GEOHYDROLOGICAL ASSESSMENT FOR THE PROPOSED UPGRADES AT THE MOOV ENERGY FUEL DEPOT, KRAAIFONTEIN, WESTERN CAPE

July 2025
Ref: 006271R01.1

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JG AFRIKA
EXPERIENCE QUALITY INTEGRITY

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AUTHOR

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CLIENT CONTACT PERSON

Ms Carli Costa

SYNOPSIS

Specialist geohydrological assessment in support of environmental authorisation for proposed upgrades at the MOOV Energy fuel depot site, Kraaifontein

KEY WORDS:

Geology, geohydrology, hydrocensus, groundwater use, groundwater potential, groundwater, risk, impact and mitigation

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QUALITY VERIFICATION

This report has been prepared under the controls established by a quality management system that meets the requirements of ISO9001: 2015 which has been independently certified by DEKRA Certification

Verification	Capacity	Name	Signature	Date
Author	Geohydrologist	Priantha Subrayen		30 Jul 2025
Checked and authorised by	Executive Associate	Robert Schapers		12 Aug 2025
Filename:	V:\Active Projects\006271 - Moov Kraaifontein Geohydro (RS)\05-Reports\006271R01.1 Moov Fuel Depot Geohydrological Assessment Report_Final.docx			

Profession
Geohydrologist

Position in Firm
Executive Associate
Geohydrologist

Area of Specialisation
Geohydrology, Contaminated Land and Remediation

Qualifications
Pr.Sci.Nat., BSc (Hons) (Geohydrology)

Years of Experience
30 Years

Years with Firm
18 Years

ROBERT SCHAPERS

Summary

Mr. Schapers has 30 years of experience in the fields of geohydrology, geology, geotechnical engineering, contaminated land and geographical information systems. He acquired a BSc degree from the University of Natal and an Honours degree from the University of the Free State. His geohydrological experience includes groundwater feasibility and implementation studies involving groundwater supply projects for rural communities, schools, clinics and ward based production supply schemes. These projects include groundwater potential assessments, borehole siting using geophysics, borehole drilling programmes, aquifer testing, and development of groundwater management plans.

He has further conducted specialist geohydrological site assessments for impact and risk for the environmental authorisation/water use license process for various activities/developments. Sites include proposed point and linear developments ranging from cemeteries, underground storage tank sites, industrial developments, waste water treatment works, landfill sites, mine sites, sewer lines, power lines and transport lines.

His contaminated land experience includes site investigations for soil and water contamination, monitored natural attenuation, due diligence, modelling, remedial works, contract supervision, and administration of remedial operations. Sites range from small and large industrial sites, manufacturing plants, factories, underground storage tank sites, refineries, chemical storage depots, waste management facilities, power stations and mines. He has a solid GIS background to complement his geohydrological and contaminated land and remediation expertise.

Earlier in his career, he had extensive exposure in geotechnical assessments where he was involved in soil and rock profiling, core logging and penetrometer testing as well as geophysical surveys, which is still widely used in the geohydrology and contaminated land fields. Sites and projects range from low cost housing, large industrial developments, centre line surveys, materials investigations, road slip failures, slope stability investigations, bridge investigations, harbour studies, pipelines, power lines and power stations.

He has worked on projects throughout KwaZulu-Natal, the Eastern Cape, Western Cape, Northern Cape, North West, Gauteng, Free State, Mpumalanga, and abroad in Mozambique, Swaziland, Lesotho, Namibia, Zimbabwe, Angola, Malawi, Tanzania, the Democratic Republic of Congo, Cameroun, the Central African Republic, Nigeria and Chad.

Professional Registrations & Institute Memberships

Pr.Sci.Nat - South African Council for Natural Scientific Professions
Earth Science - Registration No 400041/12

GWD/GSSA - Groundwater Division of the Geological Society of South Africa
Full Professional Member – Registration number 059

Education

1989	Matric – Maritzburg College
1999	BSc (Computer Science and Hydrology) – University of Natal, Pietermaritzburg
2005	BSc Hons (Geohydrology) – University of the Free State

Specific Experience

JG Afrika (Pty) Ltd

2016 – Current

Position – Executive Associate

Groundwater monitoring and impact analysis on ecological systems for the operation phase of the Steenbras wellfield

Geohydrological specialist study and groundwater risk assessment of Arnot Power Station in support of the Water Use Licence Application.

Groundwater supply for Ministerial Intervention and Work Package 1B and 2 for Umhlabuyalingana District Municipality with siting, drilling, and testing of eight (>10 No.) community water supply boreholes.

Groundwater contamination assessment for emergency hydrocarbon spill at Eskom Majuba ADF facility.

Contaminated land assessment and installation of monitoring boreholes with biannual monitoring at Metcon site in the Kempton Park SEZ.

Annual, biannual and quarterly groundwater and surface water monitoring at Felixton Mill.

Annual groundwater monitoring of the ACSA Swartklip site in Khayelitsha, cape Town.

Groundwater supply implementation for Phefumula wind farm facility.

Determination of Resource Quality Objectives in the Keiskamma and Fish to Tsitsikamma catchments.

Woodstock Transfer Station Contaminated Land Assessment. Phase 1 and 2 site characterisation for hydrocarbon contaminated site comprising soil and groundwater monitoring and regulator engagement, with the development of a remedial plan.

Contaminated land and waste characterisation for informal landfill disposal for Managed Aquifer Recharge at Cape Flat Waste Water Treatment Works.

Contaminated land and waste characterisation for housing development project in Philipi, Cape Town.

Geohydrological specialist study, groundwater risk assessment and waste assessment of Wessels mine site in Hotazel in support of the Water Use Licence Application.

Geohydrological specialist study, groundwater risk assessment and waste assessent of Metalloys site in Meyerton in support of the Water Use Licence Application.

Detailed geohydrological study and contaminated land assessment for the proposed Durban Logistics Hub at the old Durban Airport Site. This included groundwater monitoring and sampling, the development of a groundwater model, soil sampling and analysis and the development of a construction worker risk assessment.

Geohydrological specialist study and groundwater risk assessment of PCD and former tailings facility in Germiston in Gauteng in support of the Water Use Licence Application.

Geohydrological specialist study and groundwater risk assessment of quarry site for N3 upgrades near Cato Ridge in KwaZulu-Natal in support of the Water Use Licence Application.

Geohydrological specialist study and groundwater risk assessment of PCD and associated infrastructure at Marula Mine near Burgersfort in Limpopo in support of the Water Use Licence Application.

Detailed geohydrological specialist study and groundwater risk assessment for cement plant and quarry for water use authorisation including hydrocensus, water quality assessment, borehole yield testing and groundwater flow and mass transport modelling, and impact prediction, and risk and impact review.

Detailed geohydrological specialist study and groundwater risk assessment for proposed oil and gas prospecting rights (3 No. separate rights) including negative mapping, hydrocensus and baseline assessment. Numerical groundwater modelling and impact prediction, and risk and impact review.

Soil contamination assessment and remedial supervision of hydrocarbon contamination at toll plaza at Chapmans Peak, in the western Cape, comprising soil sampling and analysis and supervising soil removal.

Groundwater supply for Mthwane and Khuba Schools with siting, drilling, and testing of a water supply boreholes.

Soil contamination due diligence assessment for former oil recovery and reprocessing site in Cato Ridge for the decommissioning of the waste licence, comprising soil sampling and analysis.

Water quality review and assessment of PCD and groundwater interaction at Matla mine in support of liner design.

Groundwater supply and geohydrological risk assessments for Wolf windfarm in the Eastern Cape comprising resource assessment through existing and new boreholes, and risk and impact assessment on the geohydrological setting.

Groundwater feasibility assessment for Hakwata and Mlibizi project areas in Zimbabwe, comprising situation assessment, and review of groundwater potential and for the Climate Adaptation Water and Energy Project, with a focus on climate change vulnerability and resilience.

Soil contamination due diligence assessment for brownfields site adjacent to metal processing facility in Camps Drift, Pietermaritzburg, comprising soil sampling and analysis.

Soil and groundwater contamination due diligence assessment for attenuation pond at metal processing factory site at ACSA SEZ, Kempton Park, comprising soil sampling and installation of monitoring boreholes, and repeat biannual sampling.

Majuba Power Station project lead for monthly surface and biannual groundwater sampling and monitoring and reporting for the ADF Extension Project for a period of 1.5 years. The project also included additional geohydrological studies and implementation of monitoring boreholes around the extension area.

Geophysical investigation for Ludeke Dam wall to identify dam wall leak zones with CVES using electrical resistivity and electromagnetic methods of remote sensing.

RBIDZ monthly wetland sampling for industrial Development Zone, Phase 1F for a period of 1 year.

Swartklip Transfer Station Due Diligence Soil Contamination Assessment for underground storage tank removal project. Collection of soil samples to characterise potential impact from former diesel UST.

Cape Town CBD Due Diligence Soil Contamination Assessment for underground storage tank removal project. Collection of soil samples to characterise potential impact from former UST.

Moatize Mine Groundwater Models. Review of existing site information and reports and compilation of a groundwater fate and transport model for the TSF for impact prediction, and pit dewatering for three new mining zones.

Transnet Saldanha Effluent Monitoring. Monthly collection of effluent samples and screening against MOA permit limits for a period of 2 years.

Portland Road Due Diligence Soil Contamination Assessment for underground storage tank removal project. Collection of soil and groundwater samples to characterise potential impact from former diesel UST.

Detailed geohydrological specialist study and groundwater risk assessment for proposed Umgungundlovu landfill site including a detailed geophysical survey and site characterisation through borehole drilling and testing.

Panel member of professional service providers, appointed for the White River sub catchment, for water resource and environmental pollution remediation implementation for the Inkomathi Usuthu Catchment Management Agency.

Groundwater feasibility assessment for Zomba area, Malawi for the Southern Region Water Board.

Detailed geohydrological specialist study for Riversdale coal mine in support of a Water Use Licence Application. Study comprising detailed borehole drilling, aquifer testing, groundwater modelling and installation of monitoring network.

Geohydrological specialist study and groundwater risk assessments for ranking candidate cemetery sites for the Alfred Duma Municipality.

Implementation of groundwater monitoring network and plan for Balfour Waste Water Treatment Works.

Preliminary specialist geohydrological study for wastewater reuse treatment plant and distribution network for Umhlathuze Municipality.

Geohydrological specialist study and groundwater risk assessments for ranking candidate cemetery sites for the City of Umhlathuze.

Geohydrological specialist study and groundwater risk assessment of several quarry sites throughout KwaZulu-Natal in support of the integrated water and waste management plan and Water Use Licence Application.

Groundwater supply assessment for KwaNyathi water supply scheme in the Eastern Cape. Hydrocensus survey and sustainable yield assessment and water quality status quo of existing resources.

Baseline soil contamination assessment for Saldanha Offshore Supply Base (OSSB) including soil sampling and analysis, and installation of groundwater monitoring boreholes.

Kusile Power Station project lead for weekly and monthly surface and groundwater sampling and monitoring and reporting for the Environmental Monitoring Committee with a contract duration of 4.5 years. The project also included additional geohydrological studies and implementation of monitoring boreholes around new power station facilities with associated groundwater fate and transport modelling.

Groundwater supply and sanitation assessment for Inxu Junior School in the Eastern Cape with siting, drilling, and testing of a water supply borehole.

Geohydrological specialist study and groundwater risk assessment of Linbro and Alexandria petrol station sites for environmental authorisation and Water Use License Applications.

Contaminated Land Assessment for the Ogoniland Clean-up and Restoration Programme in Nigeria. Review of UNEP assessments, site review and development of a remedial strategy for the clean-up of the Nsisioken-Agbi project and pipeline leak.

Groundwater supply assessment for the Diageo Brewery located in Douala Cameroun. Site assessment and review of infrastructure, contaminant sources, site geohydrology and implementation of new water supply boreholes.

Groundwater supply for R4 Solar PV Projects at Dyasonsklip and Sirius Farms near Upington. Rehabilitation of an existing borehole on Dyasonsklip and implementation of a new borehole on Sirius. Development of a groundwater management plan for the project.

Geohydrological specialist study and groundwater risk assessment for Vlakspruit cemetery site including the installation of a monitoring borehole and the implementation of baseline and annual groundwater quality monitoring.

Geohydrological characterisation and development of a surface and groundwater monitoring plan for Qweqwe landfill site near Mthatha.

Groundwater assessment at Vereeniging Water Treatment Works to determine source and occurrence of groundwater inflow through a chemical and geohydrological review.

Groundwater assessment at Port Elizabeth Airport to determine source and occurrence of groundwater inflow through a chemical and geohydrological review.

Groundwater potential assessments for Namibia biomas project. Review of groundwater potential at 5 candidate sites from Windhoek to Tsumeb, and preparation of a groundwater implementation methodology.

Groundwater supply for stock watering projects in Chris Hani District Municipality with siting, drilling, testing and equipping of 10 boreholes for rural communities.

Geohydrological specialist study and groundwater risk assessment for tailings dam for manganese mine in Northern Cape in support of environmental authorisation.

Geohydrological specialist study and groundwater risk assessment for closure of five landfill sites for Drakenstein Municipality including the design and implementation of a groundwater monitoring network at each site.

Geohydrological specialist study and groundwater risk assessment and water use license application for Margate Waste Water Treatment Works for Ugu Municipality.

Umgeni Water raw water pipelines geohydrological assessments of four project areas in support of a Water Use License Application.

Detailed geohydrological assessment and installation of monitoring networks for Herbertsdale and Brandwacht waste water treatment works.

2012 – 2016

Position – Associate

Geohydrological site assessments of Port St Johns, Kelvin Jones and Rosedale waste water treatment works sites for environmental authorisation and Water Use License Applications.

Contaminated land assessment for Durban Naval Base Site at Salisbury Island including target soil sampling and installation of groundwater monitoring boreholes.

Test pumping and analysis of boreholes in support of a Water Use License Application for Honeydew, Dairy Day and Pongola Game Reserve sites.

Geohydrological assessment for Ntshongweni, Ushukela and Canelands developments in support of Water Use License Applications.

Mookesti powerline geohydrological assessment in support of a Water Use License Application.

Groundwater Feasibility Assessment for Ishwati & Emoyeni Windfarms for water supply for construction phase.

Mangwaneni raw water pipeline geohydrological assessment in support of a Water Use License Application.

Emberton Estate geohydrological assessment of sanitation practises and risk and impact review for environmental authorisation.

Groundwater sanitation protocol assessments for Amathole District Municipality for Mnquma and Mbhashe areas.

Geohydrological assessment and groundwater risk assessment for candidate site selection and detailed site assessments for Postmasburg landfill for environmental authorisation.

Geohydrological assessment and groundwater risk assessment for proposed petrol station sites in Port Elizabeth and East London for environmental authorisation.

Geohydrological assessment and groundwater risk assessment for candidate site selection and detailed site assessments for Umzimkhulu landfill for environmental authorisation, including the installation of a groundwater monitoring borehole network.

Groundwater supply for Umzimvubu Wards 20 and 21 and 22, implementation of 24 boreholes for rural water supply programme and Groundwater supply for Mbizana Wards 10, 12 and 15, implementation of 31 boreholes for rural water supply programme.

Detailed desktop geohydrological assessment and sensitivity analysis for Port Durnford sand mining project.

Contaminated land assessment for Eskom Atlas Sub Station including targeted soil sampling and the installation of targeted groundwater monitoring boreholes.

Geohydrological site assessments of 14 small to medium landfill sites throughout the Eastern Cape for environmental authorisation.

Umgeni Water refurbishment and installation of monitoring network at Darvil WWTW including the siting drilling and installation of groundwater monitoring boreholes and carrying out an initial sampling campaign.

Contaminated land assessment for Eskom UCG Gas Liquor Evaporation Pond.

FEL 2 contaminated land assessment for Durban Dig Out Port, with Tier 2 site evaluations and augmented modelling and risk assessments.

Groundwater and sanitation assessment for ASIDI Cluster II Schools in the Eastern Cape, with borehole implementation for 28 schools and sanitation assessment for 19 schools.

Geophysical investigation for Port of Ngqura, Salt Pans Site, East and West Shore Sites, resistivity and seismic survey for subsoil investigations for extension of Port.

Dube Tradeport surface water quality monitoring for 2013 and 2014, quarterly sampling and review of 20 locations.

FEL 1 contaminated land assessment for Dig Out Port, with Tier 1 assessment for soil and groundwater contamination with installation of 44 monitoring boreholes including establishment of a groundwater model.

2007 – 2012

Position – Senior Geohydrologist

Groundwater sanitation protocol assessments for seven wards in the uThungulu District Municipality.

Augmented geohydrological assessment of RBCT with installation of 10 monitoring boreholes to determine water quality impact on groundwater.

Groundwater assessment for augmented groundwater supply to Blythedale, with implementation of four production boreholes.

Electromagnetic and magnetic ground survey for Nyanzaga Gold Mine in Tanzania.

Resistivity survey for Red Cap Wind Farm Cape St Francis.

Groundwater monitoring at Soyo Kwanda Terminal, Angola with installation of eight monitoring boreholes.

Groundwater monitoring at defunct mine sites, with implementation of groundwater monitoring systems at several rehabilitated mine dumps in the Dundee area.

Groundwater assessment for St Faiths Mission groundwater supply, Ndwedwe.

Groundwater assessment for five production boreholes for Ntunjambili and Tafamasi water supply schemes in the Ilembe District Municipality for bulk groundwater supply.

Groundwater management plan for Zinkwazi and Blythedale to determine sustainable groundwater supply and potential sea water intrusion.

Geohydrological evaluation of manganese foundry site for a section 20 permit application for storage of potentially hazardous waste.

Soil and groundwater contamination assessment for Perspex SA at Umbogintwini with installation of six monitoring boreholes.

Sludge mapping and delineation in water supply reservoirs at Sasol Refinery using sonar survey and spatial analysis.

Groundwater assessment for Esindumbini water supply scheme in the Ilembe District Municipality for bulk groundwater supply with implementation of three production boreholes.

Groundwater assessment for Greater Efaye Area in the Umzinyathi District Municipality for bulk groundwater supply with implementation of six production boreholes.

Groundwater assessment for Lions River housing development with implementation of two production boreholes.

Permit audits for landfill sites in Johannesburg in terms of bi-annual sampling of boreholes and gas monitoring at four waste disposal sites.

Geohydrological assessment and groundwater risk assessment for proposed and existing landfill sites in Mthatha, Uniondale, Himeville, Pietermaritzburg and Rondebult for environmental authorisation.

Geohydrological assessment and groundwater risk assessment for proposed cemetery sites in Hammarsdale, Mandeni, Bizana and Dannhauser for environmental authorisation.

Geohydrological evaluation and risk assessments of proposed/former coal mine sites including Inkomathi, Uithoek Farm, Burnside Farm, Sesikhona, Cinderford Farm and Paulpietersburg for mining right applications.

Soil contamination study and environmental site assessments for fuel store sites for five United Nations airfield bases in Chad.

Water quality and sanitation assessment protocol for housing developments near Pomeroy and Lake Sibayi.

Geophysical investigation for location of sinkholes in the Hlathikulu to map and survey community areas with sinkhole collapse potential.

Resistivity survey for 13km pipeline route near Bulwer.

Road and materials investigation for 170km road upgrade project from Likasi to Kolwezi in the DRC.

uThungulu District Municipality groundwater supply projects for various rural communities.

Geotechnical investigation for two bridge sites in Ulundi.

Groundwater assessment of the Mtubatuba production borehole well field supply scheme.

Soil contamination study of surface and subsoil asbestos contamination for a proposed housing development site in Uitenhage in the Eastern.

Subsoil geotechnical and geophysical investigations for substation sites near Pretoria and Middelburg in Gauteng.

Geohydrological risk assessments for proposed service stations in Pinetown, Phoenix, Umhlali, Mkuze, Kosi Bay, Klein Brakrivier and Salt Rock for environmental authorisation.

Subsoil geophysical investigations for bridge sites for road upgrade projects in Port Elizabeth and in Kirkwood in the Eastern Cape.

Geohydrological assessment for a waste water treatment works expansion project in Port Elizabeth in the Eastern Cape for environmental authorisation.

Moore Spence Jones (Pty) Ltd

1999 - 2007

Position – Geohydrologist

Geotechnical and structural assessment of Namibe Harbour Quay Wall in Angola carrying out an underwater inspection of a 750m harbour quay wall to determine block and footing damage caused by storms and ship collisions.

Groundwater and soil contamination investigation (2 years) and remediation project form chrome contaminated groundwater at Durban South industrial site.

Remediation project (6 years) of 1.4 million litre mogas spill over six years to investigate and characterise mogas plume and recover more than 1.3 million litres of mogas lost through an underground transfer line, with installation of over 60 monitoring boreholes and 1000 recovery wells.

Groundwater and soil contamination investigation for refinery site and delivery line to Island View in Durban with installation of 65 groundwater monitoring and sampling boreholes and 200 soil vapour probes.

Groundwater and soil contamination investigation for a chemical storage Depot in Wadeville using RBCA phased approach for site and contamination characterization of pesticides and BTEX in the subsoil as well as disposal of contaminated soils and air stripping of groundwater and post remedial monitoring.

Groundwater and soil contamination investigation for a chemical storage depot in Paarden Eiland using RBCA phased approach for site and contamination characterization of pesticides, hydrocarbons, BTEX and solvents in the subsoils, with Tier 1 risk assessment and Tier 2 quantitative risk assessment, and remediation of contaminated soils by excavation and disposal and free phase recovery by skimming and in situ bio remediation.

Groundwater and soil contamination Investigation for industrial chemical plant in Richards Bay using phased investigation to characterize soil and groundwater and stormwater contamination.

Geotechnical investigation for a proposed Central Processing Facility for a gas refinery in Temane in Mozambique as the geotechnical site representative.

Geotechnical investigation for LogX site in Richards Bay as the geotechnical site representative.

Centre line survey and geotechnical assessment of 230km of flood damaged rail line from Maputo to Chokwe in Mozambique as the geotechnical site representative.

Groundwater and soil contamination investigation for chemical factory sites in Canelands and Newcastle in KwaZulu-Natal for pesticide contamination.

Davies Lynn and Partners (Pty) Ltd

1995 - 1999

Position – Geohydrologist

Community water supply & sanitation program for Department of Water Affairs and Forestry for the province of KwaZulu-Natal in collaboration Knight Piesold.

Umgeni Water groundwater development plans for several KwaZulu-Natal Districts.

Preliminary and follow up geotechnical investigations for Mozal Project in Maputo Mozambique.

Geotechnical investigations for selected phases of construction at Alusaf Hillside and Bayside Smelters in Richards.

Brown Fields expansion project geotechnical investigation as the geotechnical site representative.

Water quality assessment for Alusaf Bayside permit application.

Situational Analysis and geohydrological characterisation of KwaZulu-Natal for Department of Water Affairs and Forestry.

Enkanyezi drought relief programme field representative for implementation of 130 groundwater supply boreholes for emergency response.

Continued Professional Development

COURSES

2023 UNESCO – IWRA, Emerging Pollutants: Protecting Water Quality for the Health of People and the Environment

2019 Training in Managed Aquifer Recharge (MAR) Workshop arranged by IAH-SA

2013 Biennial Groundwater Conference hosted by the GWD of GSSA, in association with the International Association of Hydrogeologists

2011 Biennial Groundwater Conference hosted by the GWD of GSSA, in association with the International Association of Hydrogeologists

2009 Biennial Groundwater Conference hosted by GWD of GSSA, WRC, CSIR and Umvoto Africa

2007 Biennial Groundwater Conference hosted by GSSA, GWDCB, IGS and UFS

2006 Characterisation of Groundwater Flow and Contaminant Migration in Fractured Rocks with NAPL Emphasis hosted by IGS and presented by Dr Allen Shapiro

2006 SAGDT Training Course hosted by DWAF

2006 Technical Report Writing Course hosted by Insite Training and SAICE

2004 Contaminant Site Risk Assessment and Modeling hosted by Waterloo Hydrogeologic, presented by Harvey Miln and Troy Schultz

2003 Advanced Course in Groundwater presented by Prof D Kreamer and H Shuver

2003 ArcGIS Spatial Analyst Course hosted by Earthdata

1997 An Introduction to Groundwater hosted by KLM Consulting

1997 Introduction to Arcview hosted by GIMS

Personal Details

Nationality – South African
Date of Birth – 1971-07-07
Domicile – Durban, South Africa

Languages
English – Excellent
Afrikaans – Fair

I, Robert Schapers, hereby declare the information herein is verified to be true and correct.

Robert Schapers

GROUND WATER DIVISION OF THE GEOLOGICAL SOCIETY OF SOUTH AFRICA

MEMBERSHIP CERTIFICATE

This certifies that

Robert Ignatius Schapers

JG AFRIKA (PTY) LTD

is a

2025 PROFESSIONAL MEMBER
SACNASP 00041/12 - EARTH SCIENCE

in good standing
with all rights and privileges pertaining thereof.

NATIONAL CHAIR 2024/2025: **Dr. Roger Diamond**
MEMBER PAYMENT DATE: **18 June 2025**
CERTIFICATE ISSUED: **Office of the National Secretariat**

KwaZulu-Natal Branch Chair: Mr Mark Schapers

Member Number/UID: 059/25

PROFESSIONAL / KWAZULU-NATAL BRANCH

DATE OF ORIGINAL ISSUE: 20 June 2025

www.gwd.org.za

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Robert Ignatius Schapers

Registration Number: 400041/12

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)

Earth Science (Professional Natural Scientist)

Effective **15 February 2012** Expires **31 March 2026**

Chairperson

Chief Executive Officer

To verify this certificate scan this code

GEOHYDROLOGICAL ASSESSMENT FOR THE PROPOSED UPGRADES AT THE MOOV ENERGY FUEL DEPOT, KRAAIFONTEIN, WESTERN CAPE

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TABLES

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ANNEXURES

DECLARATION BY THE SPECIALIST

I ROBERT SCHAPERS, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

- In terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or
  - ~~am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 of the NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review specialist must be submitted);~~
- I have disclosed to ~~the applicant~~, the EAP, ~~the Review EAP (if applicable), the Department and I&APs~~ all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and
- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations.

	31 July 2025
Signature of the Specialist	Date
JG AFRIKA (PTY) LTD	
Name of company	

GEOHYDROLOGICAL ASSESSMENT FOR THE PROPOSED UPGRADES AT THE MOOV ENERGY FUEL DEPOT, KRAAIFONTEIN, WESTERN CAPE

1 INTRODUCTION

This report presents the results of a geohydrological assessment carried out for the proposed upgrades at the site of the MOOV Energy fuel depot near Kraaifontein in the Western Cape. The geohydrological report has been prepared as a specialist study in support of an environmental authorisation. The facility is currently operating as a diesel storage distribution facility and includes two (2 No.) 23 m^3 above ground diesel storage tanks housed in a bund, two (2 No.) single hose diesel pumps, a truck workshop, an oil store and offices.

It is understood that the storage of oil or lubricants at the site will remain at 500 m^3 and the current liquified petroleum gas storage capacity will be maintained at 1.5 tonnes. The proposed upgrades will comprise the decommissioning and removal of the existing above ground storage tanks (ASTs) and the demolition of two (2 No.) existing warehouses currently occupied by a wash bay and oil drums, an outbuilding, ablution and office area within the main warehouse and two (2 No.) store rooms, and replacement with three (3 No.) new ASTs with a combined capacity of 2500 m^3. An optional fourth tank is still to be confirmed. A reinforced concrete containment bund will house the new ASTs and will be configured such that the intermediate walls create subdivisions for each tank. A new wash bay will connect to the existing wash bay separator, and an additional oil water separator will be installed on site, both of which drain to the existing sewer network.

We refer to our proposal reference 6141 2417059.1, titled “Proposal for Specialist Geohydrological Assessment for the Kraaifontein Truck Depot, Cape Town”, dated 3 September 2024. JG Afrika (Pty) Ltd were requested to undertake the geohydrological assessment by Kantey & Templer Consulting Engineers by means of signed appointment letter referenced 17014C and titled ”Appointment to Compile a Geohydrological Assessment Report for the Increase in Petroleum Products Storage Capacity at the MOOV Fuel and Lubricants Facility in Kraaifontein Industria”, dated 27 November 2024.

2 INFORMATION SUPPLIED

The following information has been used in the preparation of this report:

Reports, Documents and Guidelines

- Report reference MOOVKR001 of MHR Consultants, titled ”Risk Assessment in Terms of The Major Installation Regulations and SANS 1461:2018 for the Proposed Flammable Installations at Moov Fuel & Lubricants, 3 Kiaat Road, Kraaifontein Industria”, dated January 2022
- Unreferenced report of MOOV Fuel & Lubricants (Pty) Ltd, titled ”Kraaifontein Depot New Bulk Fuel Storage Facilities Project: Conceptual Design Reports and Cost Estimates” dated October 2023
- Report reference P-24-010 of Freshwater Consulting, titled ”Aquatic Ecosystem Assessment for the Proposed Increase in Fuel Storage Capacity on Erf 21594, Kraaifontein Industrial Area”, dated July 2025
- Report reference 17307C of Kantey and Templer titled “Phase 1 Due Diligence Assessment Report for Moov Energy, Kraaifontein Industria, Cape Town, Western Cape”, Revision 0, dated July 2025
- Report reference 166 of MTB Geoservices, titled ”Increase in Fuel Storage Capacity Project Geotechnical Investigation”, dated July 2024
- Government Notice No. 326 of April 2017. National Environmental Management Act, 1998 (Act No. 107 Of 1998). Amendments to the Environmental Impact Assessment Regulations, 2014
- Commonwealth of Massachusetts Department of Environmental Protection, March 2024. 310 CMR 40: Massachusetts Contingency Plan
- USEPA RSLs (Regional Screening Levels – November 2024) for National Primary Drinking Water Regulations, Maximum Contaminant Levels (MCL)
- South African National Standard, SANS241: 2015, Edition 2. Drinking Water

- Department of Water Affairs and Forestry, Second Edition, 1996. South African Water Quality Guidelines: Volume 7: Aquatic Ecosystems

Maps and Drawings

- Unreferenced drawing titled “Moov Fuel Kraaifontein Dept.kmz”, digital format, received on 21 December 2024
- Drawing referenced 1739-C-100 (Rev E) titled “Proposed Site Layout”, digital format, received on 18 June 2025
- Map sheet titled “3318 CAPE TOWN”, at a scale of 1:250000, dated 1990, of the Geological Map Series, supplied by the Department of Mineral and Energy Affairs
- Map sheet titled, “CAPE TOWN 3317”, at a scale of 1:500000, first edition, dated 1999, of the Hydrogeological Map Series of the Republic of South Africa, supplied by the Directorate: Geohydrology, of the Department of Water Affairs and Forestry
- Map Sheet titled “3318DC”, digital version, at a scale of 1:50 000, unknown date, of the Topocadastral Map Series, supplied by the Surveyor General

Data

- National Groundwater Archive (NGA) digital information, as supplied by The Department of Water and Sanitation (DWS) as at December 2024
- Water Allocation Resource Management System (WARMS) digital information, as supplied by The Department Water and Sanitation (DWS) as at May 2024
- Google Earth Pro version 7.3.6 of December 2022.

3 SITE DESCRIPTION

The MOOV Energy site is located at 13 Kiaat Street on Erf 21594 within the Kraaifontein Industrial Area in the City of Cape Town Metropolitan Municipality. The site is approximately 0.98 ha in extent.

The site can be accessed from Kiaat Road off Industrial Road from the R167 Provincial Route through the town of Kraaifontein. The location of the site is shown in Figure 1.

The need for increased fuel storage capacity at the MOOV Energy fuel and lubricant storage facility necessitated the need for larger above ground fuel storage tanks at the site. The infrastructure that will be developed as part of this project includes three (3 No.) new ASTs, two (2 No.) of which will be 1000 m^3 tanks for diesel storage and the other a 500 m^3 tank, for the storage of unleaded petroleum (ULP), a fourth tank is still to be confirmed. The tanks will be housed in a reinforced concrete containment bund with intermediate walls. The proposed site layout is shown in Figure 2.

The site has an elevation range of approximately 106 to 107 maMSL with a gentle north westerly slope towards an unnamed tributary of the Mosselbank River which is in excess of 2 km from the site. Additionally, an artificial stormwater fed wetland is noted along the south western boundary of the site.

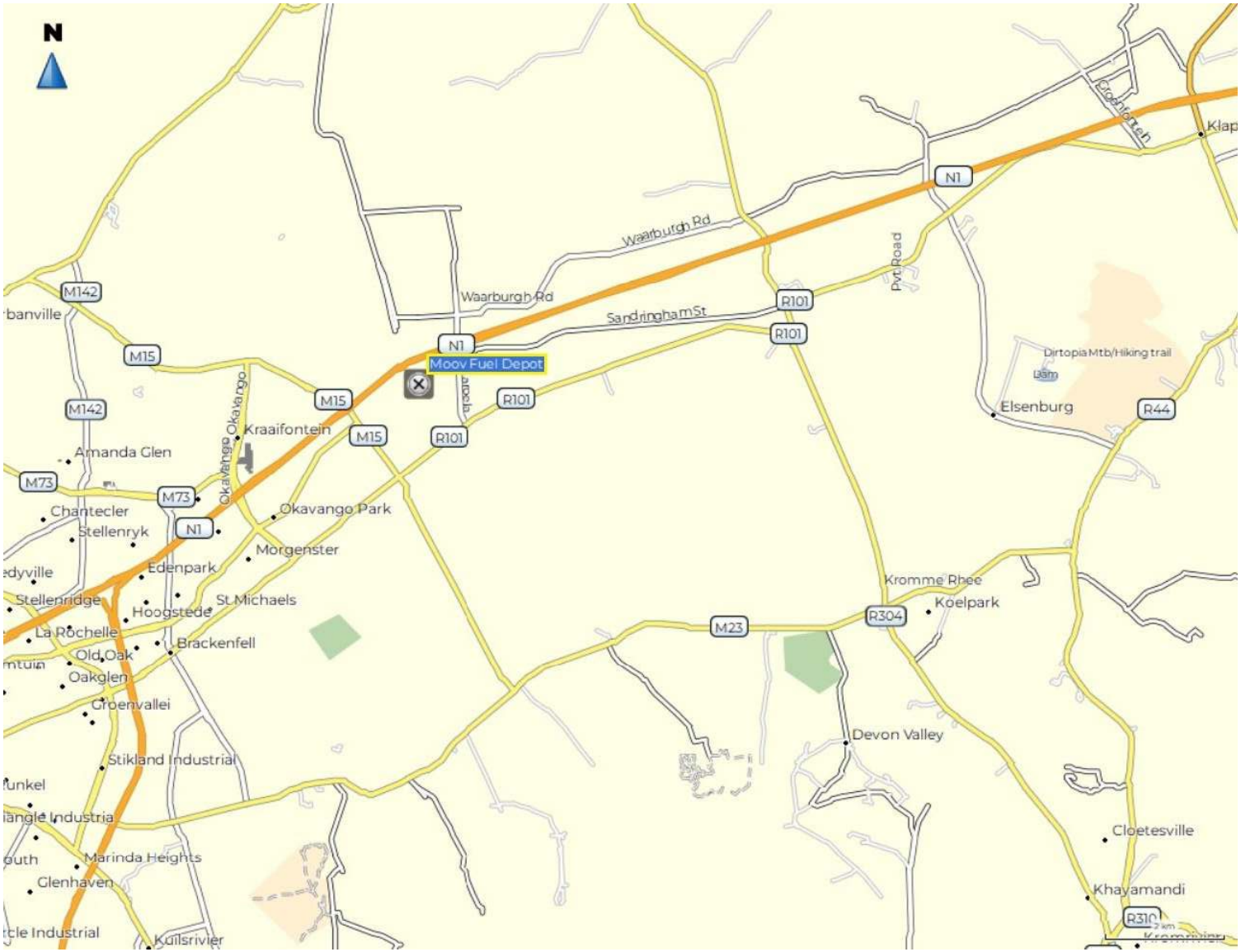

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Figure

Locality Plan

Scale as indicated

Figure 1: Site Locality

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Figure

Site Layout

Scale as indicated

Figure 2: Site Layout

4 GEOHYDROLOGICAL ASSESSMENT

4.1 Climate

The average temperature and precipitation for Kraaifontein obtained from Meteoblue.com is presented in Figure 3. The "mean daily maximum" shows the maximum temperature of an average day for each month, which ranges from 17 to 29°C. The "mean daily minimum" ranges from 6 to 17°C. Hot days and cold nights show the average of the hottest day and coldest night of each month of the last 30 years. Average monthly rainfall ranges between 15 and 119 mm, indicating a fairly moderate climate.

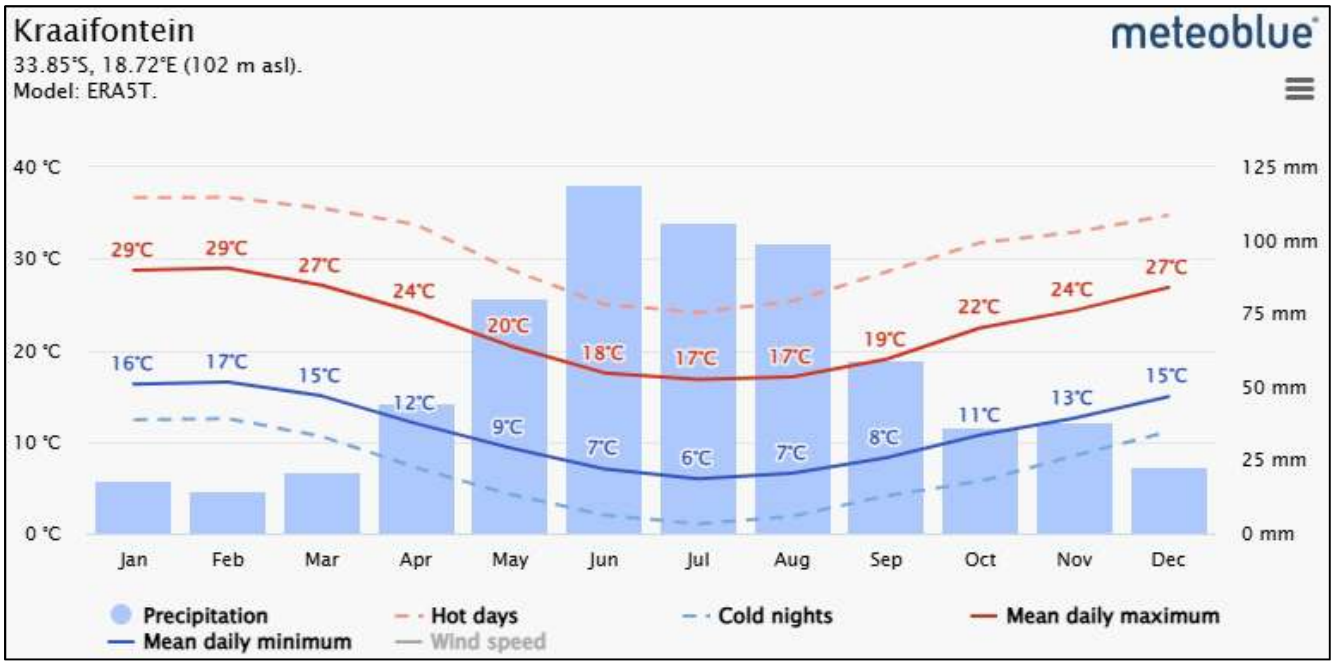

Figure 3: Average Temperature and Precipitation for Kraaifontein (Meteoblue)

4.2 Regional Geology and Structures

The regional geology of the project area comprises greywacke, phyllite and quartzitic sandstone of the Tygerberg Formation of the Malmesbury Group. The Tygerberg Formation has been intruded by granite of the Cape Granite Suite in the wider area. These sequences are overlain by the sandy soils of the Springfontyn Formation which are in turn overlain by loam or sandy loam to the north east and south west of the site, and gravelly clay or loam soil to the south east of the site.

Two parallel north west to south east trending faults are evident in excess of 2 km north east of the site. The regional geology is presented in Figure 4.

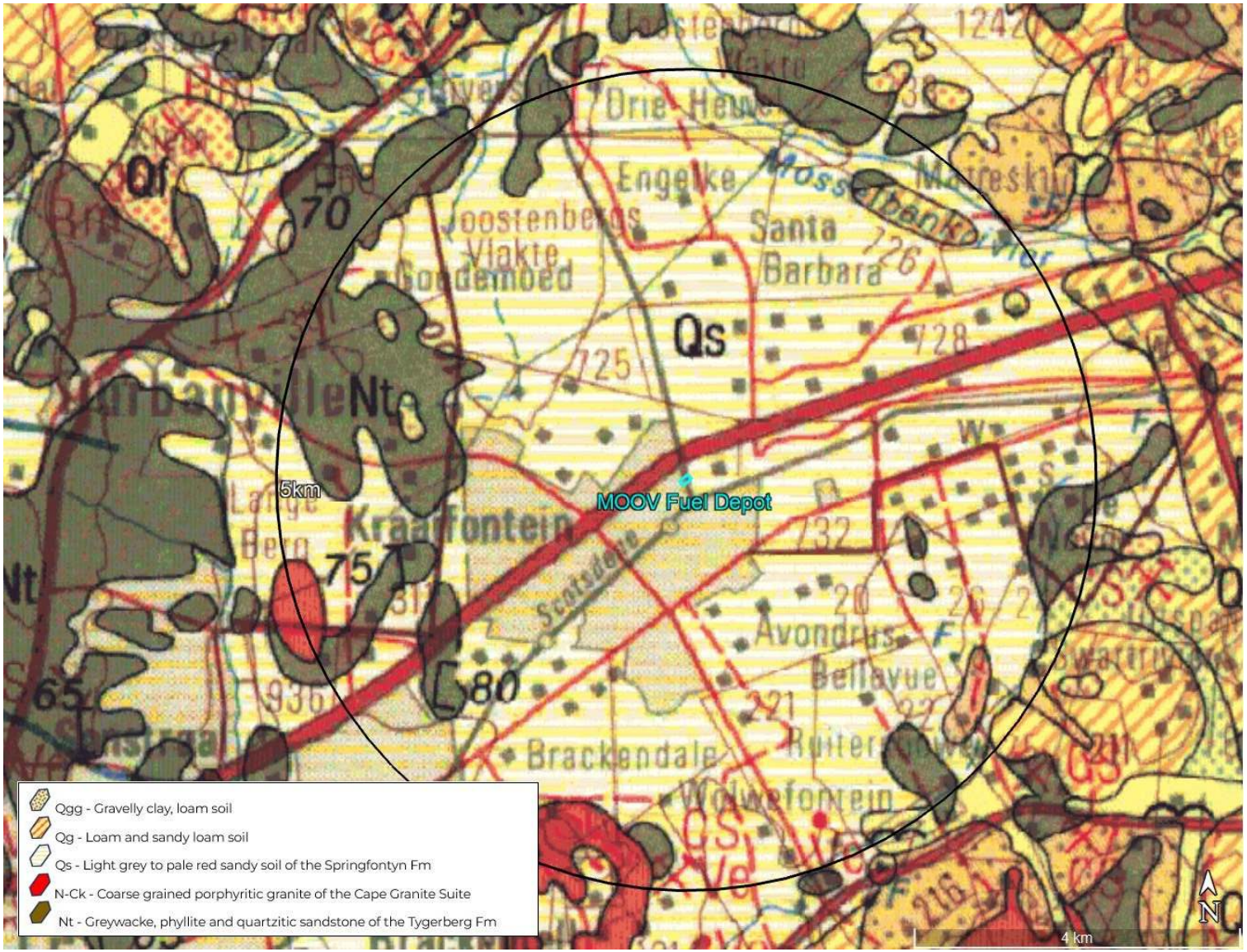

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Figure

Regional Geology

Scale as indicated

Figure 4: Regional Geology

4.3 Regional Magnetic Mapping

The regional magnetic mapping at an interpolation resolution of 100 x 100 m is presented in Figure 5. The mapping indicates that magnetic flux across the site has a range of 25760 to 25791 nT, while flux within 2 km of the site has a range of 25734 to 26347 nT. The flux is relatively uniform across the site and is considered low. Magnetic “highs” are evident 570 m south and 100 m north west of the site. These are joined by a “high ridge” passing 300m south west of the site.

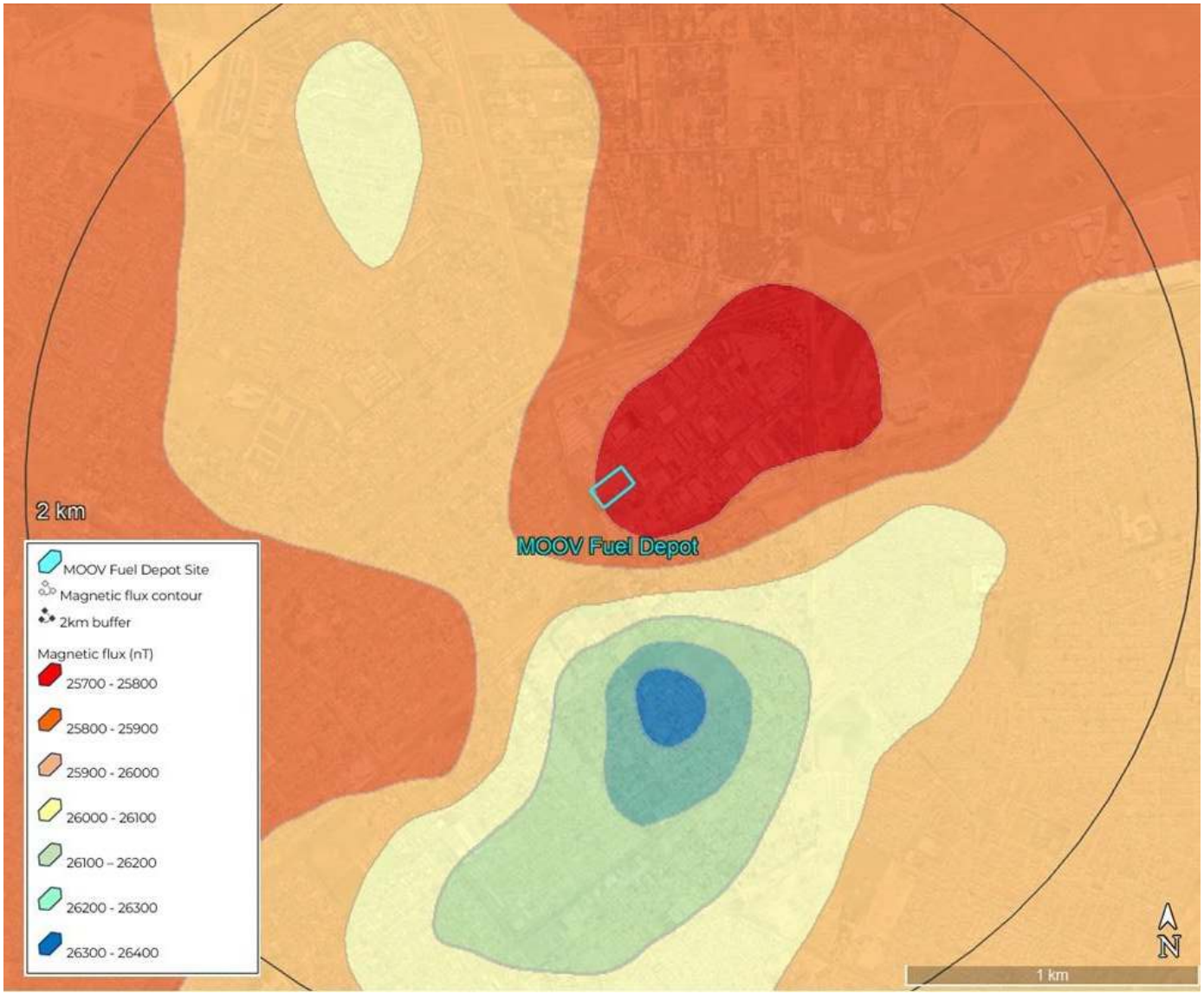

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Figure

Magnetic Mapping

Scale as indicated

Figure 5: Regional Magnetic Mapping

4.4 Regional Geohydrology and Conceptual Groundwater Flow

The regional geohydrology of the project area can be broadly described as undifferentiated metamorphic rock and various mixed lithologies comprising greywacke, phyllite and quartzitic sandstone. The principal groundwater occurrence is from a fractured aquifer type, with median borehole yields in the range 2 to 5 l/s.

The site is located within the G21E quaternary catchment. Based on WR90 data (WRC; Surface Water Resources of South Africa 1990 Study) the Mean Annual Precipitation (MAP) is 531 mm/annum and recharge is 33 mm/annum.

The project area predominantly comprises of one aquifer class unit which is characterised as a medium yielding Major aquifer. The aquifer classification scheme is presented in Table 1. The regional geohydrology of the project area is presented in Figure 6. The inferred groundwater flow direction for the project area is presented in Figure 7.

Table 1: Aquifer Classification Scheme

Aquifer System	Defined by Parsons (1995)	Defined by DWAF Min Requirements (1998)
Sole Source Aquifer	An aquifer which is used to supply 50 % or more of domestic water for a given area, and for which there are no reasonably available alternative sources should the aquifer be impacted upon or depleted. Aquifer yields and natural water quality are immaterial.	An aquifer, which is used to supply 50% or more of urban domestic water for a given area for which there are no reasonably available alternative sources should this aquifer be impacted upon or depleted.
Major Aquifer	High permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes. Water quality is generally very good (<150 mS/m).	High yielding aquifer (6-20 L/s) of acceptable water quality.
Minor Aquifer	These can be fractured or potentially fractured rocks, which do not have a high primary permeability or other formations of variable permeability. Aquifer extent may be limited and water quality variable. Although these aquifers seldom produce large quantities of water, they are important both for local supplies and in supplying baseflow for rivers.	Moderately yielding aquifer (1-5 L/s) of acceptable quality or high yielding aquifer (6-20 L/s) of poor quality water.
Non-Aquifer	These are formations with negligible permeability that are generally regarded as not containing groundwater in exploitable quantities. Water quality may also be such that it renders the aquifer as unusable. However, groundwater flow through such rocks, although imperceptible, does take place, and need to be considered when assessing the risk associated with persistent pollutants.	Insignificantly yielding aquifer (< 1 L/s) of good quality water or moderately yielding aquifer (1-5 L/s) of poor quality or aquifer which will never be utilised for water supply and which will not contaminate other aquifers.
Special Aquifer	An aquifer designated as such by the Minister of Water Affairs, after due process.	An aquifer designated as such by the Minister of Water Affairs, after due process.

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Regional Geohydrology

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Figure 6: Regional Geohydrology

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Figure

Inferred Groundwater Flow

Scale as indicated

Figure 7: Inferred Groundwater Flow

4.5 Hydrocensus

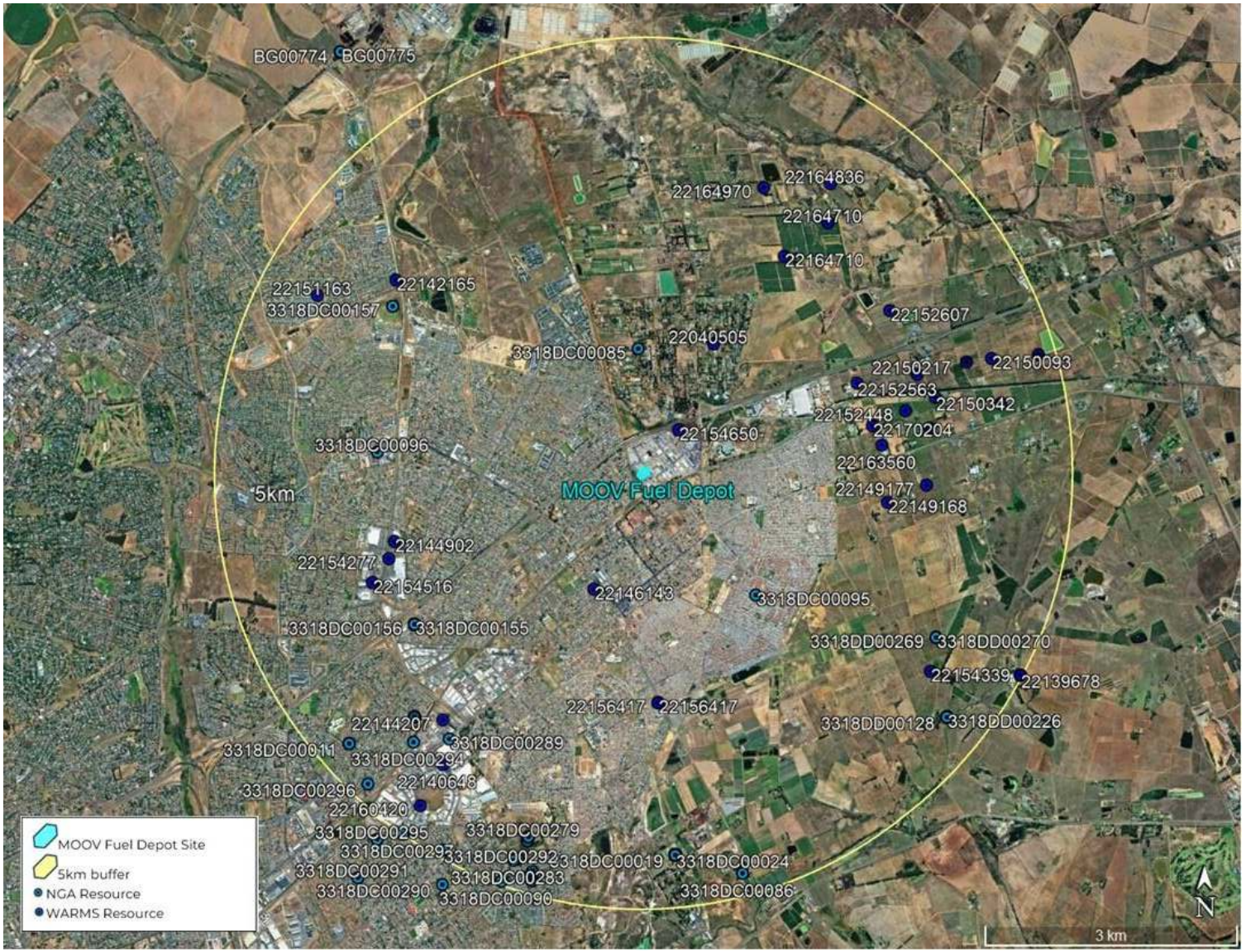
The National Groundwater Archive (NGA) and Water Allocation Resource Management System (WARMS) datasets of the DWS were interrogated to establish the existence of any groundwater resources and groundwater use in proximity to the site. The NGA reported 51 (No.) resources and the WARMS reported 34 (No.) resources within 5 km of the site. The NGA data typically has poor coordinate accuracy, where resources are often presented at the centre of a farm. The maximum, minimum, and average depth to groundwater in the vicinity of the site is 45, 0.61 and 14.7 mbgl respectively.

No existing groundwater resources were found at the site. A summary of the hydrocensus information is presented in Table 2. The locations of the hydrocensus resources are presented in Figure 8.

Table 2: Hydrocensus Resource Summary

Source	ID	Latitude	Longitude	Accuracy	Status	Depth (m)	Water Level (m)	Discharge Rate (l/s)	Comment (equipment, condition , observed use,
NGA	3318DC00290	-33.884	18.70283	1000	Unk	90.00	20.00	-	-
NGA	3318DC00090	-33.884	18.71037	1000	Unk	4.00	1.90	-	-
NGA	3318DC00281	-33.884	18.71426	1000	Unk	40.00	20.43	-	-
NGA	3318DC00291	-33.884	18.69203	1000	Unk	-	1.50	-	-
NGA	3318DC00282	-33.884	18.71429	1000	Unk	20.00	11.09	0.40	-
NGA	3318DC00278	-33.883	18.71432	1000	Unk	76.00	33.98	0.10	-
NGA	3318DC00086	-33.883	18.7412	1000	Unk	122.00	6.26	0.40	-
NGA	3318DC00285	-33.883	18.71435	1000	Unk	50.00	36.46	-	-
NGA	3318DC00283	-33.882	18.71192	1000	Unk	12.00	5.75	0.40	-
NGA	3318DC00284	-33.882	18.7125	1000	Unk	50.00	25.55	-	-
NGA	3318DC00026	-33.881	18.73259	1000	Unk	107.29	27.43	0.32	-
NGA	3318DC00024	-33.881	18.73259	1000	Unk	88.39	32.00	1.94	-
NGA	3318DC00022	-33.881	18.73259	1000	Unk	46.94	-	-	-
NGA	3318DC00020	-33.881	18.73259	1000	Unk	64.01	21.34	1.26	-
NGA	3318DC00018	-33.881	18.73259	1000	Unk	64.62	16.45	0.02	-
NGA	3318DC00019	-33.881	18.7326	1000	Unk	53.04	10.97	0.63	-
NGA	3318DC00021	-33.881	18.73261	1000	Unk	32.31	7.62	2.27	-
NGA	3318DC00023	-33.881	18.73262	1000	Unk	54.86	7.32	0.76	-
NGA	3318DC00025	-33.881	18.73263	1000	Unk	90.83	0.61	-	-
NGA	3318DC00292	-33.881	18.70289	1000	Unk	60.00	-	-	-
NGA	3318DC00277	-33.88	18.7137	1000	Unk	50.71	21.57	0.10	-
NGA	3318DC00295	-33.88	18.6945	1000	Unk	-	-	-	-
NGA	3318DC00279	-33.879	18.71383	1000	Unk	-	-	-	-
NGA	3318DC00280	-33.879	18.71383	1000	Unk	6.00	35.52	0.10	-
NGA	3318DC00297	-33.879	18.69778	1000	Unk	-	-	-	-
NGA	3318DC00296	-33.874	18.69331	1000	Unk	-	-	-	-
NGA	3318DC00011	-33.87	18.69092	1000	Unk	16.50	-	-	-
NGA	3318DC00012	-33.87	18.69093	1000	Unk	17.00	-	-	-
NGA	3318DC00294	-33.87	18.69914	1000	Unk	-	2.50	-	-
NGA	3318DC00289	-33.869	18.7037	1000	Unk	100.00	5.00	-	-
NGA	3318DD00268	-33.867	18.76732	1000	Unk	105.30	9.50	0.05	-
NGA	3318DD00226	-33.867	18.76732	1000	Unk	91.00	6.00	4.07	-
NGA	3318DC00009	-33.867	18.69926	1000	Unk	25.91	-	-	-
NGA	3318DD00129	-33.867	18.76732	1000	Unk	120.70	14.94	0.65	-
NGA	3318DC00008	-33.867	18.69926	1000	Unk	76.20	2.74	0.51	-
NGA	3318DC00010	-33.867	18.69927	1000	Unk	39.62			-
NGA	3318DD00128	-33.867	18.76732	1000	Unk	59.74	6.10	1.01	-
NGA	3318DD00193	-33.867	18.76733	1000	Unk	86.00	15.00	0.11	-
NGA	3318DD00229	-33.867	18.76734	1000	Unk	100.00	6.40	0.10	-
NGA	3318DD00269	-33.859	18.76593	1000	Unk	52.43	12.50	1.63	-
NGA	3318DD00270	-33.859	18.76594	1000	Unk	43.28	3.05	5.40	-
NGA	3318DC00156	-33.857	18.69926	1000	Unk	74.68	12.19	1.73	-
NGA	3318DC00154	-33.857	18.69926	1000	Unk	42.67	-	-	-
NGA	3318DC00153	-33.857	18.69926	1000	Unk	78.64	-	0.38	-
NGA	3318DC00155	-33.857	18.69927	1000	Unk	43.28	4.27	1.98	-
NGA	3318DC00095	-33.854	18.74287	1000	Unk	56.00	-	2.80	-
NGA	3318DC00096	-33.839	18.69453	1000	Unk	82.00	26.03	25.00	-
NGA	3318DC00085	-33.828	18.72787	1000	Unk	125.00	45.00	4.00	-
NGA	3318DC00157	-33.824	18.69651	1000	Unk	65.53	-	5.68	-
NGA	BG00774	-33.797	18.68977	1000	Unk	30.00	-	1.50	-
NGA	BG00775	-33.797	18.68986	1000	Unk	102.00	-	11.66	-
WARMS	22040505	-33.828	18.7375	-	In use	-	-	-	Agric, aquaculture, 11500 m3/a
WARMS	22139678	-33.863	18.7767	-	In use	-	-	-	Industrial, 6000 m3/a
WARMS	22139678	-33.863	18.7767	-	In use	-	-	-	Schedule 1, 4000m3/a
WARMS	22140648	-33.872	18.7029	-	In use	-	-	-	Industrial, 7200 m3/a
WARMS	22142165	-33.821	18.6969	-	In use	-	-	-	Industrial, 3150 m3/a
WARMS	22144207	-33.867	18.7029	-	In use	-	-	-	Industrial, 63027 m3/a
WARMS	22144902	-33.849	18.6967	-	In use	-	-	-	Industrial, 15720 m3/a
WARMS	22146143	-33.854	18.7222	-	In use	-	-	-	Industrial, 9198 m3/a
WARMS	22149168	-33.844	18.7597	-	In use	-	-	-	Agric, irrigation, 13750 m3/a
WARMS	22149177	-33.843	18.7647	-	In use	-	-	-	Agric, irrigation, 36000 m3/a
WARMS	22150093	-33.829	18.773	-	In use	-	-	-	Agric, irrigation, 25000 m3/a

Source	ID	Latitude	Longitude	Accuracy	Status	Depth (m)	Water Level (m)	Discharge Rate (l/s)	Comment (equipment, condition , observed use,
WARMS	22150182	-33.837	18.7651	-	In use	-	-	-	Agric, irrigation, 29120 m3/a
WARMS	22150217	-33.831	18.7635	-	In use	-	-	-	Agric, irrigation, 11500 m3/a
WARMS	22150342	-33.833	18.7658	-	In use	-	-	-	Agric, irrigation, 9270 m3/a
WARMS	22150360	-33.834	18.7742	-	In use	-	-	-	Agric, irrigation, 4000 m3/a
WARMS	22151163	-33.823	18.6869	-	In use	-	-	-	Industrial, 4700 m3/a
WARMS	22152448	-33.835	18.762	-	In use	-	-	-	Agric, irrigation, 30610 m3/a
WARMS	22152563	-33.832	18.7558	-	In use	-	-	-	Agric, irrigation, 30000 m3/a
WARMS	22152581	-33.83	18.7698	-	In use	-	-	-	Agric, irrigation, 18000 m3/a
WARMS	22152607	-33.824	18.76	-	In use	-	-	-	Agric, irrigation, 30000 m3/a
WARMS	22154277	-33.85	18.696	-	In use	-	-	-	Industrial, 14497.79 m3/a
WARMS	22154339	-33.862	18.7652	-	In use	-	-	-	Agric, irrigation, 56000 m3/a
WARMS	22154516	-33.853	18.6939	-	In use	-	-	-	Industrial, 30331 m3/a
WARMS	22154650	-33.837	18.733	-	In use	-	-	-	Industrial, 32000 m3/a
WARMS	22156417	-33.865	18.7304	-	In use	-	-	-	Industrial, 2486.30 m3/a
WARMS	22156417	-33.865	18.7304	-	In use	-	-	-	Industrial, 12150 m3/a
WARMS	22160420	-33.876	18.7000	-	In use	-	-	-	Industrial, 28382 m3/a
WARMS	22163560	-33.838	18.759	-	In use	-	-	-	Agric, irrigation, 11700 m3/a
WARMS	22164471	-33.829	18.779	-	In use	-	-	-	Agric, irrigation, 28000 m3/a
WARMS	22164710	-33.819	18.7465	-	In use	-	-	-	Agric, irrigation, 272000 m3/a
WARMS	22164710	-33.815	18.7521	-	In use	-	-	-	Industrial, 8000 m3/a
WARMS	22164836	-33.811	18.7524	-	In use	-	-	-	Agric, irrigation, 16000 m3/a
WARMS	22164970	-33.811	18.7439	-	In use	-	-	-	Agric, irrigation, 27000 m3/a
WARMS	22170204	-33.836	18.7578	-	In use	-	-	-	Agric,stock watering, 1700 m3/a



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Project	MOOV Fuel Depot Geohydrological Assessment
Figure	Hydrocensus Resources
Scale as indicated	

Figure 8: Hydrocensus Resources

4.6 Site Reconnaissance

A site walk over was carried out on 13 December 2024 with a representative of Moov Energy. The aim of the site visit was to conceptualise the site setting and selected geohydrological information, including identifying possible sampling locations close to the existing tanks to understand potential groundwater quality concerns. To avoid damage to the concrete surface within the site boundary sampling locations along the external perimeter of the boundary were identified.

The site survey indicated that the current activities on the site are typically well managed. The photographic review is presented in Table 3.

Table 3: Photographic Site Reconnaissance Evidence

Wetland opposite western boundary fence 	General waste bins within storage unit 
Collector drain within wash bay 	Oil spill kit within storage unit 

On site water storage 	Municipal water at wash bay 
Storage area, empty storage vessel 	Bunded tank (large) 
Hazardous waste bin within wash bay area 	Waste oil container 

Storage of product on site	Gas cylinders stored near warehouse
	
Generator outside admin building	Stormwater outside admin building
	
Moov truck without underlying drip tray	Wetland found along the western boundary
	

General pollution within wetland	Builders rubble near wetland
	

4.6.1 Water Quality Status Quo

Hand auger holes designated TH1 and TH2 were excavated by JG Afrika adjacent to the south western boundary of the site to determine the current water quality status quo in the vicinity of the wetland. Due to shallow auger refusal, only TH1 could be advanced to collect a groundwater sample. The depth to groundwater was reported at 1.3 to 1.5 mbgl.

A groundwater sample was collected from TH1 by JG Afrika and submitted to Environmental Pollution Laboratory (EPL) for analysis of the following:

- selected indicator compounds applicable to petroleum release site assessments to assess possible impacts of site infrastructure on the downslope wetland
- selected microbiological and inorganic compounds to assess the potability of groundwater adjacent to the downslope wetland.

The laboratory certificate of analysis is presented in Annexure B.

Auger holes designated AH1, AH4, AH5 and AH6 were excavated by Kantey and Templer[1] in targeted on site areas to determine the water quality status quo in the vicinity of the existing tank bund and associated infrastructure.

Groundwater samples were collected from the auger holes by Kantey and Templer and submitted to Environmental Pollution Laboratory (EPL) for analysis of selected indicator compounds applicable to petroleum release site assessments.

The locations of the hand auger holes are presented in Figure 9.

[1] Report reference 17307C of Kantey and Templer titled “Phase 1 Due Diligence Assessment Report for Moov Energy, Kraaifontein Industria, Cape Town, Western Cape”, Revision 0, dated July 2025

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Figure

Auger Inspection Hole Locations

Scale as indicated

Figure 9: Test Holes for Groundwater Sampling

In the absence of suitable screening limits for aquatic ecosystems of organic compounds, the results of the laboratory analysis were assessed in terms of the following screening values:

- Massachusetts Department of Environmental Protection: Massachusetts Contingency Plan (MCP) Numerical Standards
    - GW1 – Use of groundwater as drinking water, either currently or in the foreseeable future
    - GW2 – Concentrations based on the potential for volatile material to migrate into indoor air.
- USEPA RSLs (Regional Screening Levels – November 2024) - National Primary Drinking Water Regulations - Maximum Contaminant Level (MCL), with the conservative hazard quotient of 0.1.

The above MCP (GW1) limits typically compare with the USEPA Maximum Contaminant Levels (MCL) of the Regional Screening Limits (RSLs) of November 2024. The MCP limits have been used due to the availability of a more comprehensive list of limits. The MCL and Tap Water RSLs are drinking water based limits. The MCL represents the highest level of a contaminant that is allowed in drinking water supplies. The Tap Water RSLs are therefore not considered representative for screening purposes but have been included for comparison only. The results of organic analysis are presented in Table 4.

The results of the inorganic and microbiological analysis were assessed in terms of the following screening values:

- Department of Water Affairs and Forestry, Second Edition, 1996. South African Water Quality Guidelines: Volume 7: Aquatic Ecosystems
- SANS241:2015 drinking water standards.

The SAWQGs limits are stringent considering the downslope wetland is an artificial feature that has been formed as a result of stormwater inputs from upslope development, and the impeded drainage due to the railway line to the south and west of the wetland. From a risk perspective, the conservative SANS 241 Drinking Water screening limits were also used as a comparison of groundwater contaminant levels, noting that groundwater is not used on or near the site. The SANS 241 Drinking Water limits provide a more comprehensive list of limits for comparison purposes. The results of inorganic and microbiological analysis are presented inTable 5.

Table 4: Summary Results of Organic Analysis of Groundwater Samples

Sample Position		Test Hole 1	AH1	AH4	AH5	AH6	MASSDEP (Reportable Concentrations)		USEPA Regional Screening Levels (RSLs)	
Lab Sample Number		Test Hole 1	W1	W2	W3	W4				
Sampled by		JG Afrika	K & T						Screening Levels (HQ=0.1)	
Lab Certificate Number		55785	58698	58698	58698	58698				
Sample Date	Units	20-Jan-25	11-Jun-25	11-Jun-25	12-Jun-25	12-Jun-25				
BTEX/GRO Dilution.		No Dilution	No Dilution	No Dilution	No Dilution	No Dilution	GW1	GW2	Tap Water	MCL
TPH Dilution.		No Dilution	No Dilution	No Dilution	No Dilution	No Dilution				
BTEXMN/Gasoline Range Organics and Total Petroleum Hydrocarbons										
MTBE.	µg/l	<5	<5	<5	<5	<5	70	5000	14	
TAME.	µg/l	<5	<5	<5	<5	<5				
Benzene.	µg/l	<0.4	<0.4	<0.4	<0.4	<0.4	5	1000	0.46	5
Toluene.	µg/l	<1	<1	<1	<1	<1	1000	4000	110	1000
Ethylbenzene.	µg/l	<0.4	<0.4	<0.4	<0.4	<0.4	700	5000	1.5	700
m+p-Xylene.	µg/l	<0.8	<0.8	<0.8	<0.8	<0.8	3000	3000	19	10000
o-Xylene.	µg/l	<0.4	<0.4	<0.4	<0.4	<0.4				
1,3,5-Trimethylbenzene.	µg/l	<0.4	<0.4	<0.4	<0.4	<0.4	100	1000	6	
1,2,4-Trimethylbenzene.	µg/l	<0.4	<0.4	<0.4	<0.4	<0.4	10000	100000	5.6	
TPHC6-C10.	µg/l	<10	<10	<10	180	<10	200	3000	2.8	
TPHC10-C14.	µg/l	-	<120	<120	690	<120	200	5000		
TPHC10-C28.	µg/l	<328							5.7	
TPHC28-C40.	µg/l	<382	<90	<90	<90	<90	14000	50000		
TPHC10-C40 Total.	µg/l	<328					200	5000		
Polycyclic Aromatic Hydrocarbons										
Naphthalene.	µg/l	<0.1	<0.4	<0.4	<0.4	<0.4	140	700	0.12	
Acenaphthene.	µg/l	<0.1					20	10000	53	
Acenaphthylene.	µg/l	<0.1					30	40		
Fluorene.	µg/l	<0.1					30	40	29	
Phenanthrene.	µg/l	<0.1					50	10000		
Anthracene.	µg/l	<0.1					30	30	180	
Fluoranthene.	µg/l	<0.1					90	200	80	
Pyrene.	µg/l	<0.1					20	20	12	
Benzo(a)anthracene.	µg/l	<0.1					1	1000	0.03	
Chrysene.	µg/l	<0.1					20	70	25	
Benzo(b+k)fluoranthene.	µg/l	<0.2					1	100	0.25	
Benzo(a)pyrene.	µg/l	<0.1					0.2	500	0.025	0.2
Benzo(g,h,i)perylene.	µg/l	<0.2					20	20		
Dibenz(a,h)anthracene.	µg/l	<0.2					0.5	40	0.025	
Indeno(123-cd)pyrene.	µg/l	<0.2					0.5	100	0.25	

MASSDEP Screening Limits

All results reported below the laboratory method detection limit except at AH5. Total Petroleum Hydrocarbons (TPH) in the C10-C14 banding, exceeded the GW1 limit at AH5, and TPH C6-C10 was also reported above the laboratory method detection, but below the screening limit.

No exceedance of these compounds were noted at downstream locations AH6, AH4 and TH1, indicating localised impacts at AH5 likely of a diesel nature. The water quality status quo is that site activities have not impacted on the downslope wetland to date.

Table 5: Summary of Inorganic and Microbiological Analysis of Groundwater from TH1

Sample Position		TH1	SANS 241 : 2015 Drinking Water			South African Water Quality Guidelines (SAWQG)
Sample Date		20-Jan-25				
Sampled by		MA				
Sample Method		Grab	Upper Limits			
Report Date		04-Feb-25	Acute health	Aesthetic	Operational	Aquatic Ecosystems Target Water Quality Range (TWQR)
Laboratory Certificate Number		tab import				
Laboratory Sample Reference		Test Hole 1	Chronic health			
Determinand	Unit					
Micro biological determinands						
E. coli or faecal coliforms	Count per 100 mL	13000	Not detected			
Total coliforms	Count per 100 mL	63000			≤ 10	
Heterotrophic plate count	Count per mL	270000			1 000	
Physical and aesthetic determinands						
Colour	mg/L Pt-Co	882.2		15		
Conductivity at 25 °C	mS/m	206		170		
Total dissolved solids	mg/L	1198		1200		15%
Turbidity	NTU	27283		5	1	
pH at 25 C	pH units	7.65			5 to 9.7	5%
Chemical determinands — macro-determinands						
Nitrate as N	mg/L	<0.5	11			
Nitrite as N	mg/L	<0.13	0.9			
Combined nitrate-nitrite	mg/L	<0.5	1			15%
Sulphate as SO42–	mg/L	79.55	500	250		
Fluoride as F–	mg/L	19.52	1.5			0.75
Ammonia as N	mg/L	1.3		1.5		0.007
Chloride as Cl–	mg/L	336.9		300		
Calcium as Ca	mg/L	161.2		150/300*		
Magnesium as Mg	mg/L	50.27	70/100*			
Potassium as K	mg/L	16.75	50/100*		50/100*	
Sodium as Na	mg/L	186.6		200		
Zinc as Zn	mg/L	0.08		5		2
Chemical determinands — micro-determinands						
Aluminium as Al	µg/L	2270	300			10
Antimony as Sb	µg/L	<10	20			
Arsenic as As	µg/L	30	10			10
Barium as Ba	µg/L	380	700			
Boron as B	µg/L	<500	2400			
Cadmium as Cd	µg/L	<3	3			0.15
Total chromium as Cr	µg/L	<50	50			
Cobalt as Co	µg/L	<50	500*			
Copper as Cu	µg/L	180	2000			0.3
Cyanide (recoverable) as CN–	µg/L	2	200			1
Iron as Fe	µg/L	1520	2000	300		10%
Lead as Pb	µg/L	<10	10			0.2
Manganese as Mn	µg/L	140	400	100		180
Mercury as Hg	µg/L	<5	6			0.04
Nickel as Ni	µg/L	<50	70			
Selenium as Se	µg/L	10	40			2
Uranium as U	µg/L	0	30			
Vanadium as V	µg/L	<50	200*			
Chemical determinands — organic determinands						
Total organic carbon as C	mg/L	37.8	10			
Phenols	µg/L	<10		10		30

	Class I	Class II
* SANS 241:2006 Limits -		
* SANS 241:2011 Limits -	chronic health	acute health

SANS241: 2015 Screening Limits

The results of analysis of TH1 indicate that faecal coliforms were reported above the acute health limit, and fluoride, aluminium, arsenic, and total organic carbon were reported above the chronic health limits.

Colour, conductivity, turbidity, chloride, iron, and manganese were reported above the aesthetic limits, while total coliforms and heterotrophic plate counts reported above the operational limit.

The water is not potable and suitable for human consumption without treatment.

SAWQG: Aquatic Ecosystems Screening Limits

The results of analysis indicate that fluoride, ammonia, aluminium, arsenic, copper, cyanide, and selenium were reported above the Target Water Quality limits. Cadmium, lead and mercury were reported below the laboratory method detection limit, which is above the screening limit.

The results indicate that the groundwater near the wetland may cause adverse effects on the health of aquatic ecosystems with which it is hydraulically connected. It is however noted that the wetland is artificial, and does not support any important or endangered habitats from an ecological perspective.

5 RISK AND IMPACT

5.1 Geohydrological Potential

The project area is underlain by a high yielding fractured rock aquifer comprising greywacke, phyllite and quartzitic sandstone of the Tygerberg Formation. Hydrocensus boreholes indicate a yield range of 0.02 to 5.68 l/s. Generally, borehole yields are expected to be between 2 and 5 l/s with deep drilling possibly yielding above 5 l/s. The aquifer system underlying the site is classified as Major however, with geological structures being absent within the project area, the potential is considered low to moderate.

5.2 Vulnerability

The DRASTIC aquifer vulnerability method makes use of seven (7 No.) factors to calculate the vulnerability index value. The factors are:

- Depth to groundwater (D) – determines the maximum distance contaminants travel before reaching the aquifer
- Net recharge (R) – the amount of water that is able to travel from ground surface to the water table
- Aquifer (A) – the composition of the aquifer material
- Soil media (S) – the uppermost portion of the unsaturated zone
- Topography (T) – the slope of the ground surface
- Impact of vadose zone (I) – the type of material present between the bottom of the soil zone and water table
- Hydraulic conductivity of the aquifer (C) – indicates the aquifer's ability to allow for the flow of water to occur.

This vulnerability index is used to determine the aquifer's vulnerability to pollution and ranges from 1 to 200. The DRASTIC mapping index confirms the Major aquifer unit as having a "Moderate" vulnerable rating value of 95.

Factors considered in the vulnerability rating include depth to groundwater and contaminant loading. For the proposed ASTs, vulnerability is considered medium due to the shallow groundwater, and offset by the proposed bunding and containment design. The associated Parsons Groundwater Quality Management System gives the site a *High Level of Protection* index when comparing vulnerability as the second variable.

TABLE A and B: Ratings for the Groundwater Quality Management classification system.			
AQUIFER SYSTEM MANAGEMENT CLASSIFICATION		SECOND VARIABLE CLASSIFICATION	
		AQUIFER VULNERABILITY CLASSIFICATION	
Class	Points	Class	Points
Sole Source Aquifer System	6	High	3
Major Aquifer System	4	Medium	2
Minor Aquifer System	2	Low	1
Non-aquifer System	0		
Special Aquifer System	0 -6		

TABLE C: Appropriate level of groundwater protection required, based on the Groundwater Quality Management classification	
GQM INDEX	LEVEL OF PROTECTION
< 1	Limited protection
01-03	Low level protection
03-06	Medium level protection
06-10	High level protection
> 10	Strictly non-degradation

Variable 1	Variable 2
Aquifer System	Second Variable Description
Major Aquifer System	Vulnerability
	Medium
4	2
GQM Index	Level of Protection
8.0	High level protection

5.3 Strategic Value

The strategic value of groundwater is based on existing groundwater use. From the hydrocensus and site assessment, limited groundwater use was identified within 2 km of the study area. WARMS borehole "22146143" was the only resource found within this radius and is not considered geohydrologically downslope of the site. The primary use of the resource is for industrial applications. The strategic value is considered *Low* as the area is likely serviced by municipal supply. The associated Parsons Groundwater Quality Management System gives the site a *Medium Level of Protection* index when comparing strategic value as the second variable.

TABLE A and B: Ratings for the Groundwater Quality Management classification system.			
AQUIFER SYSTEM MANAGEMENT CLASSIFICATION		SECOND VARIABLE CLASSIFICATION	
		AQUIFER VULNERABILITY CLASSIFICATION	
Class	Points	Class	Points
Sole Source Aquifer System	6	High	3
Major Aquifer System	4	Medium	2
Minor Aquifer System	2	Low	1
Non-aquifer System	0		
Special Aquifer System	0 -6		

TABLE C: Appropriate level of groundwater protection required, based on the Groundwater Quality Management classification	
GQM INDEX	LEVEL OF PROTECTION
< 1	Limited protection
01-03	Low level protection
03-06	Medium level protection
06-10	High level protection
> 10	Strictly non-degradation

Variable 1	Variable 2
Aquifer System	Second Variable Description
Major Aquifer System	Strategic Value
	Low
4	1
GQM Index	Level of Protection
4.0	Medium level protection

5.4 Existing Contaminant Sources

The main potential contaminant sources within the project area include the existing ASTs as well as runoff from the existing wash bay located within the south eastern boundary of the site. Workshops, vehicle maintenance bays and fuel storage areas are also potential contaminant sources. Beyond the site boundary, localised industrial activities and existing sanitation infrastructure including the Kraaifontein Waste Water Treatment Plant (located to the north west of the site), may already be impacting on groundwater quality in the area.

5.5 Impacts During Construction

During the construction phase, the removal of the existing ASTs poses an immediate to short term risk of hydrocarbon contamination which needs to be managed during the decommissioning process. Workshop areas, maintenance of heavy vehicles, and fuel stores also pose a risk of hydrocarbon contamination. Other construction phase activities include temporary sanitation, waste handling, excavations and new infrastructure. All waste handling and sanitation is considered temporary and therefore poses a low and short term risk. Areas of excavation may result in

accelerated erosion, increased storm water runoff, increased turbidity loading, increased microbiological loading and mobilisation of existing contaminants in the soils. Counteractive measures that can be implemented including the installation of temporary containment bunds and surface water runoff controls around the existing ASTs during disassembly, should the existing bund be removed before removing the ASTs and, effective management of the temporary sanitation and waste handling facilities to avoid spills or loss of containment. Appropriate berms and surface water runoff controls should be implemented around excavations if necessary.

5.6 Impacts During Operation

During the operational phase, loss of containment or prolonged leaks from AST facilities may pose a risk of hydrocarbon contamination. Further to this during periods of heavy rainfall reduced efficiency or blockage of the stormwater management system may encourage surface runoff, particularly in areas underlain by impermeable surfaces. Surface runoff in the vicinity of workshops or vehicle maintenance areas and fuel stores and could pose risks to groundwater or the adjacent wetland.

No increase or decrease in groundwater resource quantity is expected from the proposed infrastructure. No impact on the reduction of groundwater resource quantity is expected as there is municipal supply.

5.7 Quantitative Environmental Risk Assessment and Mitigation

The quantitative environmental risk assessment (ERA) methodology is presented in Annexure C. The ERA identifies activities and associated aspects that may impact on the groundwater receiving environment during the construction and operational phases of the project. Impacts relate to water quality and water quantity. The Significance Points (SP) score is calculated from the following equation using ranking scales:

SP = probability x (duration + scale + magnitude)

The ERA for the groundwater receiving environment is summarised in Table 6. All activities present risks that score LOW for the pre mitigation ratings, with limited activities scoring MODERATE. Most scores can be reduced with the introduction of proposed mitigation measures.

Aspect	Impact	Significance	Probability	Duration	Scale	Magnitude	SP Score and Rating	<30 indicates low environmental significance	Mitigation	SP Score and Rating	
ion of existing elevated macro and micro nds in the soils matrix due to excavations		low medium negative	medium	immediate to short	site	moderate	3(1.5+1+6) = 26	LOW	Controlled earthworks and spoil management	2.5(1.5+1+5) = 19	
eas and increased turbidity loading from open excavations and stockpiles		low negative	medium	immediate to short	site	low	3(1.5+1+4) = 20	LOW	Controlled earthworks and spoil management	2.5(1.5+1+4) = 16	
inment of residual product during removal of ing AST's and previous infrastructure		low medium negative	medium	short to medium	site	moderate to high	3(2.5+1+7) = 32	MODERATE	Follow decommissioning procedure. Temporary bunds and confine temporary waste storage areas. Spill kits on site	2.5(2.5+1+6) = 24	
s from plant / equipment storage areas and/or breakdowns		low negative	low to medium	immediate to short	site	low to moderate	2.5(1.5+1+5) = 19	LOW	Use of drip trays, good vehicle maintenance, spill kits on site	2(1.5+1+4) = 13	
oss of containment from storage and handling d hazardous materials of variable nature at n areas, including temporary sanitation	Quality	low negative	low to medium	immediate to short	site	low	2.5(1.5+1+4) = 16	LOW	Bunded areas and/or compacted surfacing to reduce seepage. Restrict areas for refuelling of vehicles and machinery	2(1.5+1+4) = 13	
tion of downslope wetland from runoff and of hydrocarbons during decommissioning		medium high negative	low	medium	site to local	moderate	2(3+1.5+6) = 21	LOW	Conduct Contaminated Land Assessment if any contaminated insitu soils are identified.Install early warning groundwater monitoring points between proposed new tank farm, wash bay, separator and the wetland at the onset of the construction phase (these wells must not prohibit construction or be impacted by construction) and monitor/sample quarterly during construction	2(3+1.5+6) = 21	
groundwater quantity during construction	Quantity	positive	none	short	site	minor	0(2+1+2) = 0	LOW	Municipal supply, none required	0(2+1+2) = 0	
rmwater management system during periods rainfall or from unmaintained blockages		low medium negative	low	immediate to short	site to local	low to moderate	2(1.5+1.5+5) = 16	LOW	Correct stormwater design	1.5(1.5+1.5+4) = 11	
aks from AST's and associated infrastructure		medium high negative	medium	long	site	moderate to high	3(4+1+7) = 36	MODERATE	Routine inspection and maintenance of infrastructure. Tank farm in concrete hardstand and approved bund design. Rapid response clean up to identified leaks. Spill kits on site	2.5(3.5+1+6) = 26	
of containment from ASTs and associated infrastructure		medium high negative	low to medium	short to medium	site	moderate to high	2.5(2.5+1+7) = 26	LOW	Tank filling procedures, valve, tank and link inspections and pressure testing. Tank farm in concrete hardstand and approved bund design. Rapid response clean up to spills. Spill kits on site	2(2.5+1+6) = 19	
oss of containment from storage and handling d hazardous materials of variable nature at laydown areas		medium negative	low to medium	medium to long	site	low to moderate	2.5(3.5+1+5) = 24	LOW	waste storage in concrete hardstand demarcated areas. Waste management plan	2(3.5+1+4) = 17	
ks from office and site sanitation infrastructure	Quality	medium negative	low to medium	long	site	low to moderate	2.5(4+1+5) = 25	LOW	Early warning groundwater monitoring	2(3.5+1+4) = 17	
or leaks from washbay, workshop and plant s and oil separators/traps being compromised		medium high negative	medium to high	medium	site to local	moderate	3.5(3+1.5+6) = 37	MODERATE	Routine inspections and maintenance of infrastructure. Waste handling. Washbay, oil separators/traps inspections and clean-up. Certified waste removal	3(3+1.5+5) = 29	
tion of downslope wetland from runoff and drocarbons during new tank farm operations		medium high negative	low to medium	medium to long	site to local	moderate to high	2.5(3.5+1.5+7) = 30	LOW	Undertake quarterly monitoring on the installed groundwater monitoring network during the initial year of operation. Should the results of the sampling in the construction phase and initial year of operation show low to	2.5(2.5+1.5+6) = 25	

5.8 Mitigation Measures

Significance scores can in most instances be reduced by applying suggested mitigation measures as presented in Table 6 to reduce the probability and magnitude of identified impacts and aspects. The mitigation measures for aspects presented in the ERA are not exhaustive.

6 CONCLUSIONS AND RECOMMENDATIONS

This report presents the results of a geohydrological assessment for the increase in storage capacity at the MOOV Energy fuel depot near Kraaifontein in the Western Cape. The aim of the assessment was to characterise the geohydrological setting of the study area, and to determine impacts on the groundwater receiving environment from the proposed infrastructure upgrades.

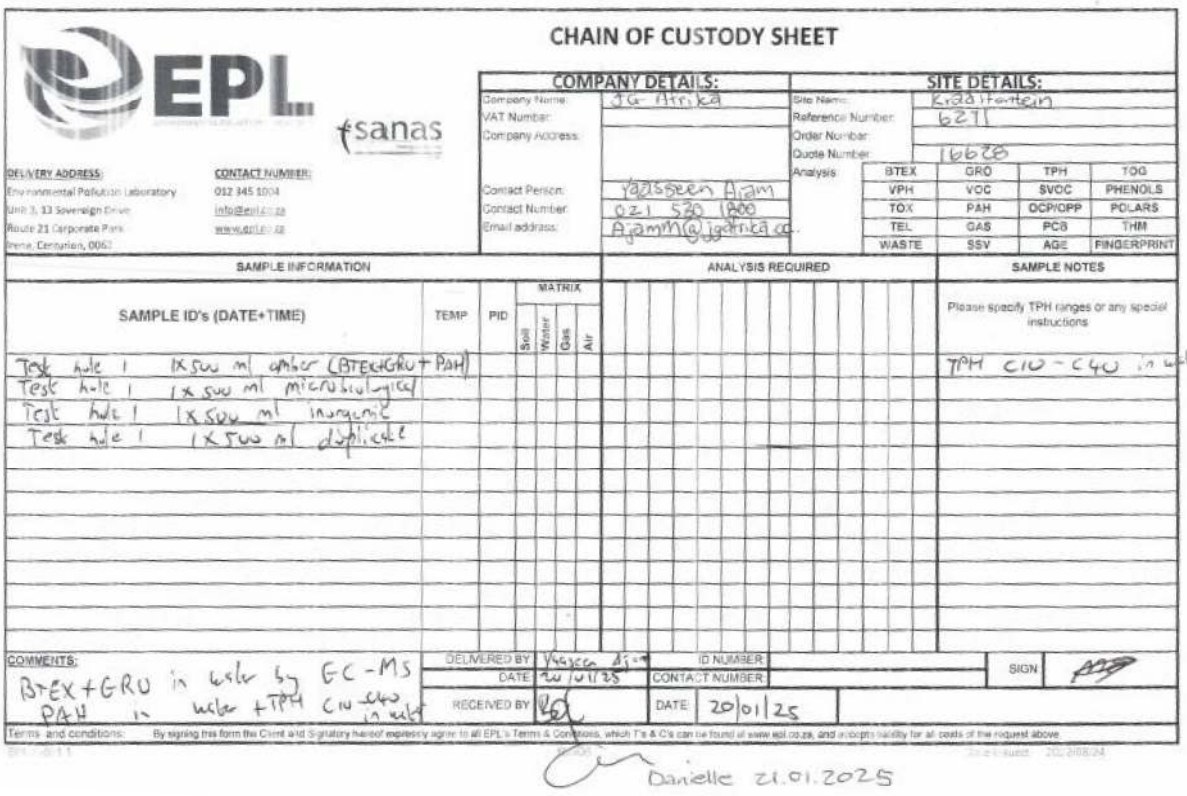
The project area is underlain by a fractured aquifer that is moderate yielding. The underlying aquifer is classified as Major. The inferred depth to groundwater is <5 mbgl across the site.

The aquifer vulnerability is *Medium* and the strategic value is *Low*. The Parsons Groundwater Quality Management System gives the site a *High Level of Protection* index for the second variable of vulnerability and a *Medium Level of Protection* index for the second variable of strategic value. Existing potential contaminating sources in the project area include the existing ASTs, wash bay, heavy vehicle maintenance workshop and fuel stores.

The water quality status quo assessment indicated localised impacts of a likely diesel nature in the vicinity of the existing bund (AH5). Downstream groundwater sample points (AH6, AH4, and TH1) reported all organic results below the laboratory detection levels, thus indicating no further impacts on the groundwater receiving environment. The groundwater quality in the area is typically not suitable for human consumption without treatment, due to the industrial nature of the project area.

The quantitative environmental risk assessment identified most listed aspects to score *Low*. Suggested mitigation measures typically reduce the significance scores for all identified aspects should be considered to reduce potential impacts and risk. Furthermore, current indications suggest no impacts to the groundwater receiving environment however, it is recommended that a groundwater monitoring network be installed around the proposed new concrete bund (and downgradient of the separator and wash bay) to act as an early warning system to historical and possible future impacts from the historical and proposed infrastructure. Subsequent to the initial baseline groundwater monitoring exercise, quarterly monitoring will need to be undertaken during the construction phase and initial year of operation. Should the results of the sampling in the construction phase and initial year of operation show low to no risk, sampling frequency can be adjusted to a biannual/annual basis.

Annexure A: Sample Handling Documents



CHAIN OF CUSTODY SHEET

EPL

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DELIVERY ADDRESS:
Environmental Pollution Laboratory
Unit 3, 13 Sovereign Drive
Route 21 Corporate Park
Irene, Centurion, 0062

CONTACT NUMBER:
012 345 1004
info@epl.co.za
www.epl.co.za

COMPANY DETAILS:

Company Name:	JG Afrika
VAT Number:	
Company Address:	
Contact Person:	Yaasseen Ajam
Contact Number:	021 530 1800
Email address:	Ajamm@jgafrica.co

SITE DETAILS:

Site Name:	Kraaifontein
Reference Number:	627
Order Number:	
Quote Number:	16628

Analysis				
	BTEX	GRO	TPH	TOG
	VPH	VOC	SVOC	PHENOLS
	TOX	PAH	OCP/OPP	POLARS
	TEL	GAS	PCB	THM
	WASTE	SSV	AGE	FINGERPRINT

SAMPLE INFORMATION						ANALYSIS REQUIRED	SAMPLE NOTES
SAMPLE ID's (DATE+TIME)	TEMP	PID	MATRIX: Soil	Water	Gas	Air		Please specify TPH ranges or any special instructions
Test hole 1 1x 500 ml amber (BTEX+GRO+PAH)								TPH C10 - C40 in water
Test hole 1 1x 500 ml microbiological								
Test hole 1 1x 500 ml inorganic								
Test hole 1 1x 500 ml duplicate								

COMMENTS: BTEX+GRO in water by EC-MS PAH in water +TPH C10-C40 in water

DELIVERED BY: Yaasseen Ajam — ID NUMBER: — SIGN:
DATE: 20/01/25 — CONTACT NUMBER:
RECEIVED BY: — DATE: 20/01/25

Terms and conditions: By signing this form the Client and Signatory hereof expressly agree to all EPL's Terms & Conditions, which T's & C's can be found at www.epl.co.za, and accepts liability for all costs of the request above.

Danielle 21.01.2025

Annexure B: Laboratory Certificates of Analysis

EPL
ENVIRONMENTAL POLLUTION LABORATORY

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Testing Laboratory

TEST REPORT
55785A

Client and Project Information

Client:	JG Afrika				
Address:	1st Floor, Block C Westville Durban 3629	Attention: Tel: Email:	Robert Schapers (031) 275 5502 schapersr@jgafrika.com	Project number: Project name:	6271 Kraaifontein

Sample Information

Sample ID:	Test Hole 1	Matrix:	Water	Date Received:	2025/01/21
Units:	mg/l [ppm] (unless stated elsewhere)	Container:	Glass & Plastic	Date Analysed:	2025/01/21
				Date Issued:	2025/02/04

Cations and Metals

Al	2.27	Cd	<0.003	K	16.75	Pb	<0.01	U*	0.03
As	0.03	Co	<0.05	Mg	50.27	Sb	<0.01		
B	<0.5	Cr	<0.05	Mn	0.14	Se	0.01		
Ba	0.38	Cu	0.18	Na	186.60	V	<0.05		
Ca	161.20	Fe	1.52	Ni	<0.05	Zn	0.08		

Anions (Discrete Analyser)

Cl	336.90	NO2 as N	<0.13	SO4	79.55	NO3 + NO2 as N	<0.5
F	19.52	NO3 as N	<0.5				

Other Parameters

pH	7.65	Turbidity (NTU)*	27283.00	E.coli (colonies/100ml)*	13000
EC (µs/cm)	2060	Hg*	<0.005	Total Coliforms (colonies/100ml)*	63000
TDS	1198	NH3 as N*	1.30	Total Plate Count (colonies/ml)*	270000
TOC*	37.80	Total Phenol*	<0.01		
Free CN*	0.002	Colour (hazen)*	882.20		

Disclaimers

Miche Kannemeyer
Authorised Signatory

1) The results only relate to the test items provided, in the condition as received.
2) This report may not be reproduced, except in full, without the prior written approval of the laboratory.
3) Parameters marked " * " are not included in the SANAS Schedule of Accreditation for this laboratory.
4) A = Concentration outside calibration range, ** = Outsourced analysis, UTD = Unable to Determine, RTF = Results To Follow, NR = Not Requested.
5) Methods: EPL-WL-001 (Conductivity), EPL-WL-002 (Alkalinity), EPL-WL-003 (pH), EPL-WL-004 (TDS), EPL-WL-005 (Anions by IC), EPL-WL-006 (Cations by IC), EPL-WL-007 (Metals), EPL-WL-008 (Cr(VI)), EPL-WL-009 (TOC), EPL-WL-010 (Hg by DMA), EPL-WL-011 (Anions by Discrete Analyser), EPL-HPLC-001 (Formaldehyde), EPL-ML-001 (Micro).
6) Uncertainty of measurement for all methods included in the SANAS Schedule of Accreditation is available on request.
7) Cr(III) and Cr(VI) are assumed to be the two major oxidative states of Chromium.

Page 1 of 1

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Testing Laboratory

TEST REPORT
55785A

Test Description BTEXMN/Gasoline Range Organics and Total Petroleum Hydrocarbons
Test Method: EPL-T-012 (BTEX/GRO) and EPL-T-011 (TPH)

Client and Project Information

Client:	JG Afrika				
Address:	1st Floor, Block C Westville Durban 3629	Attention: Tel: Email:	Robert Schapers (031) 275 5502 schapersn@jgafrika.com	Project number: Project name:	6271 Kraaifontein

Sample Information

Sample ID:	Test hole 1	Matrix:	Water	Date Received:	2025/01/21
Dilutions:	BTEX/GRO = No Dilution, TPH = No Dilution	Storage:	Fridge at 0-6°C	Date Analysed:	2025/01/21
Container:	Glass & Plastic			Date Issued:	2025/01/23

BTEXMN and Gasoline Range Organics

PARAMETER	RESULT
MTBE	<5 µg/liter
TAME	<5 µg/liter
Benzene	<0.4 µg/liter
Toluene	<1 µg/liter
Ethylbenzene	<0.4 µg/liter
m+p-Xylene	<0.8 µg/liter
o-Xylene	<0.4 µg/liter
1,3,5-Trimethylbenzene	<0.4 µg/liter
1,2,4-Trimethylbenzene	<0.4 µg/liter
Naphthalene	<0.4 µg/liter
TPH GRO C6-C10	<10 µg/liter

Total Petroleum Hydrocarbons (C10-C40)

PARAMETER	RESULT
TPH C10-C28	<382 µg/liter
TPH C28-C40	<382 µg/liter
TPH C10-C40 Total	<382 µg/liter

Disclaimers

1) The results only relate to the test items provided, in the condition as received.
2) This report may not be reproduced, except in full, without the prior written approval of the laboratory.
3) Parameters marked " * " are not included in the SANAS Schedule of Accreditation for this laboratory.
4) A = Concentration outside calibration range, O = Outsourced analysis, UTD = Unable to Determine.
5) Uncertainty of measurement for all methods included in the SANAS Schedule of Accreditation is available on request.

Hugonette Richter
Authorised Signatory

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EPL
ENVIRONMENTAL POLLUTION LABORATORY

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TEST REPORT
55785B

Test Description Polycyclic Aromatic Hydrocarbons
Test Method: EPL-T-020

Client and Project Information

Client:	JG Afrika				
Address:	1st Floor, Block C Westville Durban 3629	**Attention:** **Tel:** **Email:**	Robert Schapers (031) 275 5502 schapersn@jgafrika.com	**Project number:** **Project name:**	6271 Kraaifontein

Sample Information

Sample ID:	Test hole 1	**Matrix:**	Water	**Date Received:**	2025/01/21
Dilution:	No Dilution	**Storage:**	Fridge at 0-6°C	**Date Analysed:**	2025/01/22
Container:	Glass & Plastic			**Date Issued:**	2025/01/23

PARAMETER	RESULT
Naphthalene	<0.1 µg/liter
Acenaphthene	<0.1 µg/liter
Acenaphthylene	<0.1 µg/liter
Fluorene	<0.1 µg/liter
Phenanthrene	<0.1 µg/liter
Anthracene	<0.1 µg/liter
Fluoranthene	<0.1 µg/liter
Pyrene	<0.1 µg/liter
Benzo(a)anthracene	<0.1 µg/liter
Chrysene	<0.1 µg/liter
Benzo(b+k)fluoranthene	<0.2 µg/liter
Benzo(a)pyrene	<0.1 µg/liter
Benzo(g,h,i)perylene	<0.2 µg/liter
Dibenz(a,h)anthracene	<0.2 µg/liter
Indeno(123-cd)pyrene	<0.2 µg/liter

Disclaimers

1) The results only relate to the test items provided, in the condition as received.
2) This report may not be reproduced, except in full, without the prior written approval of the laboratory.
3) Parameters marked " * " are not included in the SANAS Schedule of Accreditation for this laboratory.
4) A = Concentration outside calibration range, O = Outsourced analysis, UTD = Unable to Determine.
5) Uncertainty of measurement for all methods included in the SANAS Schedule of Accreditation is available on request.

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Authorised Signatory

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Annexure C: Quantitative Environmental Risk Assessment (ERA) Guideline

In terms of a quantitative environmental risk assessment (ERA), the assessment will be based on:

- Probability of occurrence which describes the likelihood of the impact actually occurring and is indicated as:-
  - Improbable, where the likelihood of the impact is very low;
  - Probable, where there is a distinct possibility of the impact to occur;
  - Highly probable, where it very likely that the impact will occur;
  - Definite, where the impact will occur regardless any management measure.
- Consequence of occurrence in terms of:
  - Nature of the impact;
  - Extent of the impact, either local, regional, national or across international borders;
  - Duration of the impact, either short term (0-5 years), medium term (6-15 years) or long-term (the impact will cease after the operational life of the activity) or permanent, where mitigation measures by natural processes or human intervention will not occur;
  - Intensity of the impact, either being low, medium or high effect on the natural, cultural and social functions and processes.
- Significance level of the risk posed by the water use, which is determined through a synthesis of the probability of occurrence and consequence of occurrence.

The applicant will have to rank the risks based on the quantitative assessment as described above into high, medium, or low risks. Management measures need to be identified to mitigate, prevent and /or reduce the risk. These measures will primarily be focussed on the risks identified as high in the ranking matrix, but will also include measures for medium and low risks. The management measures will be taken forward in the IWMP as part of the water use authorisation process.

In order to assess each of the factors for each impact the ranking scales as contained in Table 7-1 could be used. Once the factors had been ranked for each impact, the environmental significance of each impact could be assessed by applying the following formula:

SP = (magnitude + duration + scale) x probability

where SP is defined as significance points.

Table 7-1: Ranking Scales for ERA

PROBABILITY = P 5 – Definite / don't know 4 – High probable 3 – Medium probability 2 – low [probability 1 – Improbable 0 - None	**DURATION** = D 5 – Permanent 4 – Long-term ceases with operational life) 3 – Medium-term (5 – 15 years) 2 – Short-term (0-5 years) 1 - Immediate
SCALE = S 5 – International 4 – National 3 – Regional 2 – Local 1 – Site 0 – None	**MAGNITUDE** = M 10 – Very high / Don't know 8 – High 6 – Moderate 4 – Low 2 – Minor

The maximum value of significance points (SP) is 100. Environmental effects could therefore be rated as either high (H), moderate (M), or low (L) significance on the following basis:

- More than 60 points indicates high (H) environmental significance
- Between 30 – 60 points indicate moderate (M) environmental significance
- Less than 30 points indicates low (L) environmental significance.