WATER USE LICENSE APPLICATION
Monitoring and Audit Plan

In support of NWA Section 21 (c), (i) and (g) water uses related to the proposed upgrade of Leachville Ext 2 Sewer Pump Station and associated infrastructure, Erf 374, Leachville Township, Brakpan, City of Ekurhuleni, Gauteng Province

Project Applicant:	**Prepared by:**
City of Ekurhuleni Metropolitan Municipality Department of Water and Sanitation	Naledzi Environmental Consultants (Pty) Ltd Independent Environmental Assessment Practitioner Building 9, Cambridge Office Park, Bauhinia Street, Highveld Techno Park, Centurion, 0169

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1. DOCUMENT PURPOSE

The purpose of the report is to develop a Monitoring and Audit Plan to inform the Water Use License Application (WULA) for the proposed upgrades to the Leachville Extension 2 Sewer Pump Station for which an environmental authorisation is sought in terms of the NEMA, 107 of 1998.

The existing facility does not have a water use license; thus the project requires a new water use license (WUL) in terms of the National Water Act 36 of 1998 for Section 21 (c), (i) and (g) water uses from the Gauteng Department of Water and Sanitation (DWS): Vaal Proto CMA. The license is required because it's a waste related activity located in the regulated area of a seep wetland.

The pump station and associated infrastructure is located on Erf 374 of Leachville Township, 4km from Brakpan in the Gauteng Province. The site falls within the quaternary catchment C21D.

The monitoring and auditing plan will ensure that the applied for Section 21 water usage complies with the water use license conditions once issued by the DWS, and to identify any potential risks or issues that may arise. The plan details the water monitoring system that needs to be implemented to generate baseline data that can be used as follows:

- As management objectives,
- To identify pollution sources and allow for early detection of changes in water quality.
- To determine the success of implemented management measures; and
- Assess compliance with the water use license, as well as the impact on the wetland system and groundwater regime.

2. PROJECT DESCRIPTION AND LOCALITY

2.1 Existing Facility

The existing facility comprises:

- 22 litres/second pump station.
- 9.87m^3 temporary storage sump (Sump no. 1).
- 157.5m^3 Lined emergency pond (Pond no. 1) in case of power outages.
- 3000m^3 Unlined emergency pond (Pond no. 2)
- Informal gravel access road from the M56 New Kleinfontein Road.
- Existing 160mm Gravity Mains (Pipe A, B and C).

- Existing rising main

For an extended period, the pump station has not been operating efficiently, and frequently spills raw sewage into the environment. This is detrimental to the environment and creates health risks including a nuisance impact to the nearby residents including the abutting farmer, who recently excavated an additional 3000m^3 unlined pond next to the pump station to contain the spill.

2.2 Proposed upgrades

The proposed sewer pump station and associated infrastructure upgrades will cover an area of 1280m^2 (Refer to **Figure 1**). The pump station footprint, once upgraded, will cover 747 m^2 and the upgraded access road will cover 530m^2.

The project components are illustrated in **Figure 2** and will include:

- **33 liters/second pump station:**
  - Upgrade both submersible pumps in the existing sump to suit flow.
  - Raise the levels of the underground infrastructure and inlet manhole by 80mm by removing 500m^3 of unstable material and depositing the same volume of infill material so there is no spillage in the pump station.
  - Construct an extra sump of 88.2m^3 (sump 2) to increase the emergency storage capacity.
  - Extend the screen room and install new mechanical automated screens in the old screen room.
  - Grit discharged from the automated screen will be discharged into a skip bin.
  - Install 11kV/420V mini—substation.
  - Install 200kVA/400V Generated for backup power.
  - Construct a gatehouse with toilet and basin.
- **Emergency Pond 1** will be expanded to increase its capacity to 294m^3 (210m^2)
- **Emergency Pond 2** (3000m^3) will be re-engineered and lined with a geosynthetic clay lined.
- The existing access road is 105 meters in length and will be paved and widened from 2m to 4.85 meters (530m^2 area) and its T-junction redesigned with the New Kleinfontein Road.

2.3 Project components requiring WUL

A new WUL is required for the following project components limited to Erf 374:

- Existing 160mm Gravity Mains (Pipe A, B and C)
- Existing rising main
- 33 Liter/second Sewer pump station
- Existing 9.87m^3 storage sump (Sump no. 1).
- Proposed 88.2 m^3 storage sump (Sump no. 2)
- 294m^3 Emergency Pond 1
- 3000m^3 Emergency Pond 2
- Access road (105 meters in length, 4.85 meters wide)

Figure 1: Map showing the existing pump station infrastructure and the proposed expansion area.

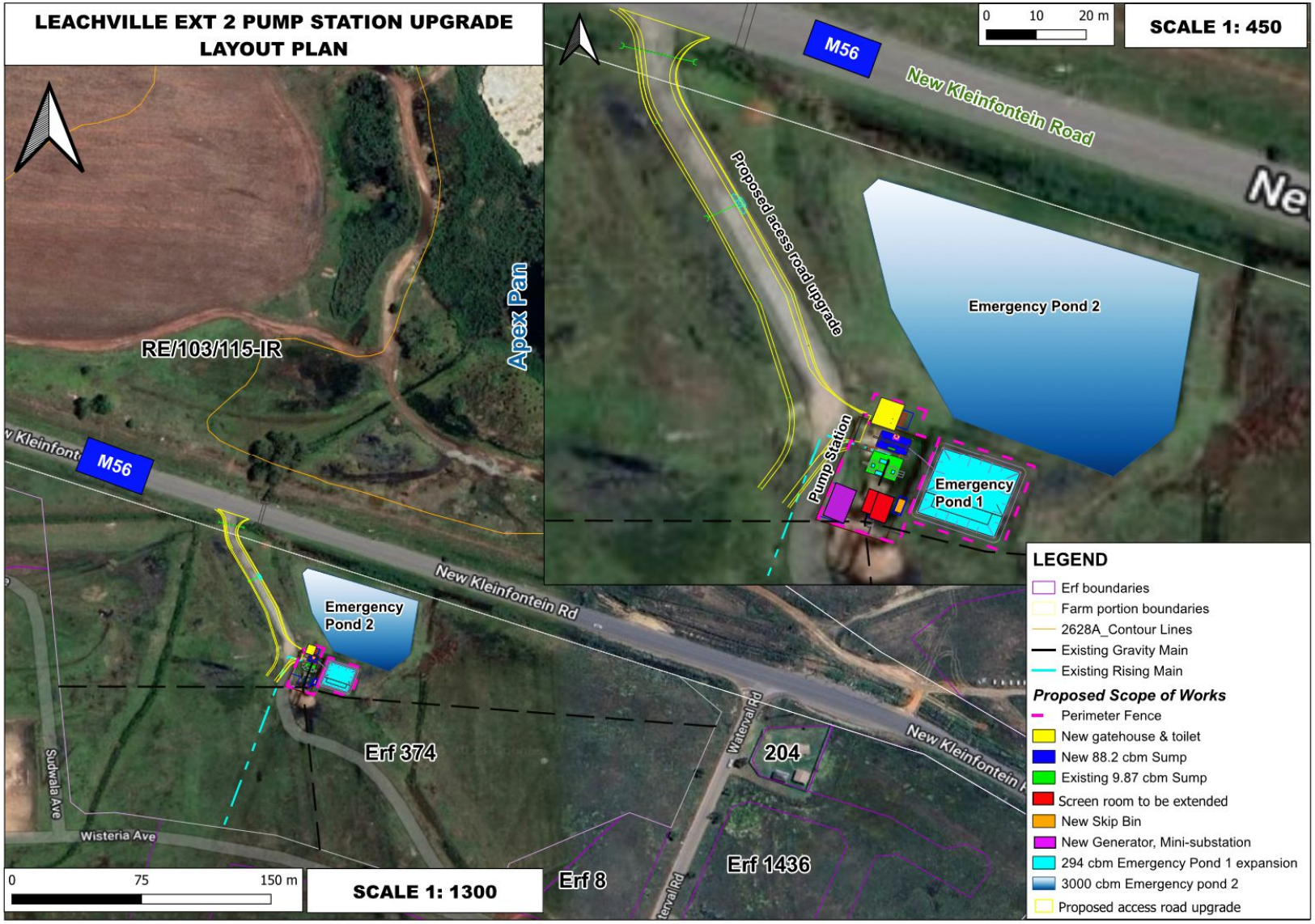


Figure 2: Site Plan / Layout Plan

3. SECTION 21 WATER USES

The water uses that require authorisation in terms of the NWA are detailed in **Table 1**.

Table 1: Relevant Section 21 water uses

Section 21	Water use(s) activities	Purpose	Capacity/ Volume (m^3, tonnes and/or m^3/annum)/ dimension	Property Description
21 (c),(i)	Existing Gravity Main within a wetland	Urban (to gravitate sewage from Leachville to pump station)	160 mm diameter Pipe A – 126.5 meters Pipe B – 93.5 meters Pipe C – 215.25 meters	Erf 374, Leachville Township
21 (c),(i)	Existing Rising Main within a wetland	Urban (transport sewage from pump sewage to WWTW)	110 mm diameter 117 meters	
21 (c),(i)	Sewer pump station within a wetland	Urban (boost sewage from Leachville to Vlakplaats/Waterval WWTW)	747m^2 686 035m^3 /a	
21 (c),(i)	Emergency Pond 1 within a wetland	Emergency storage of effluent during power outages	294m^3 capacity	
21 (c),(i)	Emergency Pond 2 within a wetland	Emergency storage of effluent during power outages	3000m^3 capacity	
21 (c),(i)	Access road across the wetland	To access sewer pump station	105 meters in length 4.85 meters wide	
21 (g)	Sump 1	Temporary storage of effluent	9.87m^3 capacity	
21 (g)	Sump 2	Temporary storage of effluent	88.2m^3 capacity	
21 (g)	Emergency Pond 1	Emergency storage	294m^3 capacity	
21 (g)	Emergency Pond 2	Emergency storage	3000m^3 capacity	

4. MONITORING PLAN

4.1 Aspects to be Monitored.

Table 2: **Primary aspects to be monitored.**

Surface and ground water quality **Ground water levels** (Construction and Operation)	**Motivation:** Surface water monitoring around pump station will assess the potential impact on water quality and ensure protection of nearby water resources. Regular measurements of groundwater levels will determine how the pump station influences the local water table, while water quality monitoring will identify any contamination risks/ groundwater chemistry changes. **Potential pollution sources:** • Construction site runoff, excavation activities • Hydrocarbon leaks from construction vehicles and equipment • Sewage spillages during operation from pump station • Heavy rains and high sewage volumes overwhelming the pump station leading to overflows. • Potential sewage leaks from emergency ponds **Pathway:** • Direct seepage into soil and aquifer • Overland runoff, flow along stormwater trenches in the wetland • Subsurface flow and underground sewage pipelines **Receptor:** • Underlaying groundwater table • Seep wetland; and • Nearby Apex Pan.
Erosion (Mainly during and post construction)	The effectiveness of the stormwater management plan and erosion control must be monitored. Erosion can result in further degradation of the wetland's Present Ecological State (PES) and if it accelerates vegetation can't re-establish and will increase sediment load into the Apex Pan.
Alien invasive plant species (Mainly during and post construction)	Increased spread of alien invasive species must be monitored and controlled through removal since the PES of the wetland is in an already seriously modified state. i.e., *Verbena bonariensis, Tagetes minuta, Cirsium vulgare, Erigeron bonariensis* and *Bidens Pilosa.*
Waste Management (On-going)	Desludging of emergency ponds and removal of grit from old mechanical screens must be disposed into a lined skip/disposed into a tanker and taken to Vlakplaats / Waterval WWTW. Safe disposal records must be provided for auditing purposes. Effluent MUST UNDER NO CIRCUMSTANCES be pumped into the environment during emptying of ponds or sumps!!!
Rehabilitation of the construction disturbed areas (Post construction)	Vegetation must be re-established along construction disturbed areas, mainly for erosion control to bind soils. The ECO would need to conduct a closeout audit to confirm that this has been implemented successfully. All wastes must be removed from site with verified safe disposal i.e., Waste manifest/safe disposal documents.
Emergency Pond Lining and sewer pipelines (Operation)	Defective / damaged pond linings and sewage pipes should be regularly monitored for leaks.

4.2 Methodology

Surface water monitoring will involve regular sampling and analysis of water samples from specifically identified monitoring points around the pump station. It will assess the presence of contaminants, nutrients, and other parameters. This monitoring will help detect any changes in the water quality due to the pump station operation and accidental spillages from either the pump station / emergency ponds etc.

Groundwater monitoring will involve installing a shallow monitoring borehole/auger hole in a strategic location near the pump station to assess groundwater levels and quality.

The surface and groundwater monitoring plan recommended by the Geohydrological Assessment Report conducted by Isiqalo Esihle Earth Science Consultants dated July 2023 will be implemented for these purposes.

4.3 Monitoring Plan

The proposed monitoring plan is detailed in **Table 3** below. The water quality monitoring points are detailed in **Table 4** and are spatially presented in **Figure 3**.

Table 3: Monitoring Plan

Commitment	Objective	Action	Interval	Field Measurements	Parameters	Responsible person
WATER QUALITY MONITORING						
Groundwater quality and level sampling	Detect changes in water table level and groundwater chemistry.	• Establish a groundwater monitoring program during construction to detect any changes in groundwater levels or quality and maintain throughout operation. • Create a shallow borehole/auger hole as per Figure 3. • Record ground water level (if any). • Measure water quality at monitoring point at specific intervals. • Maintain water quality monitoring checklist and record of the status quo of water quality and levels.	Every 6 months	• pH • EC/TDS • Temp • Dissolved Oxygen • Groundwater level (if applicable)	If contamination is observed the following parameters should be screened: pH, Conductivity, TDS, TSS Biological oxygen demand (BOD). Calcium, Magnesium, Sodium, Potassium, Carbonate, Bicarbonate, Chloride, Sulphate, Nitrate, Iron, Manganese, Fluoride, Aluminium, Total Alkalinity (TALK), Ammonia, Ammonium. Total coliforms, E. Coli, Faecal coliforms.	EMM, Results to be presented to ECO for audit purposes. If contamination detected EMM to notify DWS: Upper Vaal Proto CMA.
Surface water quality sampling	Detection of leaks	Conduct visual inspection of sewer pipes and emergency ponds for spillages and leaks.	Every 3 months	Spillages or leaks (if applicable).		
	Detect surface water contamination from pump station, ponds	Water quality sampling at perennial stream (upstream, midstream, downstream)	Monthly	• pH • EC/ TDS • Temp • Dissolved Oxygen		
COMPLIANCE MONITORING IN TERMS OF THE WATER USE LICENSE						
Construction	Compliance with EMPR, NEMA, NWA.	• Develop construction method statements on how construction works will be	Method statements to be provided prior to construction.	Internal compliance checklist	EA, WUL conditions	Contractor to prepare statements.

Commitment	Objective	Action	Interval	Field Measurements	Parameters	Responsible person
	Erosion and pollution control.	implemented in compliance with EMPr, EA and WUL conditions. • Statements will be submitted and approved by EMM and Site Engineer. • ECO to monitor and audit Compliance.	Implemented daily during construction phase. Monitored once a month by ECO over the 6-month construction period.		EMPR management measures	EMM and SE to approve. EMM to supply to ECO to monitor/audit compliance.
Environmental Awareness Training	Reduce exposure to liability for environmental degradation caused by Contractor and errant construction staff and to maximise compliance with EMPR.	• Once-off onsite environmental awareness training will be provided to the Contractor and construction staff on all the environmental obligation in terms of the EMPr including the EA and WUL conditions. • Contractor must make provision for weekly training / Toolbox talks among workforce to maximise environmental compliance.	Once off during construction. Weekly through construction period (based on incidences).	A signed register documenting all employee's environmental training and awareness programmes must be kept on record for verification purposes.		Contractor Appointed ECO
Emergency/Environmental Incidents (accidental spillage of effluent, chemical spills, leaks).	Contain accidental spills/ pollutants. Implement emergency procedures to remedy the incident.	• An emergency preparedness plan will be implemented. • Spill kits will be available prior to construction to ensure that any fuel, oil or hazardous substance spills are cleaned-up and discarded correctly. • All chemicals and toxicants to be used for the construction must be stored in a bunded area.	In the event of an emergency/environmental incident. Contractor to report incident with record of action taken within 24-hours. EMM report incident to DWS and GDARD within 5-working days of incident.	Environmental Incident Report forwarded to EMM.		Contractor (Contractor to advise ECO of emergencies onsite) EMM

Commitment	Objective	Action	Interval	Field Measurements	Parameters	Responsible person
Erosion control	Maintain effective stormwater management, erosion, and sediment control to avoid wetland degradation due to erosion and sedimentation into the downstream Apex Pan. No signs of erosion and sedimentation in wetland.	• Implement erosion and sediment control measures to minimize sediment runoff from the construction site. i.e., sediment barriers, silt fences, and sediment basins. • Implement best management practices for controlling construction site runoff. i.e., sediment ponds, retention basins, or vegetated swales to capture and treat runoff before it is discharged into the surrounding environment. • Storm water infrastructure must be monitored and maintained post construction to ensure that damage to infrastructure and erosion is prevented.	Daily during construction. During operation - inspect after each heavy rain event.	Internal compliance checklist		Contractor (during and post construction). EMM (Operational phase). ECO to audit compliance monthly.
Alien Invasive Species / Biodiversity Maintenance	Maintain PES and biodiversity of wetland and control/remedy spread of alien invasive species.	• Implement Alien Invasive Species Management Plan and control further spread through mechanical or manual removal along construction disturbed areas. • Re-establish indigenous grass / seed mix along construction disturbed areas and temporary roads.	Daily during construction. Post construction as part of site	Internal compliance checklist		Contractor Audited by ECO on monthly basis during construction. Closeout audit based on success of site rehabilitation.

Commitment	Objective	Action	Interval	Field Measurements	Parameters	Responsible person
Waste Management incl. Sludge Management	Avoid contamination of seep wetland and downstream Apex Pan water qualities from hazardous substances, raw sewage, and construction waste.	• No dumping of construction material onsite. • Hazardous substances to be stored in bunded area. • Waste skips available at designated areas for solid waste disposal. • Solid waste removal on regular basis to Weltevreden Landfill Site. • Sludge, large grit matter from ponds disposed in lined skip/tanker for disposal at Vlakplaats / Waterval WWTW.	Removal required on weekly basis. Max storage period for domestic waste is 10 days. Construction waste max storage period 30 days.	Waste manifest / safe disposal documents.		Contractor Audited by ECO
Site Rehabilitation	Re-established grass along the access road, temporary route and former construction works areas. No erosion. Waste manifest/safe disposal documents for waste.	• The Contractor must ensure that all temporary structures, equipment and materials and facilities created onsite for construction are removed on completion of the project. All disturbed areas must be rehabilitated. • Stabilization and rehabilitation of the disturbed areas must take place immediately after construction. Indigenous vegetation must be used for these purposes (grassing).	After construction. EMM, Site Engineer and ECO to approve for closeout audit by ECO.	Monitor against Landscape and Plant Plan requirements.		Contractor Audited by ECO

Commitment	Objective	Action	Interval	Field Measurements	Parameters	Responsible person
		• Once the access roads have been constructed/upgraded, the material along the temporary route must be loosened and grassed. • The construction site must be cleared and cleaned to the satisfaction of the EMM, Site Engineer, and ECO.				
Emergency Ponds, Sewage pipes	Maintain impermeable lining in ponds to avoid sewage leaks into surface and groundwater.	• Test integrity of emergency pond linings. • Any lining which needs to be repaired will be attended to immediately with assistance of specialist/engineer if required.	Annually	Internal compliance checklist		EMM ECO
Security	Maintain security at pump station to avoid sabotage of municipal infrastructure resulting in malfunction equipment, sewage overflows due to theft.	• Pump station will be security controlled i.e., gatehouse and on-site security and alarm and camera system. • Pump station will be access controlled.	Daily	Visitors Register kept daily.		EMM Onsite Security guard

4.4 Water Quality Monitoring Points and Locality

Table 4: Water Quality Monitoring Points and Locality

Monitoring Point	Type	Coordinates	Comment
SW-1	Surface water point (stormwater channel)	26°13'25.78"S 28°19'49.18"E	This stormwater channel is in the seep wetland flowing to Apex Pan.
SW-2	Surface water point (stormwater channel)	26°13'27.54"S 28°19'53.52"E	This stormwater channel is in the seep wetland flowing to Apex Pan.
SW-3	Surface water point (Emergency Pond 2)	26°13'27.24"S 28°19'51.72"E	No comment
SW-4	Surface water point	26°13'22.97"S 28°19'58.17"E	Apex Pan downstream from pump station.
A1	Groundwater point (Shallow borehole)	26°13'28.16"S 28°19'51.12"E	Shallow borehole/auger hole to be established at Pump Station.

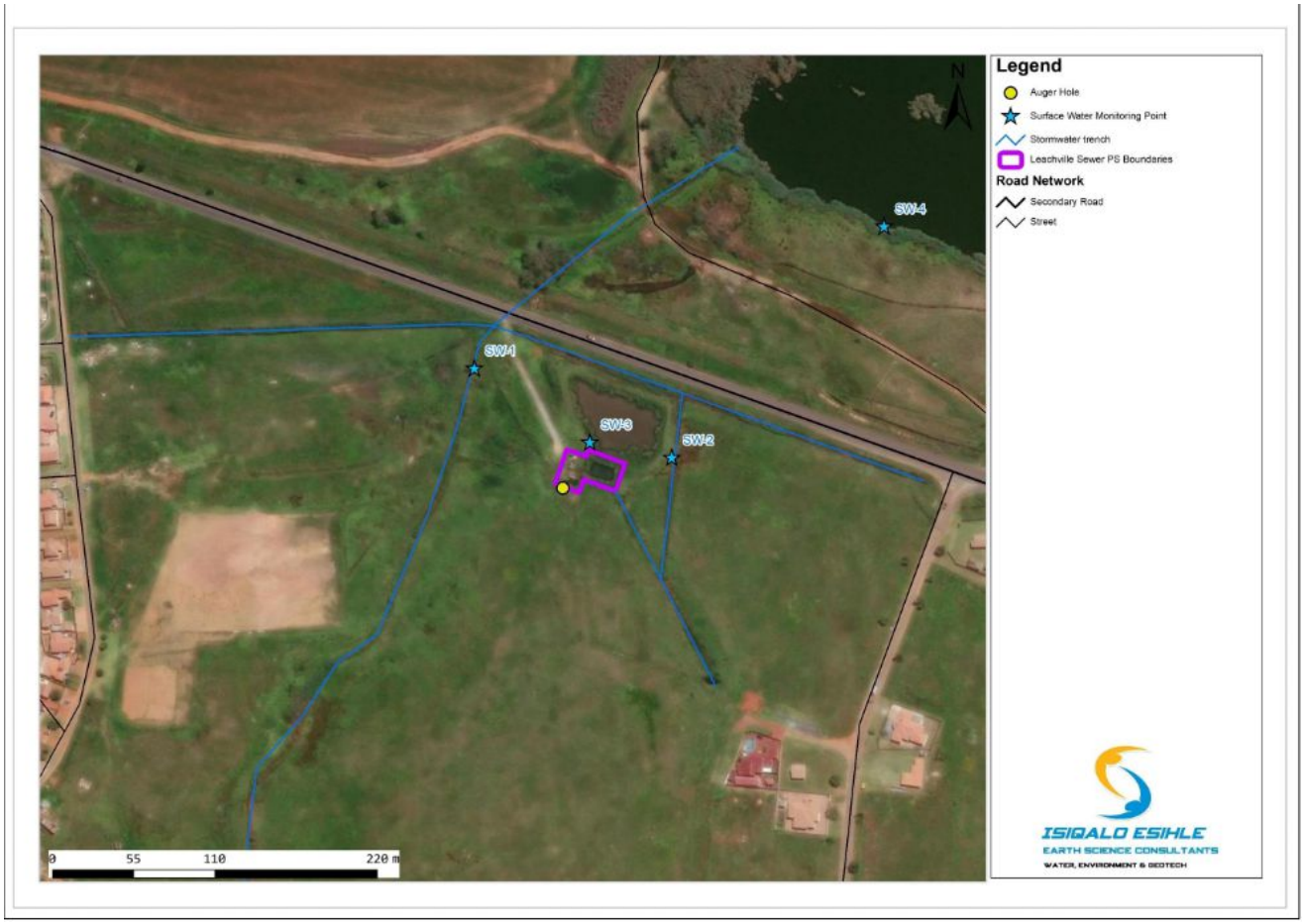


Figure 3: Proposed Water Quality Monitoring Network

4.5 Water Quality Monitoring Data Management and Reporting

A water quality monitoring checklist must be maintained, and record of the status quo of water quality and levels must be kept and made available to the ECO during EMPR and WUL audits.

A SANAS accredited laboratory, with the necessary quality control and assurance measures in place must conduct the water quality analyses.

Groundwater and surface water samples must be collected as per the monitoring network sampling points and frequencies in suitable clean sampling bottles from the laboratory. The samples must be clearly marked and submitted within 24-hours for analyses.

The laboratory results must be recorded in a database i.e.,

- Site Description
- Sampling point
- Coordinates of sampling point
- Date of sampling
- Parameters determined.

4 AUDITING PLAN

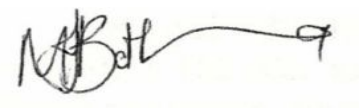
The EA EMPR will be audited by an independent ECO monthly over a 6-month period. The following auditing recommendations are made for the WUL:

- During construction
    - EMPR audit will be conducted once a month for 6 months by the ECO.
    - One post construction closeout audit will be conducted by the ECO.
    - The audit will assess compliance with both the conditions of the EA and WUL.
    - Audit Reporting can therefore be submitted to both DWS and GDARD at these intervals.
- During operation:
    - Annual internal WUL audit
    - Annual external WUL audit
    - Reporting to DWS (annually)

5 CONCLUSION

This Monitoring and Audit Plan has been compiled by:

Naledzi Environmental Consultants (Pty) Ltd
141 Thabo Mbeki Street
Polokwane, 0700
Contact number: ++2784-226-5584
Email: botham@naledzi.co.za



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Marissa Ilse Botha
SACNASP and EAPASA Registered
Registered EAP and Environmental Scientist