.	Changes in sediment entering and exiting the system	Design of watercourse crossings should ensure no nett negative effect on local or regional hydrology Construction methods should be carefully reviewed to ensure the least impact to the watercourse is ensured. Effective stormwater management should be a priority during the construction phase. This should be monitored as part of the EMP. High energy stormwater input into the watercourses should be prevented at all cost. Sediment control should be effective and not allow any release	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
		of sediment pollution downstream. This should be audited on a weekly basis to demonstrate compliance with upstream conditions. Where necessary, corrective action should be determined by a team of specialists including engineers, hydrologists and ecologists			
6.	Impact on aquatic fauna	No further coliform pollution can be released into the system from the WWTW. Water entering the site is already contaminated by coliforms. Management of this is required as the service provided by the site is specifically the treatment of wastewater. A systematic adaptive rehabilitation plan should be compiled. Implementation of an early warning system to prevent incidences of flooding inundating machinery and decrease risk to human health. Allowance must be made for overtopping of the banks of the system during flooding events.	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits
7.	Loss and disturbance of watercourse habitat and fringe vegetation.	No development or maintenance infrastructure is allowed within the delineated watercourse or associated buffer zones. Demarcate the watercourse areas and buffer zones to limit disturbance, clearly mark these areas as no-go areas. Monitor the establishment of alien invasive species within the areas affected by the construction and take immediate corrective action	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
		where invasive species are observed to establish. Operational activities should not take place within watercourses or buffer zones, nor should edge effects impact on these areas. • Operational activities should not impact on rehabilitated or naturally vegetated areas.			
8.	Changes in water quality due to foreign materials and increased nutrients.	Provision of adequate sanitation facilities located outside of the watercourse or its associated buffer zone. Implementation of appropriate stormwater management around the excavation to prevent the ingress of run-off into the excavation and to prevent contaminated runoff into the watercourse. The development footprint must be fenced off from the watercourses and no related impacts may be allowed into the watercourse e.g. water runoff from cleaning of equipment, vehicle access etc. After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land shall be left in a condition as close as possible to that prior to use. Maintenance of construction vehicles / equipment should not take place within the watercourse or watercourse buffer. Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects.	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
		Control of waste discharges and do not allow dirty water from operational activities to enter the watercourse Treatment of pollution identified should be prioritized accordingly.			
9.	Vegetation and habitat disturbance due to pollution and littering	The Contractor should employ personnel on site responsible for preventing and controlling of litter. Promote good housekeeping with daily clean-ups on site. Refresher training can be conducted to construction workers with regards to littering, ad hoc veld fires and dumping. No fires are allowed on site.	Not Applicable.	Not Applicable.	Not Applicable.
10.	Potential impact on vegetation and habitat disturbance due to the accidental introduction of alien species.	The Contractor implements suitable methods during the construction phase to limit the introduction and spread of alien invasive plant species. Promote awareness of all personnel. The establishment of pioneer species should be considered with the natural cycle of rehabilitation of disturbed areas, which assists with erosion control, dust and establishment of more permanent species. This can be controlled during construction phase and thereafter more stringent measures should be implemented during the rehabilitation and post rehabilitation.	Contractor / Developer	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.
11.	Vehicle traffic congestion	Ensure that proper road signage is used.	Contractor / Developer	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
		Limit access to the construction site to construction vehicles only.			
12.	Land/soil pollution from chemical / hydrocarbon spills, litter and waste metals.	Establish a chemical storage area that is suitably designed to contain all spills. Ensure that hydrocarbons are stored in a bunded area with a capacity of 110% of storage volume. Ensure that the bunded area is suitably designed to allow for cleaning and prevent spillage to the environment. Ensure that all vehicles, storage, and usage areas have suitable spill kits. Develop a chemical and hydrocarbon spill procedure. Ensure that chemical and hydrocarbon usage is controlled. No servicing of vehicles onsite. Regular inspection and servicing of vehicles. Develop a spill management procedure for vehicles that may leak accidently. Develop a waste management plan. Ensure that concrete spills are cleaned up. Ensure litter is cleared regularly to designated waste areas. Make sure construction vehicles are maintained and serviced to prevent oil and fuel leaks. Emergency on-site maintenance should be done over appropriate drip trays and all oil or fuel must be disposed of according to waste regulations. Drip trays must be	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
		placed under vehicles and equipment when not in use.			
13.	Pollution may enter ground / surface water	Establish a chemical storage area that is suitably designed to contain all spills. Ensure that hydrocarbons are stored in a bunded area with a capacity of 110% of storage volume. Ensure that the bunded area is suitably designed to allow for cleaning and prevent spillage to the environment. Ensure that all vehicles, storage, and usage areas have suitable spill kits. Develop a chemical and hydrocarbon spill procedure. Ensure that chemical and hydrocarbon usage is controlled.	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.
14.	Fugitive dust emissions (Health impact)	Dust suppression mitigation is recommended.	Contractor / EO / ECO	Duration of Construction Phase.	Complaints register must be kept at the construction site. No. of dust complaints received will be used to measure the effectiveness of the dust impact mitigation.
15.	Erosion and loss of soil resources	Develop a storm water management plan prior to commencement with construction. Use silt traps where necessary. Use bumps, humps, and cut off drains to control water velocity of exposed soils. Stockpile soils from footings in demarcated areas.	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
		Use soil material from footings in rehabilitation of impacted areas wherever possible. Develop a spill management procedure for vehicles that may leak accidently. Develop a waste management plan.			
16.	Sedimentation, siltation, and increased turbidity in surface water	Soil stock piling to be done at the designated area.	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.
17.	Destruction of heritage and palaeontological resources	Where artefacts of cultural significance or fossil material is found on-site, work must cease and reported to the site manager. It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area. The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist or palaeontologist for an assessment of the finds who will notify the SAHRA	Contractor / EO / ECO	Duration of Construction Phase.	Monthly ECO Audits.
18.	Uncontrolled activities may lead to fires	Undertake monitoring to determine if fires have any impact on the surrounding environment, suitable rehabilitation is to be undertaken where necessary. A fire management plan to be established prior to construction commencing. Vegetation is to be cut back in areas where welding is undertaken to prevent fires from occurring.	Contractor / EO / Developer / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
		Fire breaks along the servitude are to be established. Suitable firefighting equipment and training is to be provided.			

13.3 Operational Phase

Table 13-2: Impacts, Management/ Mitigation Measures during Operational Phase

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Operational Phase					
1.	Disturbance of faunal species	The disturbance of fauna should be minimized. Animals residing within the designated area shall not be unnecessarily disturbed.	Developer / Operations Manager	Duration of Operational Phase.	Compliance inspection by the authority.
2.	Pollution may enter ground / surface water	Ensure that all vehicles, storage, and usage areas have suitable spill kits. Develop a chemical and hydrocarbon spill procedure. Ensure that chemical and hydrocarbon usage is controlled.	Operations Manager / Developer	Duration of Operational Phase.	Compliance inspection by the authority.
3.	Altering the surface flow dynamics	Design of watercourse crossings should ensure no nett negative effect on local or regional hydrology. Operational activities should not take place within watercourses or buffer zones, nor should edge effects impact on these areas. Operational activities should not impact on rehabilitated or naturally vegetated areas. Discharged storm water must be released in a controlled manner with a diffuse flow pattern and be accompanied by energy dissipating interventions to prevent erosion.	Operations Manager / Developer	Duration of Operational Phase.	Compliance inspection by the authority.

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Operational Phase					
4.	Energy consumption	Energy-saving awareness activities / notices to be practiced within the development site (both business and residential) areas.	Developer	Duration of Operational Phase.	Not applicable.
5.	Improvement on livelihood of the local communities (positive)	No Mitigation proposed	Developer	Duration of Operational Phase.	Not Applicable.
6.	Influx of people into the area looking for job opportunities (Social Impact)	Employment opportunities must be allocated to residents in the local communities surrounding the development first.	Developer	Duration of Operational Phase.	Not Applicable
7.	Continuous treatment of sewage for the region (Positive)	Control through maintenance and refurbishment of the plant.	Developer	Duration of Operational Phase.	Compliance inspection by the authority.
8.	Improved water management and/or conservation (Positive)	Development designs to incorporate the erosion controls and storm water management infrastructures.	Developer	Duration of Operational Phase.	Compliance inspection by the authority.

13.4 Decommissioning Phase

Table 13-3: Impacts, Management/ Mitigation Measures during Decommissioning Phase

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Decommissioning Phase					
Decommissioning of the proposed activities is neither envisioned nor feasible at this stage. Relevant legislation will be applied once the project has reached the decommissioning phase. .					

14 MONITORING

This chapter deals with Compliance Monitoring as well as specific monitoring requirements, as per the Specialist Studies, during construction and operational phases. The key to a successful EMPr is appropriate monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. An audit of the environmental monitoring and management actions undertaken is essential to ensure that it is effective in operation, is meeting specified goals, and performs in accordance with relevant regulations and standards.

Regular monitoring of all the environmental management measures and components shall be carried out by the Developer's PM and independent ECO to ensure that the provisions of this plan are adhered to. Ongoing and regular reporting of the progress of implementation of this Programme should be done. Various points of compliance will be identified with regard to the various impacts that the construction will have on the environment.

Prior to the start of construction activities, an audit schedule should be drawn up, on basis of the environmental authorisation requirements and with input from ECO. The audit schedule should include target dates for implementation of recommendations and timeframes for submission to the Developer's EM, Developer's appointed PM and GDARD. The audits should be timed to coincide with scheduled project meetings, where possible.

14.1 Auditing

The key to a successful EMPr is appropriate monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. An audit of the environmental monitoring and management actions undertaken is essential to ensure that it is effective in operation, is meeting specified goals, and performs in accordance with relevant regulations and standards.

Regular monitoring of all the environmental management measures and components shall be carried out by the Developer (Johannesburg Water) and the ECO to ensure that the provisions of this plan are adhered to. Ongoing and regular reporting of the progress of implementation of this Programme should be done. Various points of compliance will be identified with regard to the various impacts that the construction will have on the environment.

Inspections and monitoring shall be carried out to assess the implementation of the EMPr. Visual inspections on all environmental aspects shall be carried out on a regular basis.

Prior to the start of construction activities, an audit schedule should be drawn up, on the basis of the EA requirements and with input from ECO. The audit schedule should include target dates for implementation of recommendations and timeframes for submission to the Developer's appointed PM and the GDARD. The audits should be timed to coincide with scheduled project meetings, where possible.

14.2 Site Documentation or Reporting

Site documentation standard shall be used to keep records on site. In addition, all non-compliances to the EA will be reported to the assigned PM within 24 hours. All documents as listed below shall be kept on site and be available for monitoring and auditing purposes. Site inspections by an Environmental Audit team may require access to this documentation for auditing purposes. The documentation shall be signed by all parties to ensure that such documents are legitimate. Regular monitoring of all site works by the ECO is imperative to ensure that all problems encountered are solved punctually and amicably. When the ECO is not available, the PM shall keep abreast of all works to ensure no problems arise.

The following documents must be kept on site:

- An Environmental File which includes:
  - Access negotiations and physical plans
  - Site instruction;
  - Pre-construction audit report;
  - Records of all remediation activities;
  - Copy of the EMPr;
  - Copy of the Environmental Authorisation;
  - Copy of all other licences/permits;
  - Copy of all rehabilitation plans;
  - Copy of the Stormwater Management Plan;
  - Environmental Policy of the Main Contractor;
  - Environmental Method statements compiled by the Contractor;
  - Non-conformance Reports;
- Environmental register, which shall include:
  - Communications Register–including records of complaints, and, minutes and attendance registers of all environmental meetings.
  - Monitoring Results – including environmental monitoring reports, register of audits, Non-Conformance Reports (NCR).
  - Incident book – including copies of notification of Emergencies and Incidents, this must be accompanied by a photographic record.
- Waste Documentation such as Sewerage Disposal Receipts;
- Material Safety Data Sheets for all hazardous substances;
- Water Quality Monitoring reports (if necessary);
- Written Corrective Action Instructions; and
- Notification of Emergencies and Incidents.

The monthly compliance report should include:

- Complaints received from I&APs and details of the actions taken;
- Environmental incidents, spills of hazardous substances, *etc.*
- Environmental damage which requires rehabilitation; and
- Damages of private property such as buildings or crops.

14.3 Environmental Register

The Developer will put in place an Environmental Register. The contractor will ensure that the following information is recorded for all complaints/incidents:

- Nature of complaint/incident.
- Causes of complaint/incident.
- Party/parties responsible for causing complaint/incident.
- Immediate actions undertaken to stop/reduce/contain the causes of the complaint/incident.
- Additional corrective or remedial action taken and/or to be taken to address and to prevent reoccurrence of the complaint/incident.
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions.
- Procedures to be undertaken and/or penalties to be applied if corrective or remedial actions are not implemented.
- Copies of all correspondence received regarding complaints/incidents.

14.4 Non-conformance Report

A Non-Conformance Report (NCR) will be issued to the Contractor as a final step towards rectifying a failure in complying with a requirement of the EMPr. This will be issued by the ECO to the Contractor in writing. Preceding the issuing of an NCR, the Contractor must be given an opportunity to rectify the issue.

Should the ECO assess an incident or issue and find it to be significant (e.g. non-repairable damage to the environment), it will be reported to the relevant authorities and immediately escalated to the level of an NCR. The following information should be recorded in the NCR:

- Details of non-conformance;
- Any plant or equipment involved;
- Any chemicals or hazardous substances involved;
- Work procedures not followed;
- Any other physical aspects.
- Nature of the risk.

- Actions agreed to by all parties following consultation to adequately address the non-conformance in terms of specific control measures and should take the hierarchy of controls into account.
- Agreed timeframe by which the actions documented in the NCR must be carried out.
- ECO should verify that the agreed actions have taken place by the agreed completion date, when completed satisfactorily; the ECO and Contractor should sign the Close-Out portion of the Non-Conformance Form and file it with the contract documentation.

14.5 Environmental Emergency Response

The Contractor's environmental emergency procedures must ensure appropriate responses to unexpected / accidental actions / incidents that could cause environmental impacts. Such incidents may include:

- Accidental discharges to water (i.e. into the watercourse) and land;
- Accidental spillage of hazardous substances (typically oil, petrol, and diesel);
- Accidental toxic emissions into the air; and
- Specific environmental and ecosystem effects from accidental releases or incidents.

The Environmental Emergency Response Plan is separate to the Health and Safety Plan as it is aimed at responding specifically to environmental incidents and must ensure and include the following:

- Construction employees shall be adequately trained in terms of incidents and emergency situations;
- Details of the organisation (i.e. manpower) and responsibilities, accountability and liability of personnel;
- A list of key personnel and contact numbers;
- Details of emergency services (e.g. the fire department / on-site fire detail, spill clean-up services) shall be listed;
- Internal and external communication plans, including prescribed reporting procedures;
- Actions to be taken in the event of different types of emergencies;
- Incident recording, progress reporting and remediation measures to be implemented; and
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.

The Contractor and their sub-contractor(s) must comply with the environmental emergency preparedness and incident and accident-reporting requirements as per the relevant legal requirements.

14.6 Monitoring

14.6.1 Undertaking audits

The Developer or PM shall appoint a qualified and experienced ECO to ensure implementation of and adherence to the EMPr.

The ECO shall conduct audits to ensure that the system for implementation of the EMPr is operating effectively. The audit shall check that a procedure is in place to ensure that:

- The EMPr and the Method Statements being used are the up to date versions;
- Variations to the EMPr, Method Statements and non-compliances and corrective actions are documented; and
- Emergency procedures are in place and effectively communicated to personnel.

The audit programme shall consist of the following at a minimum:

- First audit no later than 1 month after EA is obtained; and
- Thereafter audits at monthly intervals, at a minimum or as per EA requirement.

14.6.2 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 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 period specified by the PM.

14.7 Environmental Contact Person

To be confirmed prior commencement of the proposed development should GDARD grant an EA to proceed with the project.

14.8 Emergency Numbers

- Police: 10111
- Ambulance 10177
- Netcare 911 082911

14.9 Public Communication and Liaison with Interested and Affected Party's (I&AP's)

The Developer must ensure that the adjacent landowners are informed and updated throughout the construction phases.

Sufficient signage should be erected around the site (including at the entrance), informing the public of the construction activities taking place. The signboards should include the following information:

- The name of the Contractor.
- The name and contact details of the site representative to be contacted in the event of emergencies or complaint registration.

15 SITE REHABILITATION

15.1 Removal of structures and infrastructure

During and following the completion of the construction activities, the area must be rehabilitated by appropriate landscaping, levelling, topsoil dressing, land preparation, alien plant eradication and vegetation establishment. All construction plant, equipment, storage containers and temporary fencing must be removed from site.

15.2 Waste and pollution control

- Waste minimisation, the re-use, recycling and recovery of waste must be promoted;
- Rubble, including surplus rock, foundations and batching plant aggregates will be removed from the construction site and firstly recycled and re-used, where possible, before disposed of at a registered landfill site;
- All waste storage containers will be removed from site on a regular basis;
- All portable sanitation facilities will be removed by a certified contractor. It must be ensured that no leaks or spillage from sanitation facilities occurs during the removal thereof; and
- All hazardous waste which is temporary stored on site, including the storage containers must be removed from site and disposed of at a registered hazardous landfill site.

15.3 Grassing

- Grassing must be undertaken by a suitably qualified Contractor;
- Grass areas using the method specified on the plant plans;
- Only indigenous seeds (seed mixes) common to the area must be used in rehabilitation and re-seeding of the disturbed areas;
- Sodding may be done at any time of the year, but seeding must be done during the summer when the germination rate is higher; and
- Hydro-seeding with a winter mix will only be specified where re-grassing is urgent, and cannot be postponed until summer.

15.4 Ripping and Scarifying

- Rip and / or scarify all areas following the application of topsoil to facilitate re-growth of vegetation where required. The ECO will specify whether ripping and / or scarifying is necessary, based on the site conditions immediately before these works begin;
- 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; and
- Areas may not be ripped / scarified under wet conditions, as the soil will not break up.

15.5 Topsoil replacement and soil amelioration

- The principle of Progressive Reinstatement must be followed wherever possible. This includes the reinstatement of disturbed areas on an ongoing basis, immediately after the specified construction activities for that area are concluded;
- Execute top soiling activity prior to the rainy season or any expected wet weather conditions;
- Execute topsoil placement concurrently with construction where possible, or as soon as construction in an area has ceased;
- 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 and roads. Replace topsoil to the original depth. These areas will be quantified by the ECO;
- 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;
- The suitability of substitute material will be determined by means of a soil analysis addressing soil fraction, fertility, pH and drainage, and approved by the ECO; and
- Do not use topsoil suspected to be contaminated with the seed of alien vegetation.

15.6 Maintenance of rehabilitated areas

- Allow for a maintenance period of one year following practical completion;
- Landscape maintenance must be undertaken by a suitably qualified professional or landscape architect;
- Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access.
- Re-vegetation must match the vegetation type which previously existed, unless otherwise indicated in the Contract or specified by the ECO.
- Water all transplanted, planted and grassed areas;
- For planted areas that have failed to establish, replace plants with the same species as originally specified. The same species as originally specified must be used unless otherwise specified by the ECO; and
- A minimum grass cover of 80% is required, and individual plants must be strong and healthy growers at the end of the Maintenance Period.

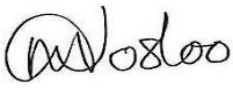
16 CONCLUSION

It is the opinion of the EAP that the implementation of the management and mitigation measures provided in the EMPr is sufficient to manage the environmental impacts associated with the proposed project. This EMPr will furthermore contribute to realizing the following over-arching objectives set out to be reached by the use of the document as an environmental management tool:

- Ensure that sufficient monetary provision, aligned with the significance of the environmental impact and scale of the project, is made to remediate and rehabilitate the environment impacted on by the construction activities;
- Verify environmental performance through information on impacts as they occur;
- Respond to unforeseen events and environmental incidents; and
- Provide feedback to drive continual improvement in environmental performance.

The effectiveness of this EMPr will to a large degree rest on adherence to and fulfilling the roles and responsibilities of each role player and stakeholder. The roles and responsibilities for management actions contained in the EMPr (refer to Section 9 of this document) and arrangements for coordination among the role players are clearly defined in this document.

ZITHOLELE CONSULTING (PTY) LTD



Tebogo Mapinga
Project Manager

Mathys Vosloo
Project Associate

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APPENDIX A: EAP's CV

ZITHOLELE CONSULTING

Tebogo Mapinga

KEY EXPERIENCE

Tebogo Mapinga is a professional evironmental scientist with 12 years' experience in the environmental management field in both public and private sectors. Her competencies lie in management and co-ordination of environmental projects, environmental impact assessments, compliance monitoring ensuring compliance to legislation and guidelines and public participation for small and large scale projects.

PROJECT EXPERIENCE

2019 Doornkop Farm EIA
Basic Assessment Process for the proposed development of a Maize Mill, Silo and associated infrastructure on Portion 12 of the Farm Doornkop 246, Mpumalanga Province

2018 – 2019 Hartebeestpoort Housing Development BAR
Basic Assessment Process for the proposed Housing Development on Portion 237 of the Farm Hartebeestpoort 328 in Koedoespoort, Gauteng Province

2018 – 2019 Eskom Battery Storage System BARs
Basic Assessment Process for the proposed installation of the Eskom Grid-scale Battery Storage at various Substations (6) in the Western Cape Province

2018 – 2019 BA for KEMJV Slimes Pipeline
Basic Assessment Process for the construction of slimes pipeline for Kimberley Ekapa Mine Joint Venture, Northern Cape Province

2018 Kendal SPR Investigation
Part 2 Amendment for the Environmental Authorisation for the Kendal Power Station's existing Ash Disposal Facility, Mpumalanga Province

2018 – 2019 EIA and WULA for the retrofitting of the FGD at Medupi Power Station
EIA and Water Use Licence Application for the proposed restrofitting of a Flue Gas Desulphurisation (FGD) System at the Medupi Power Station, Lephalale, Limpopo Province

2018 BAR Review for Lidwala
Installation of water borne sewage infrastructure and construction of Waste Water Treatment Works (WWTW) associated with the Haartebeesfontein low cost housing development within the Mkhondo Local Municipality; and
Installation of water borne sewage infrastructure and construction of Waste Water Treatment Works (WWTW) associated with the Rustplaas low cost housing development within the Mkhondo Local Municipality

Professional Registrations:

- South African Council for Natural Scientific Professions (SACNASP)
- International Association for impact assessment- South Africa (IAIAsa)

Occupation:

- Snr. Environmental Scientist

Specialisation:

- Project Management
- Environmental Impact Assessment, Permitting and Licensing
- Public Participation
- The review of BARs, EIARs, and EMPr's

Education:

- BSc (Zoology and Physiology), 2007
  University of Limpopo
  Turfloop Campus

2017 Thabametsi Coal Fired Power Station
Biodiversity and Heritage Permitting for the Thabametsi Coal Fired Power Station

2017 Richards Bay CCPP Power Project
Environmental Screening and Environmental Impact Assessment – EIA

2017 Roggeveld Wind Farm
Environmental Management Programme (EMPr) Amendment and all work required to reach financial close- permitting (Building Energy and G7)

2017 Klawer Wind Farm
EMPr Amendment and all work required to reach financial close- permitting (Building Energy and G7)

2017 Roggeveld Wind Farm
Environmental Management Programme (EMPr) Amendment and all work required to reach financial close- permitting (Building Energy and G7)

2017 Adams PV Facility Upgrading of Charles Street
All work required to reach financial close- permitting (Aurora Power Solutions (Pty)

2016 Bellatrix PV Facility
All work required to reach financial close- permitting (Aurora Power Solutions (Pty) Ltd**)**

2016 Great Karoo EA amendment
2015 Karusa Wind Farm Jhb
Part 2 EA Amendments (Enel Green Power)

PROJECT EXPERIENCE (continued)

2017 Thabametsi Coal Fired Power Station
Biodiversity and Heritage Permitting for the Thabametsi Coal Fired Power Station

2017 Richards Bay CCPP Power Project
Environmental Screening and Environmental Impact Assessment – EIA

2017 Roggeveld Wind Farm
Environmental Management Programme (EMPr) Amendment and all work required to reach financial close- permitting (Building Energy and G7)

2017 Klawer Wind Farm
EMPr Amendment and all work required to reach financial close- permitting (Building Energy and G7)

2017 Roggeveld Wind Farm
Environmental Management Programme (EMPr) Amendment and all work required to reach financial close- permitting (Building Energy and G7)

2017 Adams PV Facility Upgrading of Charles Street
All work required to reach financial close- permitting (Aurora Power Solutions (Pty)

2016 Bellatrix PV Facility
All work required to reach financial close- permitting (Aurora Power Solutions (Pty) Ltd**)**

2016 Great Karoo EA amendment

2015 Karusa Wind Farm Jhb
Part 2 EA Amendments (Enel Green Power)

2009 Bobididi Solar Facility
Environmental Screening- Root 60FOUR Energy (Pty) Ltd

2009 Great Fish River Watercourse Crossing BAR
African Clean Energy Developers (Pty) Ltd (ACED)

2009 Bedford Watercourse Crossing BAR-
African Clean Energy Developers (Pty) Ltd (ACED)

2008 EIA's at Phaki Phakanani Environmental Consultants

- Construction of Khetho Bridge, Greater Giyani Local Municipality
- Demolition and Relocation of Malamulele High School
- Construction of Malamulele Shopping Complex
- The Subdivision of land in Ellisrus
- Construction of the Senwabarwane Filling Station
- Residential Development in Tlapeng Village
- Township Development in Maphosa Village
- Establishment of a Piggery in Mogalakwena Local Municipality

- Establishment of two Piggeries in Elias Motsoaledi Local Municipality
- Establishment of a Piggery in Modimolle Local Municipality
- Township Development in Rietfontein
- Public Participation and Section 24G Application for the National Taxi Scrapping Project

2008 EIA's at Strategic Environmental Focus

- Establishment of a Guest House (ECA application
- Establishment of a Waste Management Depot in Rustenburg
- Establishment of a Waste Management Depot in Tzaneen and Nkowa-Nkowa
- Langkuil Industrial Development, (Environmental Manager and Project Manager);
- Township Development in Reitfontein
- Upgrading of the BP Golf Course
- Construction of the BP Soshanguve VV Filling Station
- Construction of the BP Soshanguve ZZ Filling Station
- Shell Filling Stations(Project Manager and Client Liaison
- Eskom- Komati Water Augmentation
- Rainbow Junction Residential Development
- Township Development in Delmore Park Extension 7
- West Rand District Municipality- Bulk Water Supply
- West Rand District Municipality Air Quality Assessment
- Lonmin K4 Shaft Mine Upgrading
- Westlake Residential Development
- Montana Spruit Upgrading

EMPLOYMENT RECORD

2018 - Present	Zitholele Consulting	Senior Environmental Scientist
2010	Savannah Environmental	Principal Env. Manager
2013	DEA	Env. Officer Specialised duction
2010	Strategic Environmental Focus	Env. Project Manager
2008	Phaki Phakanani Environmental Consultants	Environmental Consultant

ZITHOLELE CONSULTING

Professional Registrations:

- None

Occupation:

- Junior Environmental Assessment Practitioner

Specialisation:

- Project Administration
- PPP
- IWULA Application and Amendments
- ECO

Education:

- BSc (Environmental and Resource Studies), 2016, University of Limpopo Turfloop Campus

Jessica Morwasehla

KEY EXPERIENCE

Jessica is an Junior Environmental Assessment Practitioner. Her competencies lie Public Participation Processes for EIA, BA and NEMAQA Postponement for Compliance Timeframe projects. She also worked on projects that includes IWULA applications and Amendments, and GIS.

PROJECT EXPERIENCE

2019 Doornkop Farm EIA
EA Application and GIS.

2019 Steelpoort mine Rehabilitation
Environmental Control Officer, having monthly audit for the rehabilitation of the asbestos mine in Tubatse Local Municipality

2019 Msauli Mine Rehabilitation
Environmental Control Officer, having monthly audit for the rehabilitation of the asbestos mine in Msauli.

2018 AEL Consol Furnace
Compiling of PPP documents for Basic Assessment and NEMAQA postponement for Compliance timeframe

2018 Duvha WULA Amendment.
Uploading application form on the eWULAA and IWULA Amendment report

2018 Kendal 30yr Ash Disposal Facility
Engaging with the stakeholders for the wetland offset strategy and WULA Appliaction.

2018 Khathu EMPr Walkdown
eWULAA applications

2018 Farm 238JR722FR BA
Public Participation Process for the Proposed Housing Development in Koedoespoort.

2018 Farm 238JR722FR BA
Public Participation Process for the Proposed Housing Development in Koedoespoort.

PROJECT EXPERIENCE (continued)

2018 Kendal SPR Investigation
Public Participation Process and IWULA Amendment.

EMPLOYMENT RECORD

2018 – Current	Zitholele Consulting	Junior Environmental Assessment Practitioner

ZITHOLELE CONSULTING

Professional Registrations:

- (SACNASP) South African Council for Natural Scientific Professions
- (IAIAsa) International Association for Impact Assessment – South Africa

Occupation:

- Senior Environmental Scientist

Specialisation:

- Environmental and Social Impact Assessments
- Strategic Environmental Assessments
- Estuarine Ecological Assessments
- Project Management and GIS

Education:

- Ph.D., Zoology, 2012 Nelson Mandela Metropolitan University
- M.Sc., Zoology, 2003 University of Port Elizabeth
- B.Sc. Hons, Zoology, 2001 University of Port Elizabeth
- B.Sc., Zoology and Botany, 2000 University of PE

Dr. Mathys Vosloo

KEY EXPERIENCE

Dr. Mathys Vosloo is a well-qualified and technically proficient environmental and natural scientist with more than 12 years environmental management experience. His experience include Environmental Impact Assessments (EIAs) and the development of Environmental Management Programmes during environmental assessments of construction projects, environmental compliance monitoring and reporting, and Environmental Control Officer (ECO) services for construction projects. Recent experience includes project management and execution of large waste related projects, such as the application for development of Ash Disposal Facilities, and large linear projects such as the management EIA process for the implementation of extensive power lines for renewable projects. Mathys also has substantial experience in Geographical Information Systems (GIS), creating and analysing digital terrain models, runoff and stream flow analysis, stormwater design and map-making for projects in Africa. Further experience include the development and completion of State Of the Environment Reporting (SOER), Strategic Environmental Assessments (SEA) and feasibility studies. Mathys' experience in natural science include aquatic ecological assessments, project management and sample collection in several west, south and east coast estuaries, including ecosystem analysis of estuaries in the Eastern Cape and former Transkei area.

PROJECT EXPERIENCE

2017 PPP and WOP for Kusile PS 60year ADF R 2.8m
Public participation process for Wetland Offset Strategy and implementation of Wetland Offset Plan for the Kusile Power Station 60year Ash Disposal Facility.

2017 BA for KEMJV slimes pipeline R 230 000
Basic Assessment for construction of slimes pipeline for Kimberley Ekapa Mine Joint Venture, Northern Cape.

2016 - 2017 Asbestos Mine Rehabilitation Programme R 1.3 million
Undertaking environmental site investigations and project scoping for the rehabilitation of 10 derelict and abandoned asbestos mines in Limpopo and Mpumalanga Provinces.

PROJECT EXPERIENCE (continued)

2016 Walkdown & WULA for Kuruman Powerline upgrade R 355 000
Specialist walkdown of approved 132 kV powerline servitude between Kuruman and Kathu, Northern Cape.

2016 - 2017 EA Amendment for Kuruman Powerline Upgrade R 60 000
EA Amendment application i.t.o. EIA 2014 regulations for amendment to the approved 132 kV powerline corridor between Hotazel, Kuruman and Kathu, Northern Cape.

2016 Breede-Gourits CMS: Estuarine component R 81 000
Estuary Situation Assessment to inform the Breede-Gourits Catchment Management Strategy for Breede-Gourits Water Management Area.

2016 - 2017 BA for Tshepisong Extension 4 development R 198 000
Basic Assessment for Mixed Business and Residential Development within Portion 64 of Farm Vlakfontein 238 IQ, Tshepisong Extension 4, Johannesburg West, Gauteng Province.

2016 - 2017 BA for Patensie Housing Development R 283 000
Basic Assessment for the Patensie Housing Development, Eastern Cape.

2016 Specialist Walkdown for Kuruman Powerline upgrade R 355 000
Specialist walkdown of approved 132 kV powerline servitude between Hotazel and Kuruman, Northern Cape.

2016 Solar Park EA Amendment R 248 000
Environmental Authorisation (EA) Amendment application i.t.o. EIA 2014 regulations for amendments to the Solar Park to Nieuwehoop 400 kV power line corridor near Upington, Northern Cape.

2015 - 2016 Solar Park WULA R 547 000
WULA for Solar Park to Nieuwehoop 400 kV powerline development near Upington, Northern Cape.

2015 - 2016 BA Clanwilliam Weirs R 409 000
Proposed Re-alignment of the Bulshoek Dam and Doring River Weirs near Clanwilliam, Western Cape.

2015 - 2016 BA Klipspruit Valley R 244 000
BA and WULA for the Klipspruit Valley Road Upgrade.

2014 - 2016 EIA Koffiefontein Slimes Dam R1 million
EIA for the new Koffiefontein Slimes Dam Development, Kimberley.

2014 - 2015 BA and WULA Kuruman Upgrade R1.3 million
BA and WULA for 132kV power line upgrade from Hotazel to Kuruman and Kathu, Northern Cape.

2013 - 2016 EIA Kendal 30 year Ash Disposal Facility R6 million
EIA, WMLA and WULA for a new Ash Disposal Facility for Kendal Power Station near Ogies in Mpumalanga.

2013 - 2014 Design of 3 canals R 700 000
3 x BAs for the proposed prevention of water ingress into previously mined out areas in the Witwatersrand Mining Basin (canalisation of 3 streams), Gauteng.

2013 - 2014 BA for Vaalbank Switching Station R 380 000
Basic Assessment for Vaalbank Switching Station and 2 x 88 kV Powerlines, Free State.

PROJECT EXPERIENCE (continued)

2012 - 2015 EIA Solar Park **R5 million**
EIA, EMP &WULA for the Solar Park 132/400 kV Sub Station and Associated lines, Northern Cape.

2012 - 2015 Kusile 60 year Ash Disposal Facility **R11 million**
EIA, WML and WULA for the 60 year Ash Disposal Project near Balmoral in Mpumalanga.

2012 - 2015 WULA Wilge Pipeline **R 900 000**
WULA for the sewage and water pipeline from Wilge Township to Phola, Mpumalanga.

2012 BA Kouga Dam Wall **R 250 000**
The rehabilitation of the Kouga Dam wall and associated mining activities.

2012 EMP City of Cape Town Stormwater **R1.5 million**
Maintenance and management interventions undertaken by the City of Cape Town in its surface stormwater systems.

2012 BA Melkhout Powerlines **R 100 000**
The installation of 132kV transmission lines from Melkhout to Dieprivier, including the construction of a new substation at Dieprivier, Cacadu District.

2012 BA Diepriver Powerlines **R 100 000**
The installation of 132kV transmission lines from Dieprivier to Kareedouw, including the extension of the existing substation at Kareedouw, Cacadu District.

2012 BA Patensie Powerlines **R 100 000**
The installation of 132kV transmission lines from Melkhout to Patensie, including the construction of a new substation at Patensie, Cacadu District.

2012 Mmnthatha River System
Catchment delineation and stream calculation for the Mnthatha River System, GIBB Durban.

2011 - 2012 PRASA Passenger rail and shunting yard proposed sites
Environmental Screening for the PRASA passenger rail and shunting yard proposed sites in Cape Town, Gauteng and Durban.

2010 - 2012 ATTP Flow Limiters installation
NMBM Assistance to the poor (ATTP) and schools leakages repairs and flow limiters installation.

2010 - 2012 ATTP Database ManagementFlow Limiters installation **R4 million**
NMBM Assistance to the poor (ATTP) and schools leakages repairs and flow limiters installation database management.

2010 - 2011 Nelson Mandela Bay Provincial Department of Housing
Nelson Mandela Bay and Cradock low cost housing rectification audits. Management of incoming and outgoing GIS data and GIS mapping, Provincial Department of Housing.

2010 - 2011 ECO Bulk Stormwater Infrastructure Motherwell
Installation of bulk storm water infrastructure in Motherwell NU29 and 30 and Implementation of an artificial wetland at the Motherwell stormwater canal outlet structure.

PROJECT EXPERIENCE (continued)

2010 BA McAdam Street Upgrade **R 60 000**
The extension of McAdam Street from Worraker to Mangold Street, NMBM.

2009 - 2011 EIA Motherwell Housing Development **R 270 000**
Motherwell NU 31 housing development, NMBM.

2009 - 2011 Coega Integrated Stormwater Management Plan
Coega IDZ Eastern Sector Integrated Stormwater Management Plan, Coega Development Corporation.

2009 - 2011 EIA KougaWind Farm **R 350 000**
Kouga 300 MW wind farm, Kouga Local Municipality.

2009 - 2010 ECO Swartkops River Artificial Wetland
Swartkops River, NMBM.

2009 - 2010 ECO Humewood Road Upgrade
Realignment of the S-bend section of Humewood Road in Humewood.

2009 - 2010 ECO Paapenkuils Sewer Augmentation
Paapenkuils Main Sewer Augmentation in Port Elizabeth NMBM.

2009 - 2010 SOER State of the Environment Report **R 350 000**
NMBM State of the Environment Report.

2009 - 2010 ISWMP Coega IDZ **R 350 000**
Coega IDZ Eastern Sector Integrated Stormwater Management Plan, CDC.

2009 - 2010 SOER Flood Plain and Spatial Analysis
Nelson Mandela Metropolitan Municipality SOER flood plain and spatial analysis, NMBM.

2009 - 2010 EIA – Red Cap Developments
Kouga Local Municipality wind farm development EIA, RedCap Developments.

2008 - 2009 Port Harcourt City Open Space System Plan
Port Harcourt City Open Space System Plan, Government of Nigeria.

2008 - 2009 ECO Kwazakhele stormwater infrastructure
Construction of stormwater detention ponds and upgrading of stormwater infrastructure in Kwazakhele, Phase 3.

2008 ECO Sherwood Road Upgrade
Upgrading of Devon and Fairley Roads in Port Elizabeth, NMBM.

2008 OR Tambo District Municipality water conservation and demand management
OR Tambo District Municipality water conservation and demand management.

2008 SOER Eden District Municipality
Eden District Municipality SOER, Eden District Municipality.

2008 Kouga Local Municipality catchment and flood attenuation analysis
Jeffreys Bay Marina Martinique catchment and flood attenuation analysis, Kouga Local Municipality.

2008 EIA Bethelsdorp Housing Development **R 230 000**
Bethelsdorp Phase 3 social housing development, NMBM.

PROJECT EXPERIENCE (continued)

2008 **BA Beacon Maritime Navigational Structure Upgrade** **R 60 000**
Beacon maritime navigational structure upgrading, NMBM.

2008 **BA Moffet Dam Rehabilitation** **R 60 000**
Moffet Dam breach remedial works, Kouga Local Municipality.

2008 **BA Pollok Beach light mast installation** **R 50 000**
Pollok Beach light mast installation, NMBM.

2008 **BA Humewood Road Re-alignment** **R 60 000**
Humewood Road re-alignment along the S-bend section, NMBM.

2008 **SOER Hessequa Local Municipality** **R 200 000**
Hessequa Local Municipality State of the Environment Summary Report.

2008 **SEA Coastline redevelopment** **R 250 000**
North End Coastline redevelopment SEA, NMBM.

2008 **Mzimkhulu River catchment and flood attenuation analysis**
Mzimkhulu River catchment and flood attenuation analysis, Umzimkhulu Municipality.

2008 **PE Paapenkuils River catchment and flood attenuation analysis**
Port Elizabeth Paapenkuils River catchment and flood attenuation analysis, NMBM.

2007 - 2008 **ECO Mavuso Road Upgrade**
Construction of Mavuso Road in Kwazakhele, NMBM.

2007 **BA Jagersfontein Chicken Farm** **R 40 000**
Jagersfontein farm 432 commercial production of chicken and operation of an abattoir, Kouga Local Municipality.

2007 **BA Zwide Roads Upgrade** **R 55 000**
Tarring of roads in Zwide, NMBM.

2007 **BA McAdam Street Construction** **R 40 000**
Construction and extension of McAdam Street, NMBM.

2007 **BA Tygerbay Reconstructiontion** **R 60 000**
Repair and reconstruction of water retaining structures at Tyger Bay EIA NMBM.

2007 **BA Lorraine Infill development** **R 40 000**
Erf 306 Lorraine Infill development, NMBM.

2007 **BA Sherwood Roads Upgrade** **R 40 000**
Tarring of roads in Sherwood, NMBM.

2007 **BA Zwide Roads Upgrade** **R 40 000**
Tarring of Ntsele, Mkutuka, Nanto and Vabaza Streets in Zwide, NMBM.

2007 **BA Pollok Beach Parking Lot** **R 50 000**
Pollok Beach, Summerstrand, parking lot relocation, NMBM.

2007 **BA Uitenhage Roads Upgrade** **R 40 000**
Tarring of Dube, Grootboom and Luzipho Streets in Uitenhage, NMBM.

PROJECT EXPERIENCE (continued)

2007 BA PE ICC Site Assessment **R 150 000**
Port Elizabeth International Convention Centre Rapid site assessment, NMBM.

2007 EIA Exemptions Applications Motherwell
Motherwell/Coega outfall canal upgrade.

2007 EIA Exemptions Applications Lorraine Infill Development
Erf 17, Lorraine, infill development.

2007 EIA Exemptions Applications Korsten Upgrade
Korsten Modal Interchange Upgrade.

2007 GIS SANRAL outdoor advertising opportunities
SANRAL outdoor advertising opportunities in the Eastern Cape, SANRAL.

2007 Coega Integrated Stormwater Plan
Coega Integrated Stormwater Plan, Coega Development Corporation.

2007 Uitenhage Stormwater Master Plan
Uitenhage Stormwater Master Plan, NMBM.

2006 Nelson Mandela Metropolitan University exchange programme
Analyses and identification of nematode collected samples from the Mngazi Estuary in the Eastern Cape (former Transkei), South Africa, University of Ghent, Belgium – Nelson Mandela Metropolitan University exchange programme.

2005 - 2006 Berg River Reserve Determination Study **R 150 000**
Hyperbenthos and zooplankton field assessment in Berg River estuary.

2005 Olifants River Reserve Determination Study, Western Cape **R 300 000**
Specialised field ecologist - Field assessment: subtidal macrozoobenthos, hyperbenthos and zooplankton in Olifants River estuary for the Olifants River Reserve Determination study, Western Cape., Contracted sampling for CSIR Stellenbosch (Environmentek).

2004- 2005 DWAF - Kromme and Seekoei Estuary Reserve Determination Study **R 200 000**
Specialised field ecologist - Kromme and Seekoei Estuary Catchment Reserve Study. Contracted sampling for Department of Water Affairs and Forestry (DWAF).

2003 - 2004 Berg River Baseline Monitoring Program (UCT) **R 350 000**
Berg River Baseline Monitoring Program (UCT). Collecting subtidal macrozoobenthos.

2002 - 2006 University of Port Elizabeth Ecological analysis **R4 million**
Specialised field ecologist - Field assessment: subtidal macrozoobenthic and hyperbenthic invertebrates, zooplankton, microzooplankton, meiofauna at Mngazi and Mngazana River estuaries.

2002 - 2003 University of Port Elizabeth Ecological analysis
Ecological analysis of the functioning Sundays, Swartkops, Kromme, and Gamtoos estuaries using Ecopath with Ecosim, and assessment of the impact of recreational fishing on these ecosystems. MSc dissertation, University of Port Elizabeth.

PROJECT EXPERIENCE (continued)

2002 Sylt Ecosystem, Germany R 250 000
Assistant ecosystem modeller - Assisting in preparation and balancing of ecosystem carbon flow models of the Sylt Ecosystem, Germany.

2002 Field assessment: subtidal macrozoobenthos, hyperbenthos and zooplankton in Rooiels R 400 000
Specialised field ecologist - Field assessment: subtidal macrozoobenthos, hyperbenthos and zooplankton in Rooiels, Palmiet, Heuningnes, Breede, Klein Brak and Kaaimans River estuaries, Western Cape.

2002 Field Assessment - intertidal invertebrates Eastern Cape R 150 000
Specialised field ecologist - Field assessment: intertidal invertebrates in Kabeljous, Gamtoos, Swartkops, Sundays and Kariga River estuaries, Eastern Cape.

PAPERS, PUBLICATIONS, PRESENTATIONS AND PROFESSIONAL SOCIETIES

PAPERS, PUBLICATIONS

1. Vosloo, M C and Hendricks, M G J. 2017. Marine and estuarine nematodes in South Africa, Book Chapter. In *Nematology in South Africa: A view from the 21st Century*. Fourie, Spaull, Jones, Daneel, De Waele (Eds).
2. Vosloo, M.C. 2012. Network analysis of trophic linkages in two sub-tropical estuaries along the south-east coast of South Africa. PhD thesis, Nelson Mandela Metropolitan University.
3. Vosloo, M.C. 2009. Marine and estuarine meiofauna: Contribution to the National Marine Ecosystem Diagnostic Analysis. Agulhas and Somali Current Large Marine Ecosystems.
4. Vosloo, M.C. 2004. A comparative assessment of the impact of recreational and subsistence fishing on selected Eastern Cape estuarine ecosystems using the Ecopath modelling approach. MSc Dissertation, University of Port Elizabeth, Port Elizabeth.

PROFESSIONAL SOCIETIES

1. Member of International Association for Impact Assessment – South Africa (IAIAsa)
2. Registered member of South African Council for Natural Scientific Professions, (SACNASP)

EMPLOYMENT RECORD

2013 - Present	Zitholele Consulting	Manager: Licencing and Permitting, Senior Environmental Consultant
2012	GIBB Engineering and Science	Senior Environmental Scientist
2007 – 2011	GIBB Engineering and Science	Environmental Scientist

2008 – 2011	Nelson Mandela Metropolitan University	Postgraduate (part-time) Student
2005 – 2007	Nelson Mandela Metropolitan University	Full time Postgraduate (PhD) Student
2001 - 2003	University of Port Elizabeth	Full time postgraduate (MSc) Student
2006	University of Ghent, Belgium	Exchange Ecologist

ZITHOLELE CONSULTING

Professional Registrations:

- The South African Council for Natural Scientific Professions (300057/14)
- South African Student Chapter of the Society of Economic Geologist (SASSEG).

Occupation:

- Environmental Consultant

Specialisation:

- Floodline Analysis
- Site Investigation
- Preliminary Geotechnical Investigations
- Ground water source verification and development
- BA's, EIA's, WM, WUL and Stakeholder Engagement
- Environmental Control

Education:

- BSc Geography & Environmental Management, 2009, University of Johannesburg

Bongani Sicumama Dhlamini (Cert. Nat. Sci)

KEY EXPERIENCE

Bongani Sicumama Dhlamini obtained a BSc degree in Geography & Environmental Management in 2009.

He has over 7 years total working experience, where 5 years he has been focusing on the environmental management and environmental consulting. From the years he has conducted Environmental Impact Assessments (EIAs) and Basic Assessments (BA).

Bongani also supervises field work-sub-contractors on Hydro census, Geophysical Survey, Test Pumping of Boreholes, Field investigation, Site Liaison, Planning of Drilling Project, Water Sampling, QA/QC data Analysis, Borehole Sitting.

Bongani is professionally certified with the South African Council for Natural Scientific Professions as a Certified Natural Scientist. Bongani joined Zitholele's Engineering Division in March 2015.

PROJECT EXPERIENCE

2016 - 2017 Camden Environmental Control Officer R560 000
Permanent Environmental Control Officer for the construction of Reclamation Dam Pump house. Monitoring the implementation of the impact management measures that are contemplated in the approved Environmental Management Programme (EMPr) in addition to monitoring conformance to the conditions provided in the Environmental Authorisation (EA).

2016 Kusile 60yr Ash Disposal Facility R3 billion
Site investigation and preliminary geotechnical investigations for the 60year Ash Disposal Facility and floodline analysis.

2016 Patensie Housing Development R500 000
Floodline analysis of the new Patensie Housing development.

2015 - 2016 Mathanjana Groundwater Feasibility Study R1.6 million
Construction site management of ten boreholes in Mathanjana.

2015 - 2016 Johannesburg Water Depots R6 million
Measurement and quantification for Bills of Quantities.

2014 - 2017 EIA Medupi Flue Gas Desulphurisation Project R5 million
Medupi Flue Gas Desulphurisation Integrated EIA, WMLA and IWULA.

PROJECT EXPERIENCE (continued)

2014 – 2016 EIA Koffiefontein Slimes Dam **R850 000**
EIA for new slimes dam at Koffiefontein Diamond Mine.

2014 – 2016 Kendal 30 year Ash Disposal Facility **R6 million**
Environmental Consultant for the environmental authorisation processes (EIA, WMLA and IWULA) for a new Ash Disposal Facility for Kendal Power Station near Ogies in Mpumalanga.

2014 – 2015 EIA Kendal Continuous Ash Disposal Facility **R4.8 million**
Environmental Consultant for the IWULA process for the continuation of ash disposal on new footprint for the Kendal Power Station near Ogies in Mpumalanga.

2014 – 2015 Eskom Swallows Switch Projects **R 280 000**
Environmental Consultant for the Environmental Risk Assessment and Management Plan for the proposed Swallows Switch Project, Brakpan, Gauteng.

2013 Olifantsvlei Cemetery Development **R4 million**
Construction of Olifantsvlei Cemetery- Phase 2 for Johannesburg City Parks.

2013 Olifants River Water Resources Development - De Hoop Dam **R10 million**
Construction of De Hoop Dam, Steelpoort.

2013 IWUL Braamfischer Bridge **R 400 000**
Environmental Consultant for the Integrated Water Use Licence Braamfischer Bridge.

2012 - 2013 EIA Two Rivers Mine **R 230 000**
Fire Assay Laboratory for Two Rivers Mine.

2012 - 2013 BA Petrocom Fuel Storage **R 90 000**
Environmental Consultant for Petrocom underground fuel storage.

2012 - 2013 BA Kleinzonderhout Farm **R 150 000**
Environmental Consultant for Poultry Infrastructure on Kleinzonderhout 519 JR Farm.

2012 - 2013 EIA Kagiso Memorial Park **R 90 000**
Environmental Consultant for Kagiso Memorial Park EIA.

2011 - 2012 EIA Abe Bailey Nature Reserve **R 400 000**
Environmental Consultant for the Improved Facilities at Abe Bailey Nature reserve.

2012 BA Construction of Nyazela Access Road **R 120 000**
Environmental Consultant for Construction of Nyanzela Access Road.

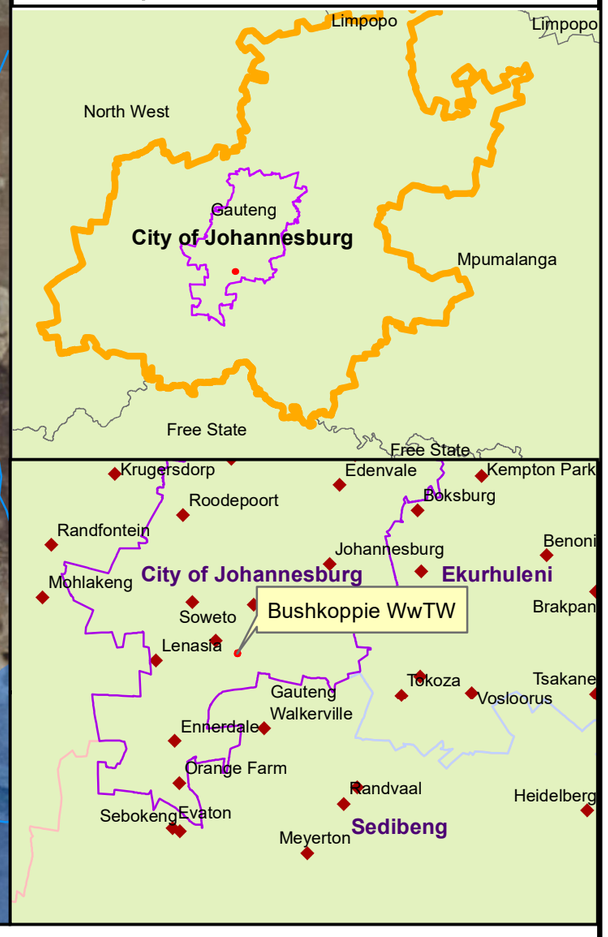
2012 Tshikondeni Mine Waste Removal **R 750 000**
Environmental Consultant for Domestic Waste Removal from Tshikondeni Mine, EXXARO.

2011 - 2013 Environmental Management Framework **R2 million**
Environmental Consultant for Environmental Management Framework for Lephalale Local Municipality.

EMPLOYMENT RECORD

Mar 2015 – Current	Zitholele Consulting	Engineering Division
Jan 2014 – Feb 2015	Zitholele Consulting	Environmental practitioner
Aug 2013 - Dec 2013	Savannah Environmental	Environmental Control Officer (Construction of De Hoop Dam)
Aug 2011 - Aug 2013	Taktho Environmental Strategy	Senior Environmental Consultant
Aug 2010 -Aug 2011	Spear System Packaging Africa	Quality Control Technician
Jun 2009 - Aug 2010	CTP Packaging	Quality Controller & Lab Technician
Feb 2009 - Nov 2009	University of Johannesburg	Geology Tutor
May 2007- Nov 2007	University of Johannesburg	Geology Laboratory Assistant
Nov 2006 - Jan 2008	South Point Management Services	Senior Record Manager

APPENDIX B: MAPS



LEGEND

- New Wash Water Holding Tank
- Trash Screen Bypass Channel
- New Blower Building Module 2
- Head Of Works Access
- Mechnical trash Screen
- New_Wash_Water_Pump_Station
- New Grit_Drying_Beds
- New PSTs
- Roads
- Place_Names
- Rivers_Non_perennial_DWAF
- NFEPA_wetlands_3Feb2011

RESOURCES

0 0,1 0,2 0,4 0,6 0,8 Km

REFERENCE

PROJECTION GCS WGS 1984

PROJECT

EXPANSION OF BUSHKPOPPIE WWTW

TITLE

BK BA & WULA LOCALITY MAP

ZITHOLELE CONSULTING

GIS	JM	2019/09/30	PROJECT No. 19043	
CHECK	TM	2019/09/30	SCALE 1:10 000	
REVIEW	TM	2019/09/30	A3	REV 0

Z:\Projects\19043 - BK BA & WULA\7 Drawings\77 Environmental\02 MXD\19043-77-Map-001-BK BA & WULA Locality Map-Rev0 Draft2.mxd

26°1'0"S

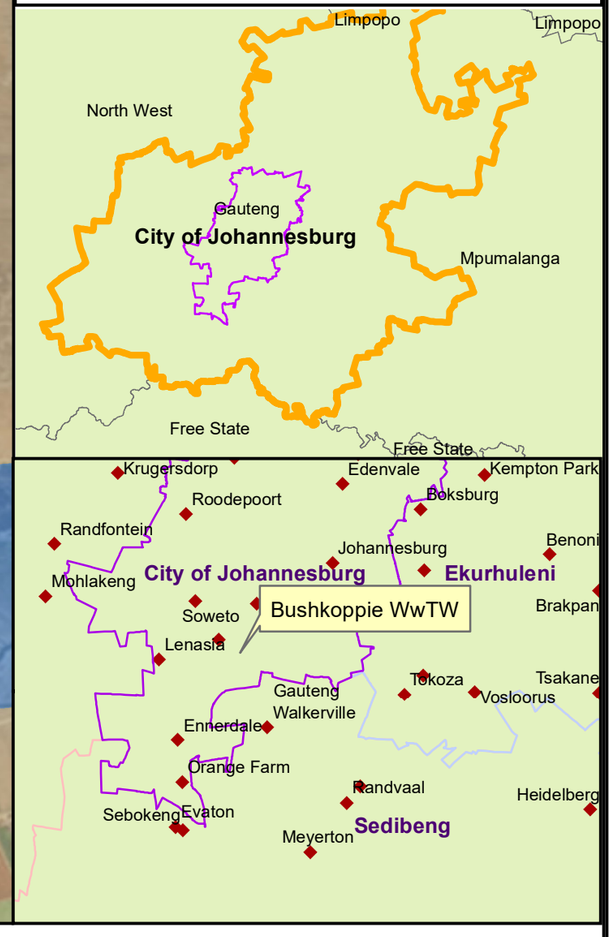
27°5'0"E

Nancefield

Devland

Stockwell Ave

N



27°57'0"E

LEGEND

- Location of New PSTs
- Location of New Wash Water Pump Station
- Bunded Area for Screenings Bin
- New Blower Building Module 2
- New Wash Water Holding Tank
- Trash Screen Bypass Channel
- Head Of Works Access
- Mechnical trash Screen
- NFEPA_wetlands_3Feb2011
- Rivers_Non_perennial_DWAF
- Place_Names

Gauteng C_Plan V33

- Ecological support area
- Important Area

Threatend Ecosystem

- Klipriver Highveld Grassland

RESOURCES

0 0,15 0,3 0,6 0,9 1,2 Km

REFERENCE

PROJECTION GCS WGS 1984

PROJECT

EXPANSION OF BUSHKPOPPIE WWTW

TITLE

BK BA & WULA SENSITIVITY MAP

ZITHOLELE CONSULTING

GIS	JM	2019/10/01	PROJECT No. 19043	
CHECK	TM	2019/10/01	SCALE 1:15 000	
REVIEW	TM	2019/10/01	A3	REV 0

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