

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

FOR

PROPOSED LINDLEY WASTEWATER TREATMENT WORKS, NKETOANA LOCAL MUNICIPALITY

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**PREPARED FOR
NKETOANA LOCAL MUNICIPALITY**



PREPARED BY



ENVIRONMENTAL & SOCIAL SCIENTISTS

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LIST OF ABBREVIATIONS

- EA – Environmental Authorisation
- EAP – Environmental Assessment Practitioner
- DEO – Designated Environmental Officer
- DESTEA – Department of Economic, Small Business Development, Tourism and Environmental Affairs
- DWS – Department of Water and Sanitation
- ECO – Environmental Compliance Officer
- EMPR – Environmental Management Programme
- PSC – Project Steering Committee
- RE – Resident Engineers
- NLM – Nketoana Local Municipality

1. INTRODUCTION

Babereki Consulting Engineers on behalf of Nketoana Local Municipality (“NLM”) has appointed *NSVT Consultants* as independent Environmental Assessment Practitioners (“EAP”) to undertake a Basic Assessment process to obtain an Environmental Authorisation (“EA”) from the Department of Economic, Small Business Development, Tourism and Environmental Affairs (“DESTEA”) to ensure environmental compliance in terms of Environmental Management Amendment Act (Act 107 of 1998 for the proposed development of wastewater treatment works with a discharge point and the associated outfall sewer and upgrading of the access road, located on the Remaining Extent of the Farm Brandhoek No. 19, in Lindley. The Environmental Management Programme (“EMPr”) is a requisite when undertaking a Basic Assessment process.

2. DETAILS OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

The curriculum vitae of the EAP is attached hereto as **Appendix A**.

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CONTACT PERSON	Lorato Tigedi Reg. EAP (EAPASA) <i>Pr. Sci. Nat.</i>		
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QUALIFICATIONS	B. Sc (Natural Science) B. Sc Hons (Wildlife)	EXPERIENCE	20 years in the environmental management field as an EAP. She has completed environmental impact assessment, basic assessment, drafting of EMPRs and environmental compliance monitoring for various developments within the Free State., North West, Northern Cape and Eastern Cape Provinces.
EXPERTISE/ TRAINING	Resources & Sustainability, Physical & Biological Environment and Informatics Project Management for Environmental Management Social & Economic Sustainability Use of Matrices in EIA Public Participation Training Introduction to Social Impact Assessment Integrating HIV/Aids and Gender related issues into EIA Process Integrated Water Resources Management, Water Use Authorisation and Water Use License Application One Environmental Systems Introduction to Environmental Law Fundamentals of Public Participation Designing Methods of Public Participation	PROFESSIONAL AFFILIATE	
			Environmental Assessment Practitioners Association of South Africa-2020/2519 South African Council for Natural Scientific Professionals: Professional Natural Scientist-4000161/09 Member of International Association for Public Participation Southern Africa Affiliate – IAPSA020 Member of international Association for Impact Assessment South Africa - 2191

3. DEFINITIONS

Environmental Management Programme (“EMPr”): An environmental action plan or tool used to ensure that undue or reasonably avoidable adverse impacts of a development are prevented, and that positive impacts are enhanced. It thus addresses the how, when, who, where and what of integrating environmental mitigation and monitoring measures through the project development activities.

Alien Vegetation: An undesirable plant growth which shall include, but not be limited to all declared category 1 and 2 listed invader species as set out in the Conservation of Agricultural Resources Act (“CARA”), 1983 regulations. Other vegetation deemed to be alien shall be those plant species that show the potential to occupy in number, any area within the defined construction area and which are declared to be undesirable.

Construction Activity: Any action taken by Setsoto Local Municipality, its contractors and sub-contractors, suppliers, or personnel during the construction process.

Environment: The surroundings within which humans exist and that could be made up of the following:

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

Environmental Aspect: An environmental aspect is any component of Setsoto Local Municipality, its contractors and sub-contractor’s construction activity that is likely to interact with the environment.

Environmental Impact: An impact or environmental impact is the change to the environment, whether desirable or undesirable, that will result from the effect of a construction activity. An impact may be the direct or indirect consequence of a construction activity.

Environmental Authorization: A written decision from the Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs that records its approval for undertaking the planned infill development and the conditions of approval which may include mitigating measures required to prevent or reduce the effects of environmental impacts during the life of a contract.

4. PROJECT DESCRIPTION

4.1. BACKGROUND INFORMATION

NLM has identified a need to develop new wastewater treatment works in the Lindley/Ntha area as the current WWTW is unable to accommodate additional loads as a result of the eradication of buckets. The proposed site is located outside the urban edge to the west of Lindley and northwest of Ntha. The development includes an outfall sewer of approximately 1.2km to connect to the proposed WWTW from pumpstation. There is an approximately 2 km existing dirt access road that will be upgraded. Vals River borders the proposed site on the northern side and a watercourse on the western side.

4.2. SENSITIVITY OF THE PROPOSED SITE

The development footprint is located within approximately 120m south of Vals River and approximately 90m on the western side is a watercourse, which are considered sensitive areas that must not be affected by the construction activities. Based on the Screening Tool, specialists' studies were undertaken, and their findings are contained in Table 1 below.

TABLE 1: SENSITIVITY OF THE PROPOSED SITE BASED ON FINDINGS OF THE SPECIALIST STUDIES

SPECIALISTS	FINDINGS
Agricultural Compliance Statement	<ol style="list-style-type: none"> 1. The Climate capability according to the Department of Agriculture, Forestry and Fisheries, 2017 is a value of 5, this is considered a moderate climate capability. 2. The study area comprises of the DC land type, which consists of sandy topsoils overlaying clayey subsoils. These soils are generally moderate to high potential agricultural soils. The area falls entirely in land type Dc10. 3. The soil capability is a value of 3 (Low) to (6) moderate, this is considered moderate soil capability. 4. The terrain capability is a value of 5-7 (moderate-high), this is considered Moderate terrain capability. 5. The Land Capability is a value of 5 (low) to 99 (moderate-high), which is generally considered to have moderately arable land capability. 6. Site has a high grazing capacity of 5ha/LSU. 7. The primary land use in the area is Grassland (Natural Grassland) (13), while there is also indication of commercial annual rain-fed crops (Cultivated) and herbaceous wetlands areas within the Development footprint. However, verification confirms most of the area is covered by grassland, but the area classified as commercial annual rain-fed crops/dryland (Cultivated) is not representative of the study area. 8. Seven soil types were classified on-site, with no soils classified as having a high soil capability. 9. Erosion was observed on site, which confirm the soil properties indicating erosion as a concern. 10. Salts was observed on some soils, therefore, salinization is a concern for agriculture.

<p>Ecologist</p>	<ol style="list-style-type: none"> 1. The entire assessment area and broader surrounding landscape is categorized as Other Natural Area and a limited portion of the outfall sewer pipeline traverses Degraded Land according to the Free State Spatial Biodiversity Plan (Collins 2018). 2. The watercourse and associated floodplain scored a low Ecological Importance and Sensitivity. 3. The Seepage Wetland scored a moderate Ecological Importance and Sensitivity. 4. The assessment area scored a low-medium Site Ecological Importance. 5. The assessment area falls within the Middle Vaal Water Management Area (WMA 09), and the associated C60B quaternary water catchment and drainage area. It does not fall within any Fish Support Area, -Sanctuary, -Corridor, -Rehabilitation Area. 6. The Vals River condition is Moderately Modified. 7. A significant second-order seasonal watercourse and associated floodplain flows past the WWTW and discharges into the Vals River east of the proposed WWTW. 8. No Red Data Listed-, nationally protected- or provincially protected plant species or any other plant species of conservational significance/value, were found to be present within the assessment area, watercourse and associated floodplain, concentrated water drainage area, seepage wetland, and the prominent rocky ridge. 9. No Conservationally significant or important avifaunal species/nests or other -faunal species were observed throughout the watercourse and associated floodplain, concentrated water drainage area, seepage wetland and throughout the assessment area. 10. A small elevated hill is situated approximately 100m south of the eastern portion and it acts as a natural local linear surface water runoff and drainage/watershed separator, between the areas situated north and south of the hill apex, which is not viewed as being of very high conservational/ecological significance/value, from an aquatic biodiversity perspective because it houses a relatively similar terrestrial grassland habitat relative to the surrounding landscape. 11. A small seepage is present along the central boundary of the proposed WWTW footprint area. Two preferential waterflow paths/drainage lines subsequently flow out of the wetland on the northern downstream side and discharge into the Vals River. A single cluster of the provincially protected succulent species <i>Aloe grandidentata</i> was also found to be present within the wetland. It is evident that from an aquatic perspective, the seepage wetland forms an important part of the aquatic ecology. 12. A single individual of the provincially protected underground bulb species <i>Boophone disticha</i> was found to be present within the grassland habitat. 13. According to the Screening Tool Report, Globally Endangered Red Listed bird species <i>Sagittarius serpentarius</i> (Secretary bird) as well as Globally Vulnerable Red Listed reptilian species 15 are potentially present within the assessment area, although they were not spotted during the site inspection. No individuals, nests, or burrows of these species were however observed throughout the assessment area.
<p>Geohydrologist</p>	<ol style="list-style-type: none"> 1. The proposed development site falls within a groundwater unit (GRU) 4 and is further subdivided herein as belonging to a GRU 4b.

	<ol style="list-style-type: none"> 2. The hydrogeological environment of GRU 4b is assessed as being slightly modified from its natural status and is therefore assigned a present Ecological State (PES) of B, slightly modified. 3. Groundwater dependent practices are domestic and livestock use with the inclusion of game farming in the broader area. 4. The Vals River, draining at the northern border presents a PES of (C) Moderate. 5. The study area is predominantly situated in a <i>minor</i> aquifer region which is a low negligible yielding aquifer system of moderate to poor water quality. 6. The aquifer has a <i>moderate</i> groundwater vulnerability rating that is only vulnerable to continuously discharged or leached pollutants in the long term when continuously discharged or leached. 7. A highly weathered and fractured mudstone outcrop was recorded 100m southwest of the proposed development site. 8. A dolerite sill outcrop was recorded 140m south of the proposed development. 9. A prominent sandstone outcrop was recorded within the access road south of the proposed development footprint. 10. Eroded dune sand was recorded at the eastern boundary and western boundary of the proposed site. 11. The study area has a good drainage environment. 12. At Surface Site LS4, there water flow is expected to emanate from a leaking a sewer and this has greatly deteriorated the local groundwater and downstream river water quality. 13. An additional drainage leak was recorded at LS 6, which is expected to flow within the subsurface confluence with the eroded river channel of LS4, contributing to its quality, quantity and associated effects on the regional groundwater system, also affecting the Vals River. 14. The amount of boreholes that could be recorded within the 1km radius buffer was limited. No borehole use was recorded within this buffer, south of the Vals River. Three rural residences were recorded north and one south of the Vals River with expected groundwater use, but they could not be surveyed due to the restricted access. Two boreholes LBH 1 and LHB2 were recorded >2km north of the proposed development site but could not be sampled due to being closed off. 15. The water chemistry of LS1(downstream) and LS4 present degradational concerns. 16. Electrical Conductivity (EC) and Total Dissolved Solids (TDS) concentrations increase from upstream to downstream within the river.
<p>Geotechnical</p>	<ol style="list-style-type: none"> 1. No natural steep slopes and natural slope instability cannot occur. 2. The proposed site has intermediate excavations and excavatability was assessed with a BELL LLB90B 4x4 TLB (Backhoe). 3. Selective on-site materials (generally topsoil) may be considered suitable for pipe bedding. 4. Site has the following geotechnical constraints. <p>*Low to medium soil heave potential.</p>

	<p>*Expected Estimated Total soil movement (up to 15 – 30mm total soil movement in areas with 50% assumed differential).</p> <p>*Possibility of shallow seasonal seepage water conditions, as indicated by the moist colluvium at relatively shallow depths.</p> <p>*Erodibility of the upper soils once cleared of vegetation and subject to concentrated water flow.</p> <p>5. Possibility of large size boulders and corestones or undulating bedrock conditions should be considered. Earthwork and/or foundation modifications may be required if any composite conditions are encountered.</p>
Heritage	<ol style="list-style-type: none"> 1. There is no evidence of intact or capped Stone Age artefacts, Iron Age structures or rock engravings (on dolerite) within the confines of the WWTW and linear footprint. 2. There is also no aboveground evidence of informal graves, graveyards, or historical structures older than 60 years within the confines of the WWTW and linear footprint. 3. Excavation within the WWTW area will primarily affect potentially significant Normandien Formation strata and geologically more recent alluvium of late Quaternary age, the latter a superficial overburden restricted to within ~50m of the southern bank of the Vals River. 4. There is currently no record of fossil-rich Quaternary sediments in the vicinity of the proposed development footprint.
Hydrologist	<ol style="list-style-type: none"> 1. The proposed site is located along Vals River, which drains its water with quaternary catchment C60A to C60B of the Vaal Water Management Area (WMA). 2. Runoff on the unnamed tributary draining into the Vals, traversed by the outfall sewer and the access road had a sewage spill from Ntha township. 3. Suspended soils exceed the Wastewater Discharge Limits 4. Faecal Coliform Bacteria values exceed the Wastewater Discharge Limits at S2 downstream point. 5. Sewer was observed flowing from an unnamed tributary to the Vals River. 6. Water Use in the Vals catchment is dominated by irrigation, which represents 80% of the local requirements for water. About 20% of the requirements are for domestic use. 7. There are no afforestation and invasive plants in the C60A and C60B quaternary catchment.

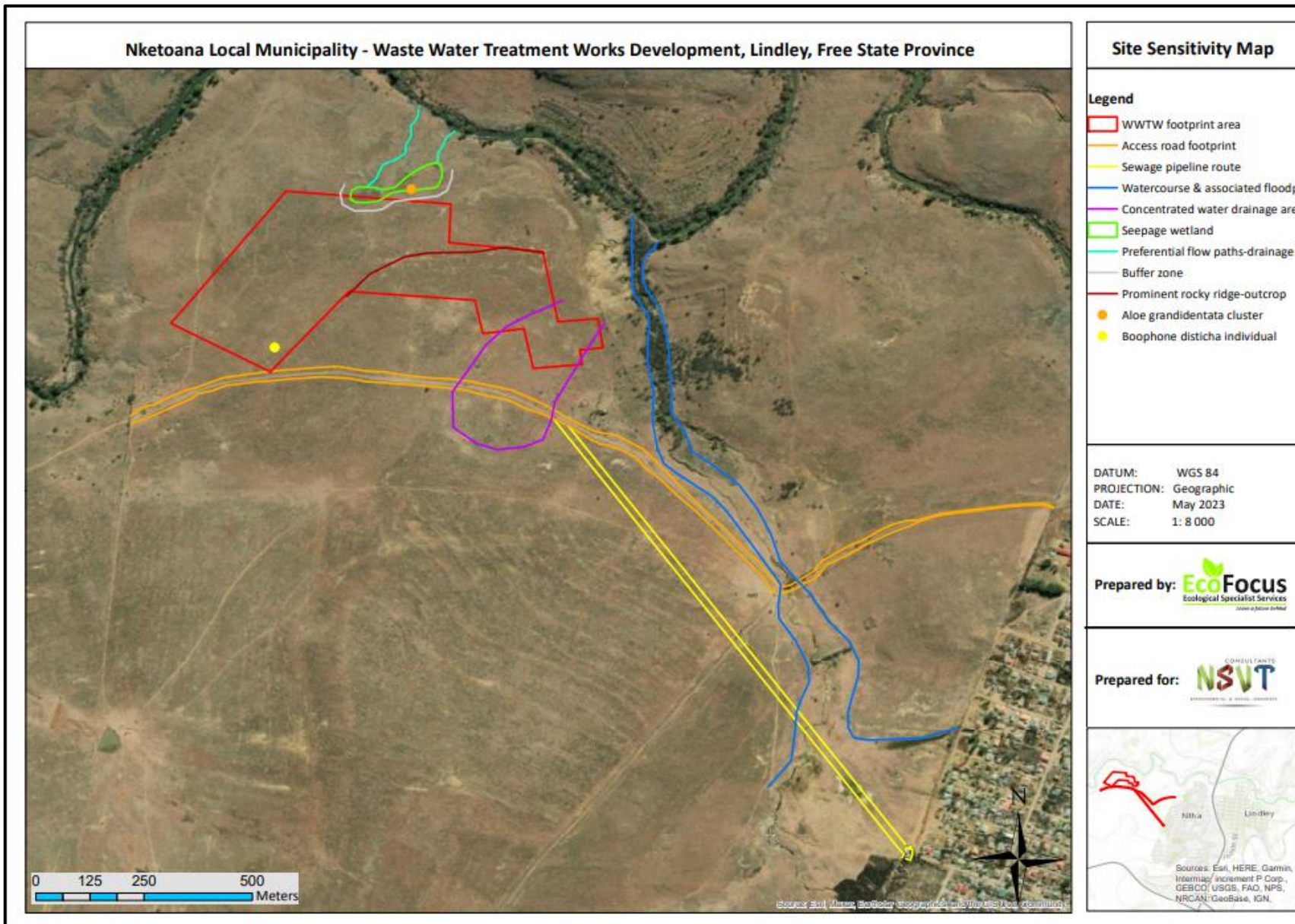


FIGURE 1: SENSITIVITY MAP OF THE PROPOSED SITE

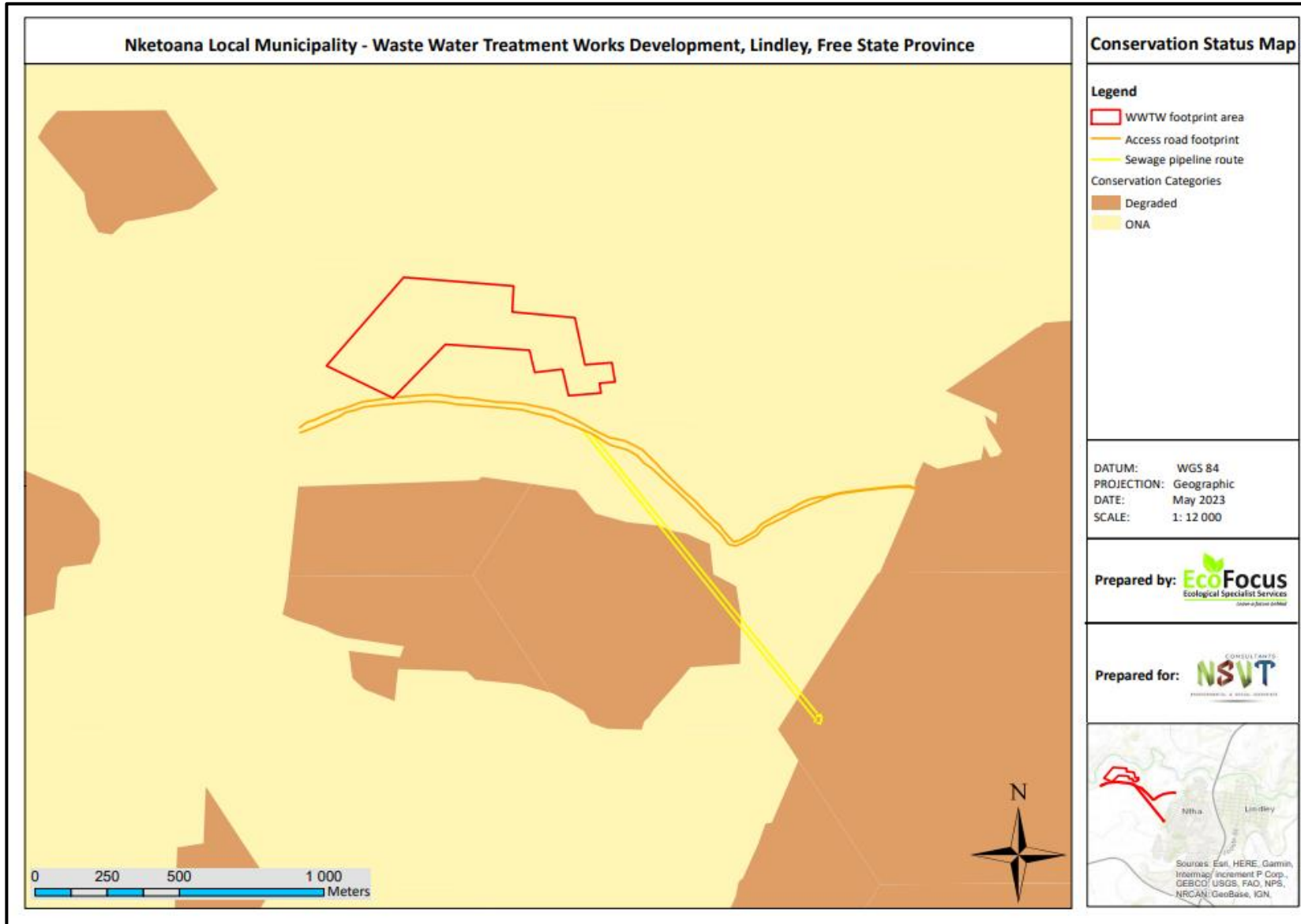


FIGURE 2: MAP DEPICTING CONSERVATION STATUS OF THE PROPOSED SITE

5. CHECKLIST FOR THE PROPOSED EXPANSION OF THE PROPOSED LINDLEY WWTW

1. Give a detailed description of the development:

The proponent, Nketoana Local Municipality, intends to construct new oxidation ponds for the treatment of wastewater with a daily throughput capacity of 6ML per day and a new 4000m x 300mm Ø bulk outfall sewer line on the Farm Brandhoek No. 19 within Nketoana Local Municipality. The proposed site is bordered by Vals River on the northern Side and a watercourse tributary on the east. To accommodate the proposed development, clearance of indigenous vegetation in an area of approximately 17 hectares, would be required and within 100m of the watercourse and a discharge point onto the Vals River, which would require excavation in, removal from, and infilling of material in the watercourse. The 1.2km in length outfall sewer and the approximately 2km existing access road to be upgraded cross a watercourse, therefore, this would require excavation, removal, and infill of material to lay the pipe and construct the road.

2. Give a brief description of the surrounding area:

The proposed site is bordered by Vals River on the north and a tributary watercourse on the east, the existing dirt road on the south and the western side is farm land. The existing dirt road and outfall sewer pipeline traverse the tributary watercourse. Ntha is located approximately 1km to the east of the proposed site.

3. Is the project significantly different from the surrounding land use?

Yes.

4. Are any of the following located on the site chosen for the development?

- i. River, stream, dam, wetland – No
- ii. Open space area – No
- iii. Residential (formal or informal settlement) – No
- iv. Area of cultural importance, e.g. graveyards, old houses, museum, etc. – No

5. Are there any protected areas close to the construction site?

No, there are no protected areas within/near the proposed site.

6. Will the project be considered a noisy intrusion to the neighbours?

No

7. Would it be necessary to construct roads to access the construction site?

No, there is an existing gravel road.

6. ENVIRONMENTAL MANAGEMENT PROGRAMME

6.1. INTRODUCTION

The EMPr has been divided into four different phases associated with the development, namely the pre-construction planning phase, the construction phase and operational phase. This draft EMPR will be considered a Final EMPr if approved by DESTEA and it will be implemented by NLM during implementation of the project. It should be read in conjunction with the contract documentation to ensure the contractor works in an environmentally sensitive manner, thus ensuring the impacts on the receiving environment. Should there be any conflict between the EMPr and project specifications, then terms herein shall be secondary.

6.2. OBJECTIVES OF THE EMPR

The aim of the EMPr is to ensure that impact on the environment due to the construction of the new development is limited. To achieve this, the EMPr has the following objectives:

- ❑ To identify possible impacts of the proposed activity on the environment and mitigation thereof.
- ❑ To provide information on construction activities associated with the identified environmental issues.
- ❑ To provide guidelines for the management of the identified environmental issues.
- ❑ To provide guidelines to the responsible person to follow appropriate contingency plans in the case of various possible impacts.

6.3. RESPONSIBLE PERSON (S)

The implementation of this EMPr requires the involvement of various role players, each with specific responsibilities to ensure that the development is completed in an environmentally sensitive manner.

The Developer: Nketoana Local Municipality

Responsibility: To implement the final EMPr after approval by DESTEA before completion of the construction phase and ensure the constructed development complies with the National Environmental Management Act (Act 107 of 1998) requirements and the conditions of the EA. This includes obtaining all the other applicable permits and/or licenses before commencement of construction.

The Project Engineers: Babereki Consulting Engineers

Responsibility: To undertake the detailed design for the development and to ensure that necessary permit has been obtained. To ensure the contractor sign the EMPr before commencement of construction.

The Environmental Control Officer (“ECO”): To be appointed.

Responsibility:

- ❑ To ensure that the contractor implements the EMPr for the duration of the project from construction to post-construction.
- ❑ To review the method statements with the resident engineer.
- ❑ To maintain direct open line between the project consultant, contractor, the project steering committee (“PSC”) and NLM.
- ❑ To audit the implementation of the EMPr and compliance to the environmental authorisation once a month until project completion.

The Contractor: To be appointed

Responsibility:

- ❑ To implement the EMPr and keep a copy on-site for the duration of the construction phase because obligations imposed by the document are legally binding to environmental legislation.
- ❑ To comply with the Environmental Authorisation and undertake his construction activities in an environmentally sensitive manner and rehabilitation of the site.
- ❑ To undertake good housekeeping practices during duration of the project.
- ❑ To ensure that adequate environmental awareness training takes place in the language of the Employees.

Designated Environmental Officer (“DEO”): To be appointed by the Contractor.

Responsibility:

- ❑ To implement the environmental management programme.
- ❑ To maintain records of environmental queries for duration of the construction.
- ❑ To resolve environmental issues during the construction phase of the project.

As a minimum the DEO/SECO shall have an accredited Higher Diploma qualification in environmental or natural sciences or equivalent. Alternatively, the DEO should have a minimum of 2 years’ experience in a similar role in construction or regulatory environment.

The Project Steering Committee/Environmental Forum: A committee that comprises of representatives of NLM, Project Engineers, Ward Councillor, Ward Committee Members, Local Community and Contractor. A Social Facilitation Practitioner should be appointed to deal with social issues during project implementation as facilitate establishment of the PSC.

Responsibility:

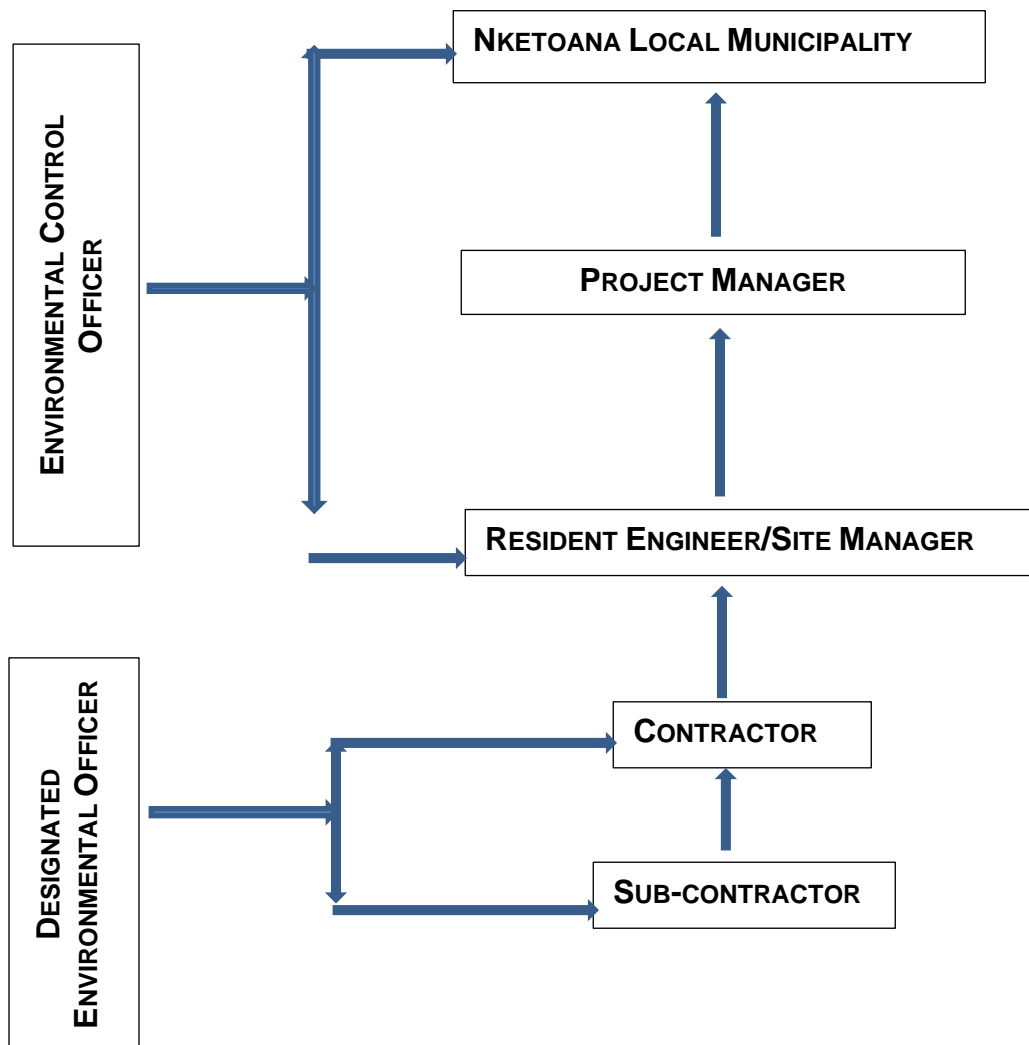
- ❑ To monitor the implementation of the EMPr.
- ❑ To assist in sourcing general workers from the local community.
- ❑ To ensure participation of local contractors during construction.
- ❑ To assist in resolving social or environmental issues that may arise during construction.

6.4. PROPOSED MECHANISMS FOR MONITORING COMPLIANCE WITH THE EMPR AND REPORTING THEREOF

The ECO must have adequate environmental knowledge to understand and implement this EMPr. They may not be someone appointed by the contractor, engineer or other party involved with the project. The ECO must be appointed and report to NLM only. If, in the opinion of the ECO, that there is a serious threat to or impact on the environment caused directly by the construction activities, the ECO may petition the Contractor with support of the Engineer to stop the works. Upon failure by the contractor or his workforce to show adequate consideration to the environmental aspects of this EMPr, the ECO may recommend to the engineer to have the contractor's representatives or any employee(s) removed from the site or the work suspended until the matter is remedied. If the transgression continues, the ECO in consultation with the Engineers may issue the contractor with a penalty.

6.4.1. ORGANIGRAM FOR REPORTING LINES

The organogram below depicts reporting lines for implementation of the EMPr.



All senior personnel shall be required to familiarise themselves with the contents of this document.

6.5. METHOD STATEMENT

A method statement outlines construction activities to be undertaken with mitigation measures. The contractor should give a written statement to the resident engineer at least two weeks before the activity so that any irregularities can be handled before construction commences and also communicated to the Employees. The format of the method statement should clearly indicate the following:

1. Construction and Operational Procedures
2. Materials and Equipment used
3. How and where materials will be stored
4. When actions will be undertaken





Based on the EMPr specifications, the following method statements are required as a minimum:

- Site clearing
- Site layout and establishment
- Storage of hazardous substances and accidental spillages of hazardous substances
- Cement mixing
- Waste management procedures
- Wastewater management procedures
- Stormwater Management
- Traffic accommodation
- Erosion remediation
- Control of Alien Invasive Species
- Fire control and emergency procedures

6.6. ENVIRONMENTAL AWARENESS TRAINING

NLM, workforce of the contractors and sub-contractors involved with the work in the construction phase are to be briefed on their obligation towards environmental protection and methodologies in terms of the EMPr prior to work commencing. The briefing must be done by the DEO prior to construction in the form of an on-site talk (toolbox talks) and demonstration. There should be records for the said presentation, which should be done in a language that will be easily understood by all. This should be done prior to commencement of construction activities and for new sub-contractors and general workers if construction has commenced.

The environmental training should, as a minimum include the following:

-  The importance of conformance with all the environmental policies and legislation.
-  The conditions of the Environmental Authorisation.
-  The roles and responsibilities in achieving conformance with the EMPr.
-  The environmental Impact, actual or potential, of their work activities.

- ✚ The mitigation measures required from specified operating procedures.
- ✚ The potential consequences of departure from specified operating procedures.
- ✚ Emergency procedures.
- ✚ Procedures to follow when working within or near sensitive areas.
- ✚ Wastewater management procedures.
- ✚ Sanitation procedures.

The basic rules of conduct, which should be considered for the duration of the project, are shown in *Table 1* below.

TABLE 2: BASIC CONDUCT RULES DURING CONSTRUCTION

Do	Do Not
Use of toilet facilities provided and report when dirty or full	Make open fires for cooking, dedicated areas should be provided.
Clear your work areas of litter and building rubbish at the end of each day. Use the waste bins provided and ensure that litter would not be blown away	Allow any cement bags or litter to be blown around
Report all leakages and/or spillages	Dispose of cigarettes and burning matches randomly
Confine work and storage of equipment and comply with all safety procedures	Leave food lying around
Provide fire extinguisher in good working condition and easily accessible	Dump any waste substance into the nearby watercourses
Use areas designated for food preparation	No storing of material or movement of construction vehicles within the seepage wetland including the protective buffer.
Only emergency repairs of construction vehicles are allowed on the construction site	
Use all safety equipment and comply with all safety procedures	
Prevent excessive dust and noise	

6.7. RECORD KEEPING

There must be an up-to-date filing system at the site office for the duration of the project whereby method statements, environmental incidents report, training records, audit reports and public complaints register are kept. It is advised that photographs of the site must be taken pre-, during and post-construction as a visual reference and must be stored with other records related to the implementation of the EMPr. These records must be kept for a minimum of 2 years after completion of the project. It is therefore imperative that there be a file dedicated to keeping Environmental Documentation.

6.8. PENALTIES

In cases of transgressions and non-compliance with the EMPr by the contractor, he should be liable to a penalty fine. Transgressions should be recorded in a dedicated register and be kept at the site office for the duration of the project.

The resident engineer will issue the penalties in terms of the severity on the environment; however, *Table 2* below may be used as a guideline.

TABLE 3: PENALTIES FOR TRANSGRESSIONS

TRANSGRESSION	PENALTY
Littering and bush-toileting	R1000
Concrete mixing on the ground	R2000
Spillages	R1000-R10 000 depending on the magnitude)
Soil erosion	R2000
Veld fires	R5000

The penalty could be donated to an environmental charity in the area or any need for environmental protection.

6.9. COMPLIANCE WITH ENVIRONMENTAL LEGISLATION

The proposed development must be in compliance with the applicable Environmental Legislation in *Table 4* below and necessary authorisation, permits and licenses obtained before commencement of construction activities as shown.

TABLE 4: APPLICABLE ENVIRONMENTAL LEGISLATION

LEGISLATION	APPLICABLE		OBTAINED	
	YES	NO	YES	NO
Environmental Authorisation in terms of Section 24 of National Environmental Management Act (Act 107 of 1998)	X			X
Water Use License in terms of Section 21(c) and (i) of the National Water Act (Act 36 of 1998)	X			X
Permit in terms of National Environmental Management Act: Biodiversity Act (Act 10 of 2004)	X			X
Section 38 of National Heritage Resources Act (Act 25 of 1999)		X		
Section 37 of the Mineral Resources Development Act (Act 29 of 2002)		X		
Construction material must be obtained from a borrow pit with a Mining Permit or a commercial quarry.				
Waste Management License in terms of National Environmental Management: Waste Management Act (Act 59 of 2008)		X		

6.10. IMPACT AND MANAGEMENT MEASURES

The EMPr is outlined in *Table 5* below and adherence to this plan during the project life cycle will ensure that the environmental impacts associated with the proposed development will be mitigated, thus promoting sustainable development. The commitment and co-operation of the identified responsible person(s) will ensure effective implementation of the EMPr for the duration of the implementation. The Contractor must familiarize himself with the requirements of the EMPr, keeping in mind that this EMPr specifies the minimum performance specifications and that other site-specific requirements and possible additional requirements from relevant stakeholders (government departments/commenting authorities), as outlined in the conditions of the EA as they must be complied with.

TABLE 5: DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVE (S)	MONITORING ACTION AND FREQUENCY
1. PRE-CONSTRUCTION PHASE					
Project Contract and Programme	Adherence to the EMPR	<ul style="list-style-type: none"> ◇ The EMPr must be included in the tender documentation and a copy of should be available on-site for the duration of the project. ◇ The environmental responsibilities should be formalized, and environmental awareness introduced to the labourers in their language as toolbox talks in addition to presentation of the EMPr. 	NLM, CONTRACTOR & ENGINEERS, DEO	Ensure that EMPr is adhere to	<u>Frequency</u> Once off
Location of Camp and Depot	Environmental damage	<ul style="list-style-type: none"> ◇ The camp depot should not be located within 100m of the watercourse thus all sensitive areas avoided. ◇ The contractor should provide the project engineer with the layout plan of the camp depot for approval before commencement with the construction phase. The plan should include site offices, temporary fencing boundary, sanitation facilities, waste and petroleum products storage facilities, stockpiling areas, etc. The parking of vehicles, storage of equipment and materials must strictly be confined to designated areas. ◇ No storage of construction material must be allowed on watercourses. 	CONTRACTOR & RESIDENT ENGINEERS	Prevent environmental damage and disturbance of neighbouring land users	<u>Frequency</u> Once off

		<ul style="list-style-type: none"> ◇ If located on the “virgin” ground, the area has to be rehabilitated once the project is completed. ◇ The construction area must be adequately cordoned off. ◇ A full list of all volatile liquids and chemicals stored onsite including the Material Safety Data Sheets must be in place. 			
MANAGEMENT ACTION		A camp depot must be approved by the Resident Engineer. An agreement should be in place between the contractor and the landowner. Photographs of the approved area before and after establishment must be kept for recordkeeping. Inventory list of chemicals and fuels stored on-site including their volumes and locations.			
Water Supply	Source of water during the construction phase.	<ul style="list-style-type: none"> ◇ No boreholes can be established without DWS approval. ◇ No water must be abstracted from the watercourse without a Water Use License. ◇ The vehicle abstracting water from a river does not enter or cross it and does not operate from within the river. No damage occurs to the riverbed or banks and abstraction must entail stream diversion activities. ◇ Use of greywater must be encouraged. 	CONTRACTOR, ENGINEERS & MUNICIPALITY	Prevent borehole establishment or water abstraction without DWS approval.	<u>Frequency</u> Once off
MANAGEMENT ACTION		A written agreement between the contractor and property owners or Water Use License for abstraction must be in place. If water will be obtained from the municipality or alternative source, then an agreement must be in place.			
Access Control for the camp depot	Hazards to livestock, and stealing of construction materials	<ul style="list-style-type: none"> ◇ Fence or suitably secure main site office and material storage area. ◇ Unauthorized entry must be prohibited 	CONTRACTOR AND ENGINEER	Keep the site secure from trespassing or theft and keep animals out.	<u>Frequency</u> Duration of the project
MANAGEMENT ACTION		A fenced off camp depot with access control, e.g., site access register and complaints book should be in place.			
Access route	Erosion and dilapidation of the access route	<ul style="list-style-type: none"> ◇ Upgrade the access route used during construction to an acceptable condition. ◇ Proper maintenance must be done to ensure the quality of the access road is improved. ◇ Implement erosion protection works at identified problem areas. 	CONTRACTOR, ECO & ENGINEERS	Prevention of dilapidation of access route	<u>Frequency</u> Weekly
MANAGEMENT ACTION		Photographs depicting conditions of the road pre- and post-construction.			

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVE (S)	MONITORING ACTION AND FREQUENCY
Power Supply	Safety Impacts	<ul style="list-style-type: none"> ◇ No illegal electrical connections allowed. ◇ A safety officer must be appointed to undertake safety audits. 	CONTRACTOR & ENGINEERS	Implement safety measures	<u>Frequency</u> Monthly
MANAGEMENT ACTION		Appointment letter of the Safety Officer must be in place and approved/acceptable electrical connections allowed.			
Solid Waste	Littering/ Pollution of environment with waste materials	<ul style="list-style-type: none"> ◇ Refuse receptacles marked for different waste streams must be provided. ◇ Temporary storage areas must not cause odour, rodent or fly problems. ◇ System for regular waste removal must be set up. ◇ Letter or agreement between contractor and pollution control officers or companies dealing with hazardous waste should be on site. The service provider must have the necessary accreditation to transport and dispose waste. ◇ Staff must be trained in waste segregation. 	CONTRACTOR & ENGINEERS	Prevent environmental pollution with waste materials and visual impact.	<u>Frequency</u> Duration of the Project
MANAGEMENT ACTION		Method Statement for storing, handling, and disposal of waste and Record keeping of all records. Letter of Agreement for handling of hazardous waste between contractor and Service Provider must be in place.			
Sewage	Pollution of environment with waste materials	<ul style="list-style-type: none"> ◇ Adequate sanitation facilities e.g. ,chemical toilets must be provided at the camp depot and construction site. ◇ It must not be located within 100m of the watercourses. ◇ No emptying of chemical toilets in the neighbouring watercourse or bush-toileting must be allowed. ◇ Letter of consent from the municipality or a registered waste facility to allow contractor to empty the toilet facility at their sewer system should be in the environmental document. 	CONTRACTOR & ENGINEERS	Prevent environmental pollution	<u>Frequency</u> Duration of the project
MANAGEMENT ACTION		Record keeping for emptying of the chemical toilets. Written agreement between contractor and the chemical toilets service provider must be in place.			

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVE (S)	MONITORING ACTION AND FREQUENCY
Social & Socio-Economic Aspects	Dissatisfaction	<ul style="list-style-type: none"> ◇ Job opportunities for general workers must benefit the local community. ◇ Labour recruitment must follow municipality's processes. ◇ A Community Liaison Officer must be appointed. ◇ A PSC that meets regularly to address any concerns/issues from the neighbouring land users and employing local labourers must be established. 	CONTRACTOR, ENGINEERS, WARD 8 COUNCILLOR & NLM	Ensure satisfaction of workers and neighbouring land users	<u>Frequency</u> Monthly
MANAGEMENT ACTION		Appointment letter for the CLO must be in place. Contravening of PSC meetings and Records of the Minutes			
Health & Safety	Danger to the neighbouring land users	<ul style="list-style-type: none"> ◇ The contractor should provide employees with suitable equipment to protect them from hazards being presented and that will allow them to work without risk to their health in a hazardous environment, e.g., hard hats, gloves, boots, etc. ◇ An Emergency Preparedness Plan must be compiled and reviewed by the Resident Engineer, Safety Officer and ECO before construction commences. ◇ A list of all emergency telephone numbers, i.e., fire, ambulance, ECO, engineers, etc. should be available all the time at the construction and camp site. ◇ A medical first aid kit should be available on site for duration of the project. ◇ Safety signs complying with SABS and SANS standards should be placed on-site in a manner clearly visible to the public. ◇ Construction methods should adhere to the Occupational Health and Safety Act (Act 85 of 1993). 	CONTRACTOR & ENGINEERS & SAFETY OFFICER	To avoid endangering of the community members as well as exposure of workforce to hazardous working conditions required without PPE.	<u>Frequency</u> Duration of the Project
MANAGEMENT ACTION		An Emergency Preparedness Plan, first aid kit and Risk register should be in place. Use of PPE must be enforced and of safe working practices followed at all times.			

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVE (S)	MONITORING ACTION AND FREQUENCY
FLORA	Destruction of the provincially protected species	<ul style="list-style-type: none"> ◇ A Provincial Flora Permit has to be obtained from the Free State DESTEA, prior to commencement of any construction activities and the subsequent potential removal/destruction of any identified provincially protected species individuals. ◇ The identified provincially protected species <i>Boophone disticha</i> as well as any other individuals of this species potentially found on site must be relocated to another suitable and similar area as to where they were removed. This relocation process must be completed prior to the commencement of any vegetation clearance and/or construction activities. A Protected Plant Species Relocation Management Plan must be compiled by a suitable qualified and experienced ecologist. ◇ A rehabilitation Management Plan must be compiled by a suitable qualified and experienced Ecologist. 	CONTRACTOR & ENGINEERS & SAFETY OFFICER	To relocate the individuals of the Provincially Protected Species	<u>Frequency</u> Once off
MANAGEMENT ACTION		A Plant Species Relocation Management Plan A Rehabilitation Plan A Flora Permit obtained prior to commencement of construction activities.			
SEEPAGE WETLAND	Destruction of the wetland	A seepage wetland must adequately be buffered out of the construction footprint with a minimum of 20m buffer distance.	CONTRACTOR & ENGINEERS & SAFETY OFFICER	To prevent destruction of the seepage wetland	<u>Frequency</u> Duration of the project
MANAGEMENT ACTION		Undisturbed seepage wetland by construction activity as it is a no-go area			

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVE (S)	MONITORING ACTION AND FREQUENCY
2. CONSTRUCTION PHASE					
Characteristics of Watercourses	Contamination of Vals River and Watercourse	<ul style="list-style-type: none"> ◇ Adequate stormwater and erosion management measures must be implemented for the entire assessment area during the construction and operational phases. ◇ Soils must be stored outside of the watercourse in order not to smother established riparian vegetation. ◇ The movement of heavy machinery within the watercourse must be prohibited. ◇ Indiscriminate habitat destruction must be avoided and the construction footprint, including service and support areas should be kept to a minimum. ◇ Adequate site reinstatement must be implemented in order to abate the formation of erosion through modification of the surface water hydrology. 	CONTRACTOR, DEO, RE & ECO	To avoid the complete destruction of the watercourse	<u>Frequency</u> Throughout construction.
Water quality of the watercourses	Contamination of the watercourses due to accidental spillages or leaking of poorly services vehicles during construction	<ul style="list-style-type: none"> ◇ No fuel to be stored at or near to the watercourses. ◇ Fuel storage and pump area must be banded to avoid accidental leakage. ◇ Spill control measures must be in place and accidental spills must be reported and cleaned immediately per contingency plans in place in the event of spills. ◇ Emergency Spill Kit must be available on the construction site. ◇ Equipment must be properly maintained and services. 	CONTRACTOR, DEO, RE & ECO	To protect and prevent contamination of the watercourses	<u>Frequency</u> Throughout construction

		<ul style="list-style-type: none"> ◇ Adequate operational procedures for construction machinery and equipment must be developed in order to strictly govern movement of machinery only within the proposed development construction footprint area and to ensure environmentally responsible construction practices and activities. ◇ The stockpiled construction material must be banded to keep material within confined areas as well as avoiding turbid stormwater discharge. ◇ Proper drainage must be in place to divert water from excavated areas. 			
MANAGEMENT ACTION		ECO Compliance Report			
Flora	Loss of vegetation	<ul style="list-style-type: none"> ◇ Existing access road in proximity to the construction footprint area must be used during the construction phase. ◇ No new temporary roads or tracks may be constructed within the surrounding undeveloped areas outside the proposed development footprint and specifically not within 32m of the watercourse. ◇ Topsoil must be reserved and used as a top layer on disturbed areas to enable plant succession. ◇ Mechanical tools should be used for vegetation clearance where possible. ◇ Vegetation clearance should be confined to the development footprint and set out to avoid substantial vegetation disturbance. ◇ All excavations to be filled and rehabilitated before construction moves off sites. 	CONTRACTOR, DEO, RE & ECO	Prevent impacts on flora within surrounding areas	<u>Frequency</u> Once off
MANAGEMENT ACTION		ECO compliance report, Photographs taken before the clearance of the vegetation is undertaken.			

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVE (S)	MONITORING ACTION AND FREQUENCY
Fauna	Disturbance to fauna in the area	<ul style="list-style-type: none"> ◇ No hunting, snaring, shooting, nest raiding or egg collection by the construction staff must be allowed. ◇ Toolbox talks must include handling of animals. 	CONTRACTOR, RE, DEO & ECO	To avoid disturbance and prevent killings of fauna in the area	<u>Frequency</u> Duration of the contract
Areas of Paleontological, Cultural and/or Historical Importance	Disturbance of important scientific artefacts	<ul style="list-style-type: none"> ◇ Excavations exceeding >1m into the intact Normandien Formation rocks should be monitored by a professional palaeontologist on a regular basis during the construction phase of the outfall sewer. ◇ Should unexpected finds be made (e.g., precolonial burials; ostrich eggshell container cache; or localised Stone Age sites with stone tools, pottery, ash midden with bone/pottery; military remains), contact SAHRA. ◇ If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations, construction must halt and the ECO must be informed. ◇ These discoveries ought to be secured (if possible, <i>in situ</i>) and the ECO ought to alert SAHRA so that appropriate mitigation (documented and collection) must be undertaken by a professional palaeontologist/archaeologist and a Phase 2 rescue operation may be required. ◇ If unmarked burials, the SAHRA Burial Grounds and Graves Unit must be alerted. ◇ On going heritage monitoring must be in place. ◇ A Chance Find Protocol Must be followed attached hereto as Appendix B. 	RE, CONTRACTOR, DEO & ECO	Prevent disturbance of scientific heritage and/or cultural artefacts.	<u>Frequency</u> Duration of the Contract
MANAGEMENT ACTION		Appointment of a Palaeontologist prior to commencement of construction of the outfall sewer pipeline. Inclusion or process to follow in case of chance find of Palaeontological artefacts must be included in the toolbo talks.			

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVE (S)	MONITORING ACTION AND FREQUENCY
Geology and soils (Geotechnical constraints)	Collapsing of structures	<ul style="list-style-type: none"> ◇ Earthwork and/or foundation modifications may be required if any composite conditions are encountered. ◇ One or a combination of the following foundation options can be recommended as a generic approach, together with articulation joints in floors and masonry and light reinforcing in masonry: Soil raft constructed of inter material; Stiffened or cellular raft; Deep strip footing with normal construction (Areas of shallow competent rock); Compaction below floors and below the far western to southwestern extent of the site, where the sandstone formation with low PI, low expansiveness residual sands were encountered. ◇ A general soil raft approach is attached hereto as Appendix C. 	RE, CONTRACTOR, DEO & ECO	Prevent any structural collapse.	<u>Frequency</u> Duration of the Contract

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVE (S)	MONITORING ACTION AND FREQUENCY
Topsoil	Loss of Topsoil	<ul style="list-style-type: none"> ◇ Exposure of bare ground must be minimized. Topsoil stripping should be limited to the development footprint. ◇ It must be stored separately from subsoil, <i>i.e.</i>, no mixing of soils. ◇ In situ material should be removed to an average depth of 1000mm. ◇ Cleared and grubbed topsoil must be stockpiled as a top layer of at least 150mm thickness on the backfilled trenches for rehabilitation purposes. ◇ Soil conservation measures such as berms, gabions and mats should be used on-site to help reduce erosion. ◇ No stockpiling of topsoil within 32m of the watercourse. ◇ Double handling of topsoil must be avoided. ◇ Topsoil stockpile must be bunded and kept weed and litter free. 	CONTRACTOR, DEO, RE & ECO	Conserve and protect topsoil from erosion and deterioration	<u>Frequency</u> Weekly
MANAGEMENT ACTION		Litter-and weed free topsoil stockpiles ECO Compliance Report, Photographs			

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVE (S)	MONITORING ACTION AND FREQUENCY
Topography	Disturbing the natural topography	<ul style="list-style-type: none"> ◇ Trenches, soil dumps and other working areas should be rounded-off to ensure the disturbed area(s) blend in with the natural environment and the possibility of erosion is minimized. ◇ All the excavations should be backfilled to avoid. ◇ Rehabilitation by covering the disturbed areas should hasten the succession process and minimize potential erosion. 	CONTRACTOR, RE, DEO & ECO	Minimize the disturbance of topography	<u>Frequency</u> Duration of the project
MANAGEMENT ACTION		ECO Compliance Report			
Stormwater	Contamination of stormwater	<ul style="list-style-type: none"> ◇ An approved Stormwater Management Plan must be in adhered to. ◇ Stormwater control works must be constructed, operated, and maintained in a sustainable manner throughout the project. ◇ Stormwater leaving the construction site must in no way be contaminated by any substance produced, stored, dumped, or spilled on site. ◇ No contaminated water should be allowed to run freely into the watercourse. ◇ The release of settled water back into the environment must be subjected to approval by Resident Engineer and support by ECO. ◇ Excavations must not be left open longer than four (4) weeks. 	CONTRACTOR, DEO, RE & ECO	Avoid contamination of storm water	<u>Frequency</u> Weekly
MANAGEMENT ACTION		Stormwater Management Plan must be in place and kept in the Environmental Documentation			

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVE (S)	MONITORING ACTION AND FREQUENCY
Soil erosion	Erosion	<ul style="list-style-type: none"> ◇ Adequate stormwater and erosion management measures must be implemented during the construction and operational phases to sufficiently manage stormwater runoff in order to prevent any significant erosion from occurring. ◇ Effective sediment control practices must be in place so that it does not reach the watercourse. ◇ Gully formation must be prevented. ◇ Erosion within the proposed site must be stabilised. 	CONTRACTOR, DEO, RE & ECO	Prevent soil Erosion	<u>Frequency</u> Weekly
Air Quality	Nuisance and reduction in visibility	<ul style="list-style-type: none"> ◇ Access road must be maintained properly so that dust generation is minimal. ◇ Occasional wetting of the construction site must be done by means of a water tanker pipe to suppress dust. ◇ Contaminated water must not be used for dust suppression. ◇ Vehicles should drive at 40km/h speed. ◇ Exhaust emissions from engines must be maintained to acceptable levels. ◇ Regular maintenance and inspection programs must be in place for all construction machinery and vehicles. ◇ Proper and efficient operation of construction vehicles by qualified operators. ◇ Routine maintenance of construction vehicles and machinery. 	CONTRACTOR, DEO, RE & ECO	To avoid excessive dust from excavated materials and emissions from construction vehicles	<u>Frequency</u> When necessary
MANAGEMENT ACTION		Physical observation Dust suppression measures in place ECO Monitoring Report			

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVE (S)	MONITORING ACTION AND FREQUENCY
Noise	Nuisance	<ul style="list-style-type: none"> ◇ Construction should be limited to normal working days and office hours from 08h00 to 17h00. Limit working hours of noisy equipment to daylight hours. ◇ Ensure that employees and staff conduct themselves in an acceptable manner while on site. ◇ Fit silencers to equipment. ◇ Municipal by-laws regulating noise must be adhered to. ◇ All machinery and equipment must be operated efficiently and according to the specifications of the manufacturer. ◇ They must be in good working order and maintained regularly to ensure optimal performance during operation. ◇ They must be operated by trained and qualified operators. 	CONTRACTOR, DEO, RE & ECO	To avoid excessive noise generation from site operations	<u>Frequency</u> Duration of Contract
Solid Waste	Littering/ Pollution	<ul style="list-style-type: none"> ◇ Toolbox talks should include a component of waste management. ◇ All waste should be appropriately separated, contained, and disposed be removed from the site to the registered landfill site. Reduction, reuse and recycling of waste should be introduced. ◇ Illegal dumping should be forbidden. No dumping of builders' rubble earth or other materials within the watercourse. ◇ Good housekeeping practices must be in place. ◇ Certificates of safe disposal of general, hazardous and recycled wastewater must be maintained. 	CONTRACTOR, ENGINEER AND ECO	Provide facilities for appropriate collection and disposal of different waste streams	<u>Frequency</u> Weekly

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVE (S)	MONITORING ACTION AND FREQUENCY
Sewerage	Pollution of the receiving environment.	<ul style="list-style-type: none"> ◇ Adequate sanitation facilities <i>i.e.</i> 15 employees per facility should be provided. ◇ The toilets should be located at least 50m from the construction site. And must be kept clean and hygienic regularly. ◇ Effluent must not be discharged into natural environment and bush-toileting is prohibited. ◇ No chemical toilets must be placed within the 100m of the watercourse. ◇ Toilets must be secured to the ground to prevent them from toppling due to wind or any other cause. ◇ A copy of the waste disposal certificate must be maintained. 	CONTRACTOR, DEO, RE & ECO	Provide facilities for sanitation	<u>Frequency</u> Weekly
Batching Plant and Cement mixing	Pollution of soils, surface and groundwater	<ul style="list-style-type: none"> ◇ Bagged cement must be stored in an appropriate facility atleast 50m from any watercourse. ◇ Mixing of cement should be done at specifically selected areas on mortar boards or similar structures to contain surface run-off. ◇ Batching plants must be fitted with a containment facility for the collection of cement laden water. ◇ Cleaning of cement mixing equipment should be done on proper cleaning trays. ◇ Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licensed disposal facility. ◇ No cement or cement containers should be left lying around. They must be secured with adequate binding material if they will be temporarily stored on-site. 	CONTRACTOR, DEO, RE & ECO	Avoid polluting soil and groundwater	<u>Frequency</u> Weekly

		<ul style="list-style-type: none"> ◇ No disposal of excess cement or cleaning of cement mixing equipment within the watercourse or within 32m. ◇ Runoff from cement/concrete batching areas must be strictly controlled and contaminated water must be collected, stored and either treated or disposed off-site, at a location approved by Site Engineer. ◇ Dirty water from the batching plant must be contained to prevent soil and groundwater contamination. 			
Water Supply	Source of potable water during the construction phase.	◇ Potable water must be available at the camp site and construction site in clearly marked containers.	CONTRACTOR, DEO, RE & ECO	To provide clean and safe potable water to the workforce	<u>Frequency</u> Weekly
Power Supply	Safety Impacts	<ul style="list-style-type: none"> ◇ Limit the power supply cables & ensure the safety of the workers and neighbouring residents. ◇ All health and safety laws and regulations should be adhered. 	CONTRACTOR, DEO, RE & ECO	Avoid health and safety impacts	<u>Frequency</u> Weekly
Energy Efficiency	Saving of fossil fuels	◇ Manual labour should be used as much as possible rather than machinery to conserve fossil fuels.	CONTRACTOR, DEO, RE & ECO	Saving of fossil fuels by means of using labour intensive work.	<u>Frequency</u> Weekly
MANAGEMENT ACTION		Physical observation Photographic History ECO Monitoring Report			

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVE (S)	MONITORING ACTION AND FREQUENCY
Alien invasive species	Prevent the spreading of alien invasive species especially to the surrounding cultivated areas	<ul style="list-style-type: none"> ◇ Alien Invasive Species Establishment Management and Prevention Plan must be compiled by a suitably qualified and experienced Ecologist. ◇ All the identified alien invasive species individuals must be actively eradicated from the assessment area and adequately disposed of in accordance with the National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014. ◇ A designated person must be appointed to keep the construction site weed free. ◇ Construction vehicles must be cleaned before entering the construction site. 	CONTRACTOR, ENGINEER AND ECO	To prevent and control establishment of weed and alien species	<u>Frequency</u> Weekly
Traffic Impact	Safety/ Traffic Impacts	<ul style="list-style-type: none"> ◇ The vehicle construction should limit speed to 40km/h and also be considerate of the surrounding land users. ◇ Only drivers with valid licenses should be allowed to drive the construction vehicles. ◇ In the event of abnormal vehicles, a permit must be obtained from the local Department of Traffic. 	CONTRACTOR, DEO, RE, ECO & TRAFFIC OFFICER	Minimize the disruption of road users	<u>frequency</u> Weekly
Fire Hazard	Risk of veld fires	<ul style="list-style-type: none"> ◇ No open fires are permitted in the construction site, except under strictly controlled conditions subject to the National Veld and Forest Act, (Act No. 101 of 1998). ◇ The contractors and labourers should be informed and advised on the associated risks, dangers and damage of property caused by accidental fires and how to prevent them. 	CONTRACTOR, DEO, RE & ECO	Prevent veld fires.	<u>Frequency</u> Weekly

		<ul style="list-style-type: none"> ◇ Fire extinguishers should be made available at the construction site, and the labourers should be informed of their location and shown how to use them. ◇ Restrict smoking activities to demarcated smoking activities. 			
MANAGEMENT ACTION		Alien/weed free construction site Waste disposal certificate for emptying of mobile toilets. Dedicate Smoking area ECO Compliance Reports and Photographic History			
Vehicle Servicing Areas	Pollution	<ul style="list-style-type: none"> ◇ Vehicle servicing should be done at the identified camp depot on impermeable surfaces to minimize the likelihood of petrochemical spills on soil. ◇ In the case of accidents, polluted soil should be appropriately treated or taken away to an appropriate site. ◇ Used spares must be collected and disposed of in the correct manner. Oils must be drained into a suitable container, transferred to a larger storage container, and then supplied to oil recycling companies. ◇ Oil may under no circumstances be disposed of into the sewer lines, storm water system, stream, or the ground. 	CONTRACTOR, DEO, RE & ECO	Prevent soil Erosion	<u>Frequency</u> Weekly
Areas of Palaeontological, Cultural and/or Historical Importance	Disturbance of important scientific artefacts	<ul style="list-style-type: none"> ◇ Should fossil material be discovered later, it must be appropriately protected, and the discovery reported to a palaeontologist for the removal thereof as per SAHRA legislation. ◇ Should any human skeletal remains be found during excavations, work must stop in the area. The findings should be reported immediately to SAHRA. 	CONTRACTOR, ENGINEER AND ECO	Prevent disturbance of historical scientific artefacts.	<u>Frequency</u> Duration of the Contract

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVE (S)	MONITORING ACTION AND FREQUENCY
Blasting and Excavations	Impact to the environment	<ul style="list-style-type: none"> ◇ Any blasting activity must be conducted by a suitably licensed blasting contractor. ◇ Notification of the surrounding landowners, emergency services, site personnel of blasting activity 24 hours prior to such activity should be taking place on site. ◇ Blasting should not occur within 50m buffer or effective blast range (based on variable geotechnical conditions) from existing boreholes to preserve borehole structure stability. 	BLASTING COMPANY, CONTRACTOR, ENGINEER AND ECO	Prevent destruction of the existing boreholes and prevent danger to the workforce	<u>Frequency</u> Duration of the Contract
MANAGEMENT ACTION		ECO Compliance Reports Photographic History			

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVE (S)	MONITORING ACTION AND FREQUENCY
3. POST CONSTRUCTION PHASE					
Aesthetic view of the area	Aesthetic pollution	<ul style="list-style-type: none"> ◇ Areas surrounding the construction footprint must be adequately rehabilitated as soon as practically possible after construction. ◇ The site must be clear of litter and all waste and builders' rubble must be removed and disposed to the Lindley landfill site. ◇ All stockpiles must be removed to spoil or handled as directed by the engineers. ◇ Spoil heaps should be flattened to the similar adjacent ground, to prevent soil erosion, thus encouraging natural revegetation. ◇ All excavations should be backfilled, levelled properly and compacted. ◇ All surfaces hardened due to construction must be ripped and material imported thereon be removed. ◇ The original site topography should be restored where as much as possible. ◇ A final audit must be completed before the contractor may leave the site to ensure that all requirements were adhered to. ◇ A meeting must be held between the stakeholders to ensure that the site has been restored to a satisfactory condition. 	CONTRACTOR, ENGINEER AND ECO	Prevent pollution	<u>Frequency</u> Once off
MANAGEMENT ACTION		Visual inspections Final Audit Report submitted to DESTEA			

4. OPERATION PHASE	
	<ul style="list-style-type: none">◇ Operation and maintenance must be followed by the municipality.◇ Routine analysis of water samples must be undertaken.◇ Regular monitoring of chlorination process must be in place.◇ The overall operation must ensure that the water quality meets the water standards.◇ Generator, as a back-up power source must be in place in case of electricity cuts.◇ Handling of sludge and appropriate disposal must be in an acceptable environmental manner following Best Practice.◇ Community awareness must be introduced to inform the residents on the implications of flushing unwanted materials.◇ A Surface Water Monitoring Plan attached hereto as Appendix D must be implemented.
MANAGEMENT ACTION	“As built drawings” and Maintenance and Operation Plan must be in place

7. AUDIT AND MONITORING

Compliance monitoring provides useful information for gauging environmental performance throughout the duration of the project. The information obtained can be used to determine how effective the mitigation plans in the EMP_r are and ascertain whether the corrective actions undertaken are adequate and whether some modifications are required. The resident engineer must monitor the overall aspects of the project, e.g., labor issues and complaints raised by the local community, so they can be addressed in conjunction with the PSC. A DEO must be on site for the duration of the project to ensure that the conditions of the EA and EMP_r are adhered to. The ECO must monitor construction activities at least once a month and the monthly reports must be compiled and presented to the PSC for discussion if needs be. On completion of the construction phase, post-rehabilitation, an environmental audit must be conducted by an experienced and qualified auditor.

APPENDIX A
CV OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

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Date of Birth.: 1980-09-25

Nationality: South African

Education:

NAME OF INSTITUTION	DEGREE OBTAINED	DATES ATTENDED
University of the Free State	BSc. Natural Science (Zoology)	1999-2002
	BSc. Hons in Wildlife	2003-2004

Professional Membership:

MEMBERSHIP	MEMBERSHIP No.
Environmental Assessment Practitioners Association of South Africa-(EAPASA)	2020/2519
South Africa Council for Natural Scientific Professions (SACNASP)	Environmental Scientist (400161/09)
International Association for Impact Assessment South Africa Affiliate (IAIAsa)	Member (2191)
International Association for Public Participation Southern Africa Affiliate	Member (2010/ZA/FS0001)

Key Experience: She has 20 years experience in environmental consulting and has completed basic assessment, environmental impact assessment, waste management license, and water use license applications for various infrastructure developments in different provinces. She, therefore, has extensive knowledge regarding the competencies required to ensure the implementation and alignment of environmental policy instruments such as Environmental Impact Assessment. She possesses the technical expertise and scientific knowledge for conducting thorough environmental assessments. She has considerable public participation experience through her work in EIA and understands that an effective public participation process provides an opportunity for identifying problems during the EIA process and identifying opportunities that could be used in the decision-making process. Through her involvement in various projects, she has acquired analytical, problem-solving, and excellent research skills. She is licensed as a Trainer by the International Association for Public Participation in 2022.

Employment:

Duration: March 2011 to date Organization: NSVT Consultants-Environmental and Social Scientists

- ❖ Environmental Service for the proposed expansion of Slovpark Residential Development, Brandfort, Masilonyana Local Municipality
- ❖ Environmental Service for the proposed raw water pipeline from Lucretia Dam to the Clocolan water treatment works, Setsoto Local Municipality, Setsoto Local Municipality
- ❖ Environmental Services for the proposed sewer and water infrastructure from Fateng tse Ntsho to the Paul Roux wastewater treatment plan, Dihlabeng Local Municipality
- ❖ Environmental Services for the Routine Maintenance of the National Route Section 5 to Section 8.
- ❖ Environmental Service for the Routine Maintenance of National Route 8 Section 8 and National Route 10 Section 8 to 11,
- ❖ Project: Environmental Services for the proposed potable water pipeline from Lindley Water Treatment to the reservoir in Leratswana within Nketoana Local Municipality.
- ❖ Basic Assessment for the proposed Jan Kempdorp infill residential development, Phokwane Local Municipality
- ❖ Basic Assessment for the proposed expansion of the Jan Kempdorp cemetery, Phokwane Local Municipality
- ❖ Environmental Services for the proposed pipeline from Luiperdsvallei to the Bultfontein Water treatment plant, Tswelopele Local Municipality
- ❖ Basic Assessment for a new 132kV powerline from Rouxville substation, Mohokare Local Municipality to Melkspruit substation in Aliwal North, Walter Sisulu Local Municipality
- ❖ Environmental Compliance Monitoring for the Construction of a feeder pipeline to connect reservoir 8 with the existing water supply network, Section F, Botshabelo, Mangaung Metropolitan Municipality, Free State Province
- ❖ Environmental Impact Assessment for the proposed development of Frankfort, Vrede, and Villiers residential areas in Mafube Local Municipality
- ❖ Basic Assessment, Water use License, and Environmental Compliance Monitoring, for the Ficksburg Pipeline from Meulspruit Dam to the water treatment plant, Setsoto Local Municipality
- ❖ Environmental Authorisation application for the development of new residential areas including associated infrastructure in Metsimaholo Local Municipality and Maluti-a-Phofung Local Municipality
- ❖ Environmental Authorisation application for development of new residential areas including associated infrastructure in Phumelela Local Municipality, Dihlabeng Local Municipality, Tswelopele Local Municipality
- ❖ Application for rectification for upgrading the treatment works without obtaining an Environmental Authorisation in Vredefort, Ngwathe Local Municipality
- ❖ Environmental Compliance Monitoring for the Upgrading of 31km of widening and rehabilitation of N9 Sec 7 between Wolwefontein and Colesberg as well as the construction of a new access interchange at Colesberg which required the utilization of 10 borrow pits, Umsobomvu Local Municipality
- ❖ Environmental Authorisation application and Environmental Compliance Monitoring for a new interchange, overhead, and pedestrian bridge, Mangaung Metropolitan Municipality

Position: Director and Environmental Specialists/Scientist

Responsibilities: Business Operations, Marketing, Project Management, Community Facilitation, Internal EIA Evaluation and associated administration work including Determine whether the Basic Assessment or Environmental Impact Assessment is required, Initial assessment of site to identify potential environmental constraints, Initial screening (considering

sensitivity/environmental flaws) of borrow pits and selection of suitable ones, Team co-ordination, Collate project information, *i.e.*, civil reports and review, Consult with the Competent Authority to ensure the project is compliant with applicable national requirements and social legal requirements and policies, Consult with relevant Stakeholders per requirements of the National Environment Act of 1998, Undertake Site Investigation, Review of the Draft Environmental Management Plan and amendments following the confirmations of the route selection and alignment, Compilation of Progress Reports (Weekly or Monthly as required), Undertake public participation process, Compilation of construction EMP since no Basic Assessment/Environmental Impact Assessment was required, Compilation of EMPR as part of mining permit application for borrow pits, Approval of EMPRs and obtaining mining permit applications, Internal Review of Environmental Reports, Mentoring of Environmental Management Undergraduate Students

Previous Employment:

Duration: March 2004 to February 2011

Organization: Bokamoso Consultants-Environmental Scientists and Geohydrologist

- ❖ Environmental Impact Assessment for the upgrading of the wastewater treatment works in Dewetsdorp, Naledi Local Municipality
- ❖ Application for exemption from conducting EIA process for the upgrading of the treatment works in Marquard, Setsoto Local Municipality
- ❖ Application for exemption from conducting EIA process for the upgrading of the treatment works in Senekal, Setsoto Local Municipality
- ❖ Project: Environmental Impact Assessment for a new access road in Mount Arthur, Emalaheni
- ❖ Environmental Impact Assessment for the upgrading of D313 road from Morokweng to Vorstershoop, Kagisano-Molopo Local Municipality
- ❖ Environmental Impact Assessment for the upgrading of the wastewater treatment plant in Jan Kempdorp, Phokwane Local Municipality
- ❖ Environmental Impact Assessment for the upgrading of wastewater treatment works in Jagersfontein, Kopanong Local Municipality
- ❖ Community facilitation and public participation process for the resettlement planning and environmental authorisation application for Khuis Community

Position: Environmental Consultant

Responsibilities: Site visits, undertake public participation process and compile public participation report and/or comments and responses report, compilation of basic assessment and scoping report, compilation of environmental management plan, liaison with stakeholders and competent authorities, Water use License Applications, Waste Management License Applications, Environmental Compliance Monitoring,

Duration: March 2003 to February 2004

Organization: Geo Pollution Technologies (Bloemfontein)

- ❖ Application for rezoning and closure of the landfill site in Thaba Nchu and Botshabelo, Mangaung Local Municipality
- ❖ Environmental Impact Assessment for the wastewater treatment works in Ladybrand, Mantsopa Local Municipality
- ❖ Environmental Impact Assessment for the new reservoir in Ladybrand, Mantsopa Local Municipality

Position: Junior Environmental Consultant

Responsibilities: Site visits, undertake public participation process and compile public participation report and/or comments and responses report, compilation of basic assessment and scoping report, compilation of environmental management plan, liaison with stakeholders and competent authorities.

Reference:

CONTACT NAME	ORGANISATION	TELEPHONE NUMBERS
Mamofolo Matebele	Babereki Consulting Engineers	051 522 4865
Solomon Munthali	TS Consulting Engineers	071 875 8952
Christiaan Vermaak	Tucana Solutions	082 703 5680

Consent:

I confirm that the above CV is an accurate description of my qualifications and experience in environmental management, waste management license applications, which included basic assessment and environmental impact assessment processes, water use license and mining permit and rights applications, and environmental compliance monitoring, and public participation, stakeholder engagement and social facilitation.



Signature

2023-06-06

Date

APPENDIX B
CHANCE FIND PROTOCOL

1. Any excavations required for laying of foundations or installation of underground infrastructure that exceeds 1 m into Normandien Formation bedrock, will impact in situ sedimentary strata which could be palaeontologically sensitive. In this case Dr Ragna Redelsdorf at SAHRA must be alerted accordingly since freshly exposed sedimentary rock will require contracting a professional palaeontologist for appropriate monitoring for fossil remains by during the construction phase. 7 If any newly discovered palaeontological resources prove to be significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA; The decision regarding the EA Application must be communicated to SAHRA and uploaded to the SAHRIS Case application. If, in the event that localized fossil material is discovered exposed or eroding out of intact superficial overburden during the construction phase, it will in all probability resemble modern-looking, but more or less lithified animal bones and teeth and it will most likely be those belonging to bovids (Bovidae: the biological family of ruminant mammals that includes wildebeest, buffalo, antelopes, etc.).
2. In the unlikely event of fossil discovery within previously undisturbed Quaternary overburden, a professional palaeontologist must be called in immediately to confirm and record the finds. If any newly discovered palaeontological resources prove to be significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA; The decision regarding the EA Application must be communicated to SAHRA and uploaded to the SAHRIS Case application.
3. In the meantime, ex situ remains must be wrapped in paper towels or heavy duty tin foil and stored in a safe place. The material should not be washed or cleaned in any way.
4. In situ material must be kept in place and protected from further damage by covering it with light but rigid object like a box, bucket or metal sheet until further confirmation by the palaeontologist.

APPENDIX C
GENERIC SOIL RAFT APPROACH



- Remove in situ material to 1,0 to 1.5m beyond perimeter of building to a depth and width of 1,5 times the widest foundation and replace with inert material compacted to minimum of 93% to ideally +95% Mod. AASHTO density at -1% to +1% of optimum moisture content. Soils classifying as SC as per the Unified Soil Classification System.
- Lightly reinforced strip footings and light reinforcement in masonry should be considered to cater for the slight differential movements that may result from the soils with a slight heave potential.
- Cut-to-fill-to-level preparations are expected to be conducted to form level founding platforms for medium- to large-size structures. Proper compaction will be critical in the fill portion, as well as the voided colluvial the structures. Proper rip and re-compaction and fill of inert material should be implemented across the platforms, in order to prevent composite founding conditions. The concept is illustrated in Figure 6.

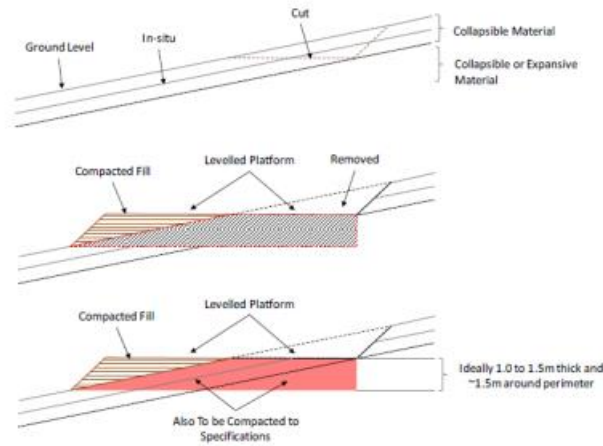


Figure 6: Proper Compaction of In-situ Soils to Form a Uniform Platform

- If pad footings or strip foundations (or a combination of the foundations) are considered, excavation beyond the perimeter and below the foundation with proper re-compaction of the material to ideally +95% Mod. AASHTO compaction effort at or near optimum moisture content will be critical in order to break-down the collapsible soil structure. For pad footings, the compaction depth should ideally be 1.5 times the width of the footing and for strip footings the ideal compaction depth is at least 2 times the width of the strip footing. Compaction guidance are visually illustrated in Figure 7 and Figure 8 as for pad footings and strip foundations respectively. Scenario B will mostly apply for Figure 7 and Figure 8 as thick collapsible/compressible/expansive horizons are mainly present.

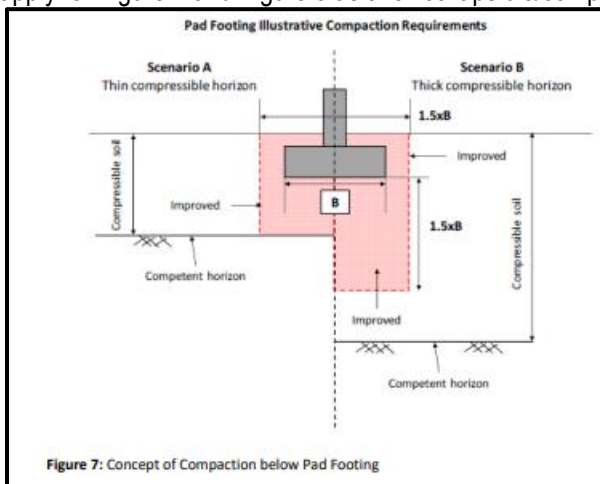


Figure 7: Concept of Compaction below Pad Footing

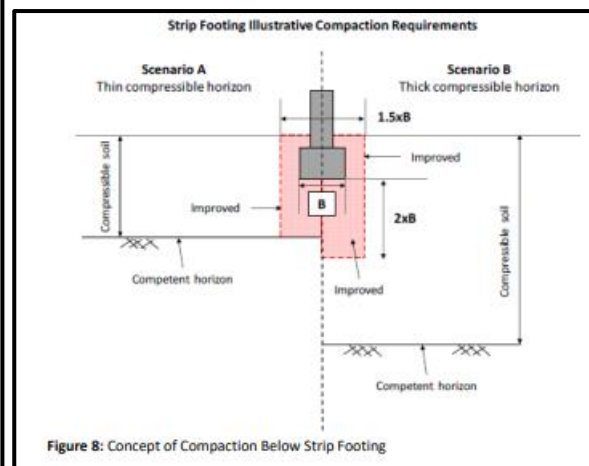


Figure 8: Concept of Compaction Below Strip Footing

- It will be recommended that the floors are suspended from the foundations with articulation joints through the lightly reinforced masonry to accommodate some degree of differential movement. If proper compaction below the floors and foundations are conducted in combination of the soil mattress, suspension will not be critical, however some allowance should be made for the slight heave expected as discussed in the relevant report section. If inert imported fill is used as mattress construction, then the heave allowance will not apply. Special foundation and masonry design will be required if additional loads will act on the foundations and floors. The design engineer should ideally liaise with the Geotechnical engineer and provide load schedules once available for any structures with expected induced loads of more than ~75kPa. Any retaining walls, high bearing footings or areas of other induced loads such as in-store storage areas should be evaluated on an individual basis.
- No details are currently available, so the recommendations are purely generic or nature

APPENDIX D
SURFACE WATER MONITORING PLAN

9 SURFACE WATER MONITORING PLAN

9.1 Monitoring Plan

Monitoring is required to ensure that the receiving environment surrounding the proposed WWTW is suitably safeguarded against the identified potential impacts and that the environmental management requirements are adequately implemented and adhered to during the project's operational phase. This monitoring plan only focuses on surface water resources.

The monitoring objectives include the following:

- Compliance monitoring - checking compliance with environmental consents (limits), legal requirements or relevant guidelines (including the WRC Guidelines for the Utilisation and Disposal of Wastewater Sludge / prevailing guidelines);
- System performance monitoring - evaluating the effectiveness of effluent and sludge treatment and control; and
- Environmental monitoring - determining the potential impact on the water resources downstream and evaluating the need for further remedial actions or mitigating measures.

9.2 Implementation Programme

The implementation programme for surface water monitoring is provided in Table 9.1 and Table 9.2. Sampling and analyses shall be carried out in accordance with methods prescribed by the South African National Standards (SANS) and using surface water sampling procedures from the DWS Water Quality Sampling guidelines. All samples shall be analysed in a SANAS-accredited laboratory for analysis. The monitoring locations of the effluent inlet and discharge points, together with the baseline sites are shown in Figure 9.1.

9.3 Resources and Competence

All staff working at Lindley WWTW must be competent and skilled to perform their designated functions and to ensure that water and waste are adequately managed.

Training and awareness creation must be undertaken to foster a general attentiveness amongst the staff at the WWTW to sensitive environmental features (including surface) and an understanding of implementing environmental best practices. All staff must undergo induction and attend regular training on the requirements of the WUL and the environmental management requirements on the site. This also includes the surface water sampling procedures and protocols.

Table 9.1: Strategic monitoring implementation

Water Quality Monitoring					
Comments	Objectives	Actions and Targets	Performance Indicators	Methodology	Resource Requirements
Surface water quality sampling	<ul style="list-style-type: none"> Ensure that the Water Quality of the Vals River is not altered due to WWTW operations. 	<ul style="list-style-type: none"> Water quality monitoring will be conducted as per WUL conditions for the WWTW. 	<ul style="list-style-type: none"> Baseline water quality (as per the water quality indicators of sampling points S2 and S3) be maintained throughout the lifetime of WWTW. Water quality variables listed in the water analyses certificates (Appendices) will be measured and the monitoring during the operation of the WWTW to compare the results with the baseline results obtained during the site visit of this study. 	<ul style="list-style-type: none"> Water quality monitoring checklist (status quo of the watercourse during sampling). Measurements of the quality of the water resource at specific intervals. 	Hand-held testing equipment, sampling bottle, magnesium sulphate solution and iodide azide for dissolved oxygen

Table 9.2: Details of monitoring implementation programme

Monitoring Type		Parameters / Factors	Locations	Frequency
Effluent	Quality	As per the DWS' WWTW effluent discharge limits	WWTW's Inflow point WWTW's Outflow point	Monthly
Surface Water	Instream Water Quality	As per the DWS' WWTW effluent discharge limits	<ul style="list-style-type: none"> S1, S2, and S3 (as per Figure 9.1) 	Monthly
	Biomonitoring	<ul style="list-style-type: none"> Aquatic macroinvertebrates Habitat integrity Fish assemblages 	<ul style="list-style-type: none"> S1 and S3 	Biannual (high and low flow)

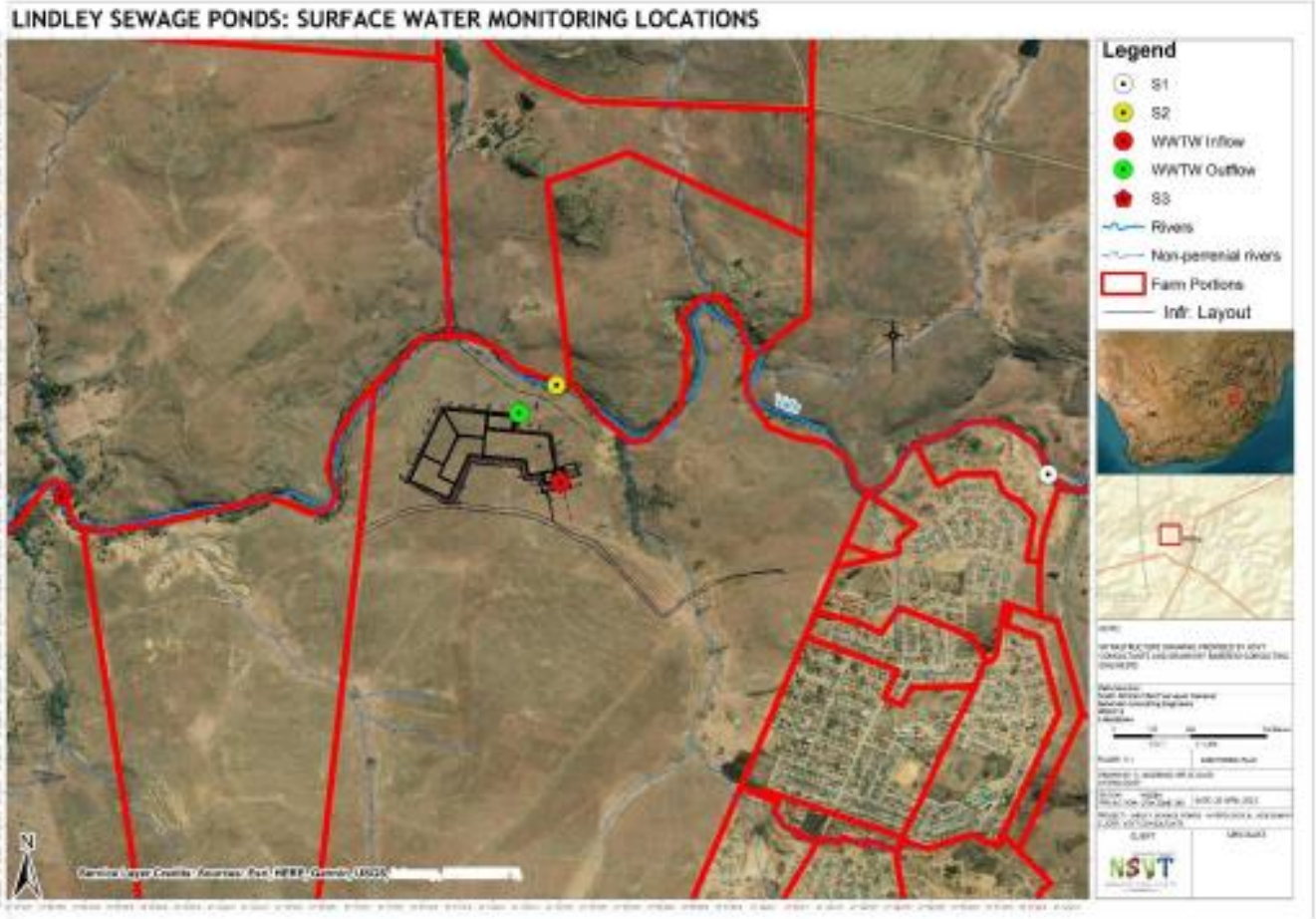


Figure 9.1: Proposed surface water monitoring locations for the monitoring plan

9.4 Incident Management

According to the NWA, an "incident" includes any incident or accident in which a substance pollutes or has the potential to pollute a water resource or has, or is likely to have, a detrimental effect on a water resource. For the purposes of this report, an incident also refers to a loss of control of the system due to unforeseen and emergencies.

Examples of incident triggers at a WWTW include the following:

- Non-compliance with operational monitoring criteria;
- Inadequate performance of a WWTW discharging to source water;
- Spillage of a hazardous substance into source water;
- Failure of the power supply to an essential component at the WWTW;
- Extreme rainfall in a catchment;
- Detection of unacceptable levels of metals, ammonia, etc.;
- Unusual odour or appearance of returned effluent water;
- Detection of microbial indicator parameters, including unusually high faecal indicator densities and unusually high pathogen densities in returned effluent; and
- Public health indicators or a disease outbreak for which water is a suspect vector.

9.5 Reporting

An operator of the WWTW shall conduct the following audits, which will be updated to ensure alignment with the requirements of the Water Use Licence:

- Annual internal audits on compliance with the conditions of the WUL. The audit reports shall be submitted to DWS;
- Annual audits by an independent external auditor on compliance with the conditions of the WUL. The audit reports shall be submitted to the DWS;
- Annual audits of the implementation of and adherence to the WUL conditions; and
- Annual audits of the effectiveness of the Monitoring Programme