SANPC/467/07/2027	**RFQ- SANPC requires a service provider to monitor the groundwater networks at the Saldanha and Milnerton Tank Farms for a period of 24 months**	

Scope of Work: Groundwater monitoring at Saldanha and Milnerton tank farms.

Section A: General requirements

The Service Provider is required to monitor groundwater networks at Saldanha (Section B) and Milnerton (Section C) Tank Farms on a quarterly and/or bi-annual basis for a period of 24 (twenty-four) months.

The Service Provider will provide the following Services:

- Sampling and maintenance of monitoring networks;
- Analysis of groundwater samples; and
- Comprehensive report on laboratory analysis.

The Service Provider will provide the following technical requirements:

- All sampling equipment and containers;
- All field measurement equipment (calibrated prior to the commencement of the sampling); and
- The use of a ISO/IEC accredited laboratory for analysis and the valid certification must be referenced in the reports.

The company tendering must have;

- Relevant experience in ground water monitoring for petroleum hydrocarbons operations.
- A valid agreement with an ISO/IEC accredited laboratory for the analysis of petroleum hydrocarbons.

Section B: Saldanha Tank Farm

The Saldanha tank farm has twenty-eight (28) monitoring wells and operates under a Waste Management License/WML (12/9/11/L230731144638/9/R) and Water Use Authorization (WUA) (27/2/2/G1310/476/2) for which, all the requirements for groundwater monitoring must be met.

1. **Monitoring requirements**

- Groundwater Monitoring (GWM) must be conducted on a **bi-annual basis** with a report submitted that includes trends analysis, graphic presentation, interpretation, and discussion.
- Where **bi-annual** water quality sampling is undertaken, record ground water levels during every bi-annual water quality sampling event.
- If a monitoring borehole cannot be sampled during a monitoring event, the report must clearly record:
    - The borehole identification
    - The reason it was not sampled
    - Whether the borehole was dry, blocked, damaged, inaccessible, or had insufficient water column
    - The measured total depth and water level, where possible
    - Whether a partial sample was collected
    - Whether the failure affects plume interpretation, and
    - Corrective action required before the next monitoring round.
- The data from the GWM must be used to assess the water quality during operation and note the direction of the plume that might emanate from the site and identify remedial actions if necessary.

- Groundwater levels must ALSO be measured on a **quarterly basis**, and must include, as a minimum:
    - Static groundwater level measurements in all accessible monitoring boreholes
    - Confirmation of borehole condition and accessibility
    - Record measurement reference point details, including whether measurements are taken from the top of casing/ collar height or ground level.

- Convert water levels to groundwater elevations where surveyed collar elevations are available
- Update groundwater contour maps
- Interpretation of groundwater flow direction, and
- Comparison with previous monitoring rounds to identify water level trend, rebound or hydraulic gradient change
- The groundwater monitoring network must be maintained in a serviceable condition. Boreholes that are blocked, dry, damaged, open to surface debris or repeatedly yield insufficient water must be assessed and rehabilitated where feasible. Where rehabilitation is undertaken, pre- and post-rehabilitation camera profiling should be completed and submitted with the Client.

- Audit the monitoring network biannually to determine if there is a need to extend the monitoring network over time.

Table 1 provides lists parameters to be analysed from the twenty-eight (28) monitoring wells, in compliance to the Waste Management License and Breede-Olifants Catchment Management Agency (BOCMA) requirements.

Table 1: Parameters to be analysed (ALL 28 MW's)

Parameters for Analysis – Bi Annual	
(WML requirements)	**[1](BOCMA requirements)**
Ph	Sulphate (SO42-)
Total dissolved solids (TDS)	Nitrite (NO2- as N)
Electrical conductivity (EC)	Nitrate (NO3-as N)
Temperature	Dissolved iron (FE2+)
Oxidation – Reduction potential	Total Organic Carbon (TOC)
Salinity	Methane (CH4)
BTEX (including MTBE, TAME) suite of compounds	Ethane (C2H6)

Total Petroleum Hydrocarbon compounds (TPH)	Manganese (Mn2)
Polycyclic Aromatic Hydrocarbon compounds (PAH)	
Total soaps, Oils and Grease (SOG)	

[1] *The inorganic parameter suite is to provide secondary lines of evidence for biodegradation within the dissolved phase plume.*

There are five (5) existing boreholes that additional analysis is required. These are listed in Table 2 below.

Table 2: *Provides additional parameters to be analysed (for five MWs) as per the Water Use Authorization requirements*

Parameters for Analysis – Bi Annual VBH3, VBH7, VBH5A, VBH6B, MMNON01 (5 MW's)	
Temperature °C	Potassium mg/l
pH	Total zinc mg/l
Electrical conductivity (EC) mS/m	Total lead mg/l
Nitrates mg/l	Total organic carbon mg/l
Nitrites mg/l	Mercury mg/l
Ammonium ion mg/l	Cadmium mg/l
Chloride mg/l	Chromium mg/l
Total phosphorous mg/l	Arsenic mg/l
Calcium mg/l	Vanadium mg/l
Coliforms cfu/100ml	Sodium mg/l
Magnesium mg/l	Sulphates mg/l
Nickel mg/l	Copper mg/l

2. Once-off additional requirements

2.1 Conduct **hydro-census** to identify and verify the status of groundwater users within 1km of the site, in order to assess any changes in receptor conditions and potential groundwater use.

2.2 A **paired upgradient groundwater monitoring borehole system shall be installed**, to improve the understanding of background groundwater conditions. The borehole pair shall comprise: One shallow monitoring borehole to represent the shallow aquifer zone; and one deeper monitoring borehole to represent the deeper aquifer zone.

For any newly drilled monitoring boreholes, the following information must be collected and submitted to the SANPC:

- Borehole coordinates, Drilling method, Final borehole depth, Lithological log, Water strikes/intersections, if any, Casing and screen details, Gravel pack and sanitary seal details, Borehole construction diagram, Collar elevation and ground elevation, Initial static water level, Borehole development record; and Baseline water quality results.

2.3 Conduct a **geohydrological study** in terms of the National Water Act, 1998. Where such report is not available, a geohydrological study must be undertaken in accordance with GN R.267. The study must also include the development of a groundwater contamination transport plume model for the site.

Section C: Milnerton Tank Farm

1. Monitoring requirements

- Groundwater Monitoring (GWM) must be conducted on a bi-annual basis with a report submitted that includes trend analysis, graphic presentation, interpretation, and discussion of the monitoring results to ensure that the groundwater is not contaminated by the crude oil stored on-site.
- There are twenty-six (26) boreholes that require monitoring on a bi-annual basis.

Figure 2: Groundwater monitoring locations at Milnerton

Table 3 provides lists parameters to be analysed from the twenty-six (26) monitoring wells, for continuous monitoring of the groundwater network and verification of any contamination from on-site activities.

Table 3: Parameters for Analysis

Parameters for Analysis- Bi Annual
pH
Total dissolved solids (TDS)
Electrical conductivity (EC)
Temperature
Oxidation- Reduction potential (ORP)
Salinity
BTEX (including MTBE, TAME) suite of compounds
Total Petroleum Hydrocarbon (TPH)
Polycyclic Aromatic Hydrocarbon compounds (PAH)
Total Soaps, Oils and Grease (SOG)