INTEGRATED WATER AND WASTE MANAGEMENT PLAN 2026

PREPARED FOR MOOIPLAATS COLLIERY

FEBRUARY 2026

1745: Integrated Water and Waste Management Plan for Mooiplaats Colliery

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List of Abbreviations

ABET	:	Adults Basic Education Training
BOD	:	Biological Oxygen Demand
CMA	:	Catchment Management Area
CMS	:	Catchment Management Strategy
COD	:	Chemical Oxygen Demand
DEA	:	Department of Environmental Affairs[1]
DMR	:	Department of Mineral Resources[2]
DWS	:	Department of Water and Sanitation[3]
EAP	:	Environmental Assessment Practitioner
ECO	:	Environmental Control Officer
EI	:	Ecological Importance
EIA	:	Environmental Impact Assessment
EIS	:	Ecological Importance and Sensitivity
EMP	:	Environmental Management Plan
EMPr	:	Environmental Management Program
EMS	:	Environmental Management System
EO	:	Environmental Officer
ES	:	Ecological Sensitivity
GSW	:	Geo Soil and Water cc
GDP	:	Gross Domestic Product
HRDP	:	Human Resources Development Programme
I&AP	:	Interested and Affected Party
IDP	:	Integrated Development Plan
ISO	:	International Organisation for Standardisation
IUA	:	Unit of Analysis

[1] This Ministry was recently renamed as Department of Forestry, Fisheries and the Environment (DFFE). All reference in this report to DEA or DEFF should be read synonymously with DFFE.

[2] This Ministry was recently renamed as Department of Mineral and Petroleum Resources (DMPR). All reference in this report to DMR or DMRE should be read synonymously with DMPR.

[3] This Ministry was recently renamed as Department of Water and Sanitation (DWS). All reference in this report to DHSWS should be read synonymously with DWS.

IWWMP:		Integrated Water and Waste Management Plan
LED	:	Local Economic Development
LoM	:	Life of Mine
MAE	:	Mean Annual Evaporation
mamsl	:	Metres Above Mean Sea Level
MAP	:	Mean Annual Precipitation
MAR	:	Mean Annual Runoff
MPRDA	:	Mineral and Petroleum Resources Development Act (Act 28 of 2002)
MSDS	:	Material Safety Data Sheet
NEMA	:	National Environmental Management Act, (Act 107 of 1998).
NEMBA	:	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMWA:		National Environmental Management: Waste Act (Act 59 of 2008)
NFEPA	:	National Freshwater Ecosystem Priority Areas
NWA	:	National Water Act (Act 36 of 1998)
NWRS	:	National Water Resource Strategy
PCD	:	Pollution Control Dam
PES	:	Present Ecological Status
PPP	:	Public Participation Process
PPR	:	Public Participation Report
Ptn	:	Portion
RE	:	Remaining Extent (in relation to farms and portions)
RQO	:	Resource Quality Objectives
SANS	:	South African National Standards
SASS	:	South African Scoring System
SAWQG:		South African Water Quality Guidelines
Sc	:	Specific Storage
SDS	:	Safety Data Sheet
SHE	:	Safety, Health and Environmental
SHEQ	:	Safety, Health, Environment and Quality
SLP	:	Social and Labour Plan
SWMP	:	Storm Water Management Plan

TDS	:	Total Dissolved Solids
WARMS	:	Water Authorisation Registration and Management System
WMA	:	Water Management Area
WML	:	Waste Management License
WMS	:	Waste Management Strategy
WCDSS	:	Water Conservation, Demand and Supply Strategy
WUL	:	Water Use Licence
WULA	:	Water Use Licence Application

1 INTRODUCTION

Geo Soil and Water CC. to assist Mooiplaats Colliery (hereafter referred to as the "Applicant"), with an update of the existing Integrated Water and Waste Management Plan (IWWMP) in-line with Department of Water & Sanitation (DWS) conditions of the current Water Use Licence and to support a new Water Use Licence Application (WULA). The Colliery has an existing Water Use Licence (Ref.no.: 08/C11B/AGJ/2141) issued on 02/05/2013 (Appendix A) and concluded a Section 102 application in terms of the MPRDA for the inclusion of two prospecting rights[4] into the existing mining right. Furthermore, Mooiplaats Colliery also included two additional areas from the adjacent Vunene Mining Right into the Mooiplaats Colliery Mining Right though a Section 102 Application. Due to the cessation of mining activities within the Mining Right, Mooiplaats Colliery and the shift towards toll washing, the Colliery has embarked on a new Water Use Licence Application to update all Section 21 water uses that are relevant to the operations.

Relevant information from numerous existing sources were integrated and is presented in this document which follows the template provided by the IWWMP Guideline in GNR 267 (2017) in support of the IWWMP Compilation. Table 1 below provides an overview of the existing documentation that was collated for the compilation of the IWWMP.

The Mooiplaats Colliery is located approximately 18km south of the town of Ermelo, between the N2 and N11, and lies to the south of the Eskom Camden Power Station which falls within the municipal boundaries of the Gert Sibande District Municipality, Mpumalanga Province. The mine has an existing WUL (Ref #; 08/C11B/AGJ/2141). Mooiplaats Colliery has a mining right (MP 30/5/1/2/68MR - Appendix B) in terms of the MPRDA.

Table 1: Existing Reports Used to Compile the IWWMP

Author	Document Title
EIMS/GSW	Integrated Water and Waste Management Plan – 2024
GSW	Annual Internal IWUL Audit Report, Mooiplaats Colliery - 2025
GSW	Annual Water Quality Report 2024/2025 Mooiplaats Colliery
Gradient Consulting	Hydrogeological Baseline Investigation and Groundwater Impact Assessment (Updated as of November 2024)
Gradient Consulting	Mooiplaats Colliery Operational Water and Mass Load Balance Update – February 2026
The Biodiversity Company	Wetland Functional and Impact Assessment for the Mooiplaats Colliery (Draft as at November 2024)

[4] 667PR over Portions 2, 3 and the remaining extent of the farm Klipbank 296IT and 677 PR over Portions 1, 2 and the remaining extent of the farm Adrionople 296IT.

Table 2: Details of the applicant

	Details
Company	Mooiplaats Processing and Material Handling Pvt Ltd
Name	Navneet Goyal
Telephone	+27 10 003 8075
E-mail Address	nyathim@ngglobal.co.za
Physical Address	6th floor Park lane west 180 -197 Amarand Avenue Waterkloof Glen 0010

1.1 ACTIVITY BACKGROUND

Mooiplaats Colliery is an underground coal mine which has since been sealed off. All five accesses to the underground workings (5 adits shaft) situated near the northern boundary of the Mooiplaats property have been sealed. A final engineer's audit or inspection was undertaken, wall was drilled, sealed and passing certificates were issued by OEM Civil Engineer in May 2023. Four (4) rescue boreholes were rehabilitated (opened 3m deep, capped with concrete slab topsoiled and grassed). Plans are underway to complete rehabilitation of the exploration boreholes (42) which were identified underground with the holes staked out and the shaft area in 2023. The mine ceased underground mining on 31 December 2021 and is currently making use of third-party miners receiving coal and washing at the plant. It is important to note that limited toll washing has taken place since June 2025.

1.2 REGIONAL SETTING AND LOCATION OF ACTIVITY

The Mooiplaats Colliery is located approximately 18 km south of the town of Ermelo, between the N2 and N11, and lies to the south of the Eskom Camden Power Station. The Colliery is located on portions 1, 2, 7, 8 and 9 of the farm Mooiplaats 290 IT, and falls within the municipal boundaries of the Gert Sibande District Municipality, Mpumalanga Province (refer to Figure 1).

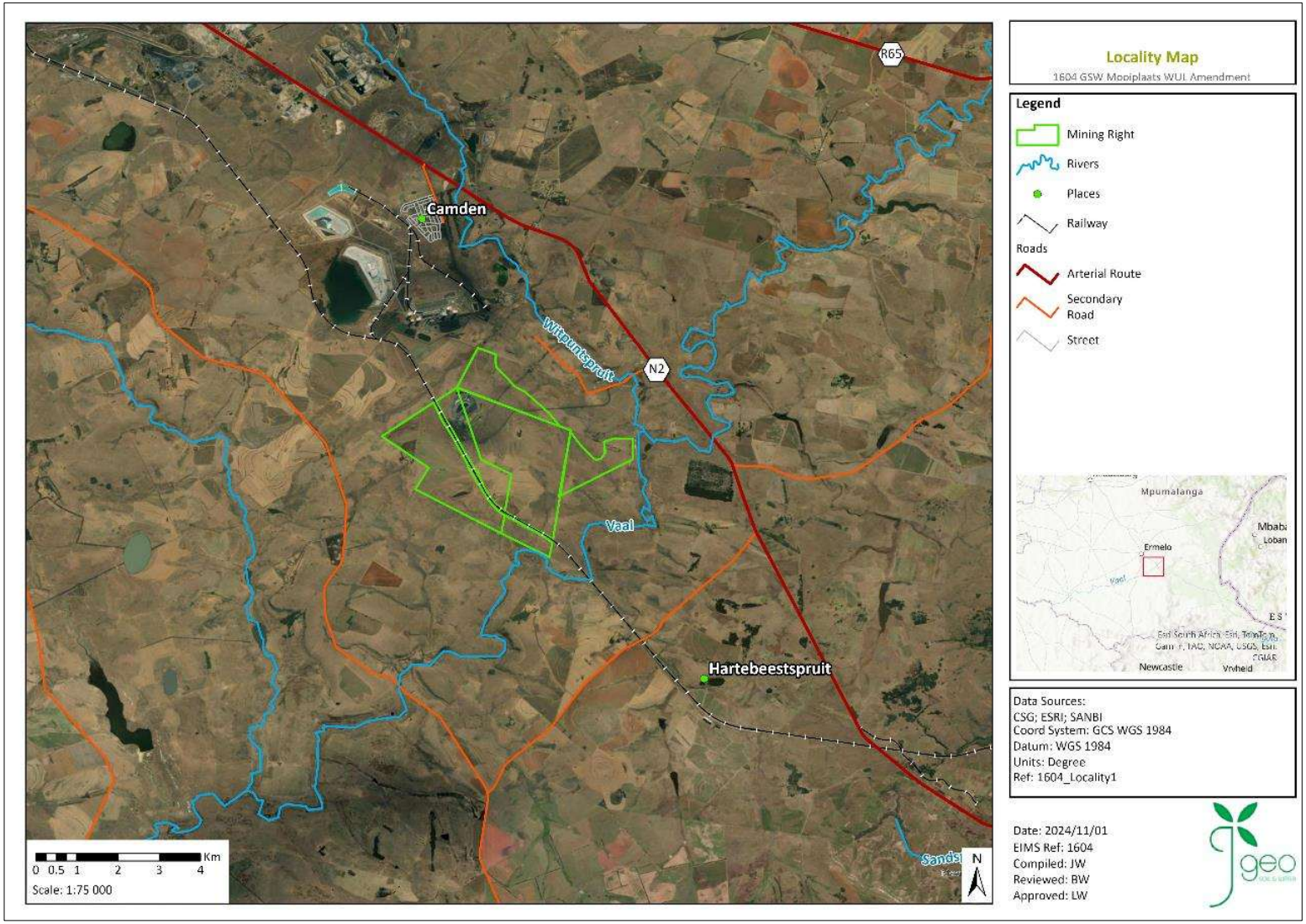


Figure 1: Locality map of the Mooiplaats Colliery.

1.3 PROPERTY DESCRIPTION

Table 3 below indicates which farms and farm portions form part of the Mooiplaats Colliery Mining Right (including the 3 Mooiplaats Colliery Vunene project areas) and indicate the owner as well as the title deed of the property.

Table 3: Properties that form part of the Mooiplaats Colliery

Farm Description	Owner	Tittle Deed	Mineral Tenure Status
Portion 1 of Mooiplaats 290 IT	Eglin Investments No. 44 (Pty) Ltd.	T13234/79	Mooiplaats Original MR (MR68)
Portion 9 of Mooiplaats 290 IT	Eglin Investments No. 44 (Pty) Ltd.	T13234/79	Mooiplaats Original MR (MR68)
Remainder of Portion 2 of Mooiplaats 290 IT	Eglin Investments No. 44 (Pty) Ltd.	T84901/2002	Vunene Area incorporated through S102
Portion 7 of Mooiplaats 290 IT	National Government of South Africa	T2301/2008	Vunene Area incorporated through S102
Portion 8 of Mooiplaats 290 IT	National Government of South Africa	T2301/2008	Vunene Area incorporated through S102

1.4 PURPOSE OF IWWMP

Although the requirement for the compilation of an IWWMP was originally aimed at collating and rationalising the information submitted for Water Use Licence Applications (WULA) to the DWS, it has progressed beyond this purpose to:

- Provide the regulatory authorities with focused and structured information not only to meet their general information needs, but also to articulate the required management measures and actions to achieve the water and waste related performance on an on-going basis; and
- Provide direction and guidance to the water user on water and waste management of any activity.
- Be used in conjunction with other guidelines developed by DWS, such as the External Guideline on the Water Use Authorisation Process and the series of Best Practical Guidelines for water resource protection in Industries and Mines - the Department and/or relevant Catchment Management Agencies (CMA) implement Integrated Water Resource Management (IWRM) at source by means of an IWWMP.
- The Department requires an IWWMP as a simple feasible, implementable plan for water users based upon site specific programmes, also taking into account the National Water Resource Strategy (NWRS), Catchment Management Strategy (CMS), Resource Quality Objectives

(RQO's) and sensitivity of the receiving water resource, upstream and downstream cumulative impacts of water use activities, external water use authorisation guidelines, as well as water use specific supplementary information requirements. The most important component of the IWWMP development process is the formulation of various strategies, goals and objectives for the water use or waste management of an activity, in accordance with the set philosophies and policies. The policies must address the four key areas related to IWWMP development, namely process water, storm water, groundwater and waste.

The purpose of an IWWMP apart from encouraging IWRM and informing policy is as follows:

- Compilation of a site specific, implementable, management plan addressing all the identified water use and waste management related aspects (e.g., process water balances, storm water management, groundwater management, water re-use and reclamation, water conservation and demand management, waste minimization and recycling) of the specific activity, in order to meet set goals and objectives, in accordance with Integrated Water Resources Management principles;
- Provision of management plan to guide a water user regarding the water and waste related measures which must be implemented on site in a progressive, structured manner in the short, medium and long term;
- Documentation of all the relevant information, as specified in this guideline, to enable the Department to make the decision regarding the authorisation of a water use;
- Clarification of the content of the IWWMP for DWS officials and the water users, as the various regional offices of DWS might have different interpretations regarding the content of an IWWMP;
- Standardisation of the format of the supporting documentation which the Department requires during submission of a WULA;
- Provision of guidance on the content of information required in an IWWMP as part of the water use authorisation process and level of detail that the Department requires to enable them to evaluate the supporting documentation to make a decision on authorisation water use; and
- Ensuring that a consistent approach is adopted by the Department and the various Regional Offices and CMA's with regards to IWWMPs.

It is the responsibility of the water user to demonstrate to the Department that the selected management measures in the IWWMP action plan adhere to the "SMART" concept i.e.:

S	M	A	R	T
•Sustainable	•Measurable	•Achievable	•Resources Allocated	•Timeframe Specific

It is a DWS requirement that a water user needs to compile an IWWMP for any one of the following purposes:

- As the supporting technical documentation for any WULA (the main purpose of this document in terms of the pending WULA);

- When converting Existing Lawful Use (ELU) to licensed water use;
- In order to comply with the conditions of an existing water use licence; and
- The implementation of the IWWMP is an interactive process whereas its performance is monitored on an annual basis. The assessment of the IWWMP document itself, as well as the submission of information relating to monitoring and auditing is conducted in terms of the requirements of DWS. It is important to update this document as it could lead to shortcomings. These must be addressed in the annual update of the action plan of the IWWMP. This will ensure that the concept of continual improvement is applied throughout the life cycle of the activity (Operational Guideline: IWWMP dated February 2010 and GNR 267, the Water Use Licence Application and Appeals Regulations, dated March 2017).

In line with the guidelines of the DWS Operational Guideline: Integrated Waste and Water Management Plan (2010) and GNR 267, Water Use Licence Application and Appeals Regulations (2017), Figure 2 and Table 4 provides a guide to the structure of the IWWMP. Headings and sub-headings within this IWWMP are in line with required table of contents as specified within Annexure D of GNR 267.

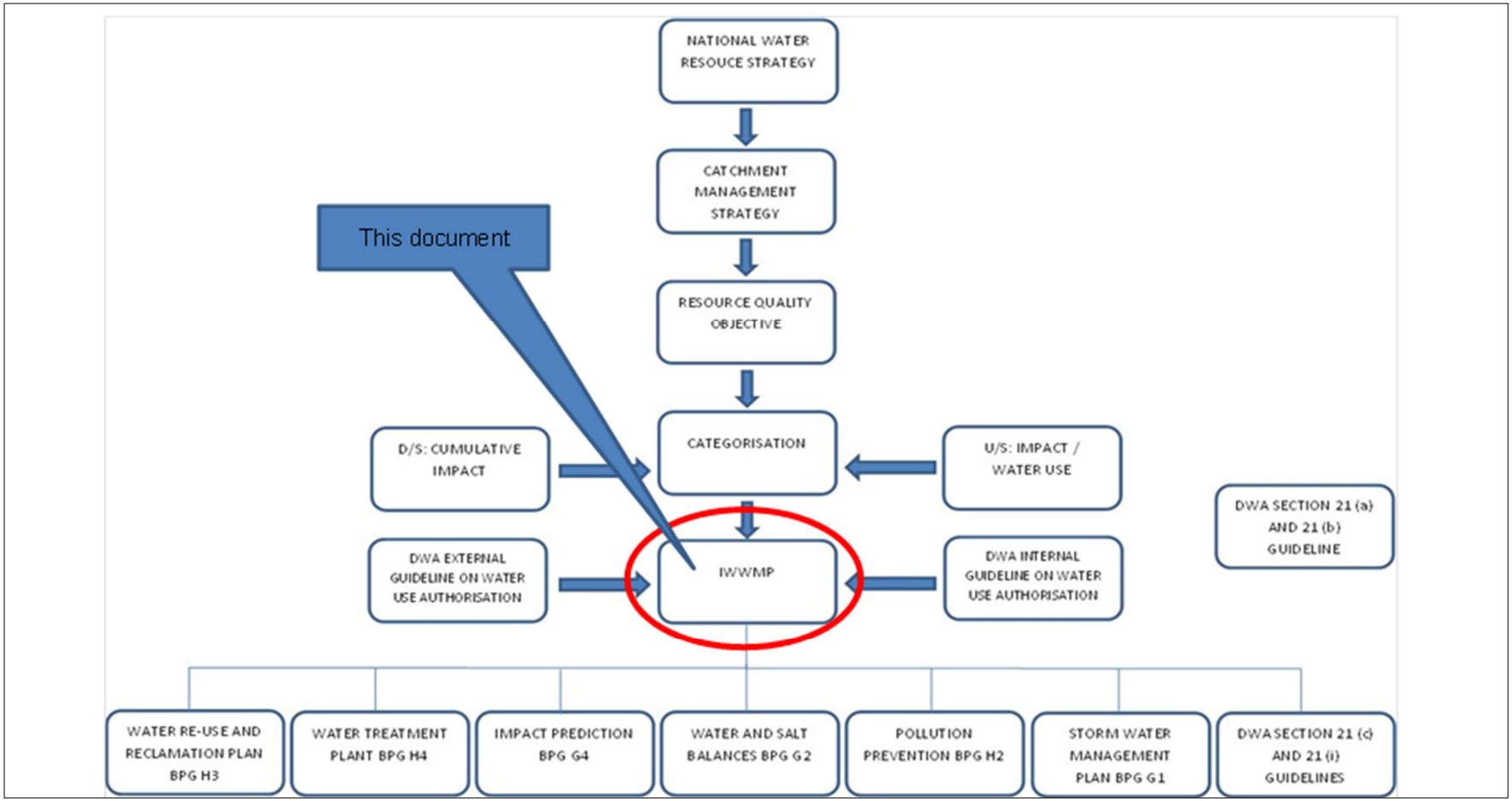


Figure 2: Schematic Layout of the IWWMP Approach

Table 4: Guide to the structure of the IWWMP

Guideline Item	Relevant IWWMP Section
Quantification of the Water Resource Problem	Section 4 and Section 5.
Are the existing water quality data adequate to identify contaminants of concern?	Yes, refer to Section 4 and Section 5.13.1, Section 5.13.2 and Section 5.13.3.
How well have the nature, extent and causes of the water management problems on site been identified?	Section 4.5.1, Section 4.5.2, Section 4.5.3 and Section 4.5.4.
To what extent has the analysis and characterization of the problems considered current thinking on water resource management?	Section 5.2, Section 5.2.5 and Section 5.17.
Are there any discernible trends?	Section 6.8.
Targets, Indicators and Monitoring	
Does the IWWMP define medium and long-term goals towards sustainable management of water resources?	Section 5.2 to Section 5.13
Does the IWWMP make provision for the establishment of indicators of progress and set annual and medium-term targets?	Section 6.3 and Section 6.4.
Are these indicators and targets appropriate and consistent with the policies and strategies considered for implementation of the IWWMP?	Section 6.2, 6.4 and Section 6.6
Are the proposed monitoring, review and evaluation as well as auditing systems adequate and sustainable?	Section 6.7, Section 5.13.1, Section 5.13.2 and Section 5.13.3
Priority Actions	
Does the IWWMP describe clear priorities for action, relevant to the goals and targets, feasibility in terms of achieving targets, their estimated costs, available resources, institutional capacities and effectiveness?	Section 6.1, Section 6.2, Section 6.3, Section 6.4 and Section 6.6.
Does the water management strategy have an adequate and credible financial provisioning plan to support the implementation of the IWWMP?	Section 6.2

1.5 PROPOSED LICENCE AMENDMENT

As previously indicated, Mooiplaats Colliery has an existing WUL (Ref # 08/C11B/AGJ/2141). Some of the water uses that have been licenced in this WUL require changes to be made due to administration corrections in terms of co-ordinates and farm portions. Further, several existing water uses require amendment in terms of their specific volumes. Some existing water uses which have not previously been licensed have also been included in this proposed amendment. Table 5 in Section 0 indicates all changes that need to be made to the existing licence.

2 CONTEXTUALISATION OF THE PROJECT

2.1 DESCRIPTION OF THE ACTIVITY

Mooiplaats Colliery removal of coal from underground or mining ceased on 31 December 2021, with only the coal washing plant being operational. Final engineer's audit or inspection was undertaken, wall was drilled, sealed and passing certificates were issued by OEM Civil Engineer in May 2023. Four (4) rescue boreholes were rehabilitated (opened 3m deep, capped with concrete slab topsoiled and grassed). The rehabilitation of the exploration boreholes (42) which were identified underground with the holes staked out and the shaft area in 2023 were reportedly completed in 2024. The mine ceased underground mining on 31 December 2021 and is currently making use of third-party miners receiving coal and washing at the plant. It is important to note that toll washing has ceased since June 2025. The mining area lies within the Ermelo Coalfield.

2.2 EXTENT OF ACTIVITY

The Mooiplaats Colliery lies within the Ermelo Coalfield, three coal seams occur in the area of interest. The upper A, C and Lower B coal seams are poorly developed and not economically viable to mine. The B Upper seam is sufficiently developed. The "B" seam varies in thickness from less than 1.2 metres in the south-eastern corner of the reserve, increasing to 2.4 metres to the north. A depression in the seam to a width of approximately 1.5 metres runs through the reserve from north to south. This was probably caused by the close proximity of a Dolerite Sill above the coal. Access to the underground workings were sealed off and there are no mining activities currently taking place within the mining right. As depicted in several of the maps presented in this document, Mooiplaats Colliery had previously intended to expand their underground mining operations to neighbouring properties to the South of the existing operations. This project has since not been followed through for various reasons. The mine is making use of third-party miners receiving coal and washing at the plant. This activity has also ceased since June 2025. The Life of Mine (LoM) is indicated in Figure 3.

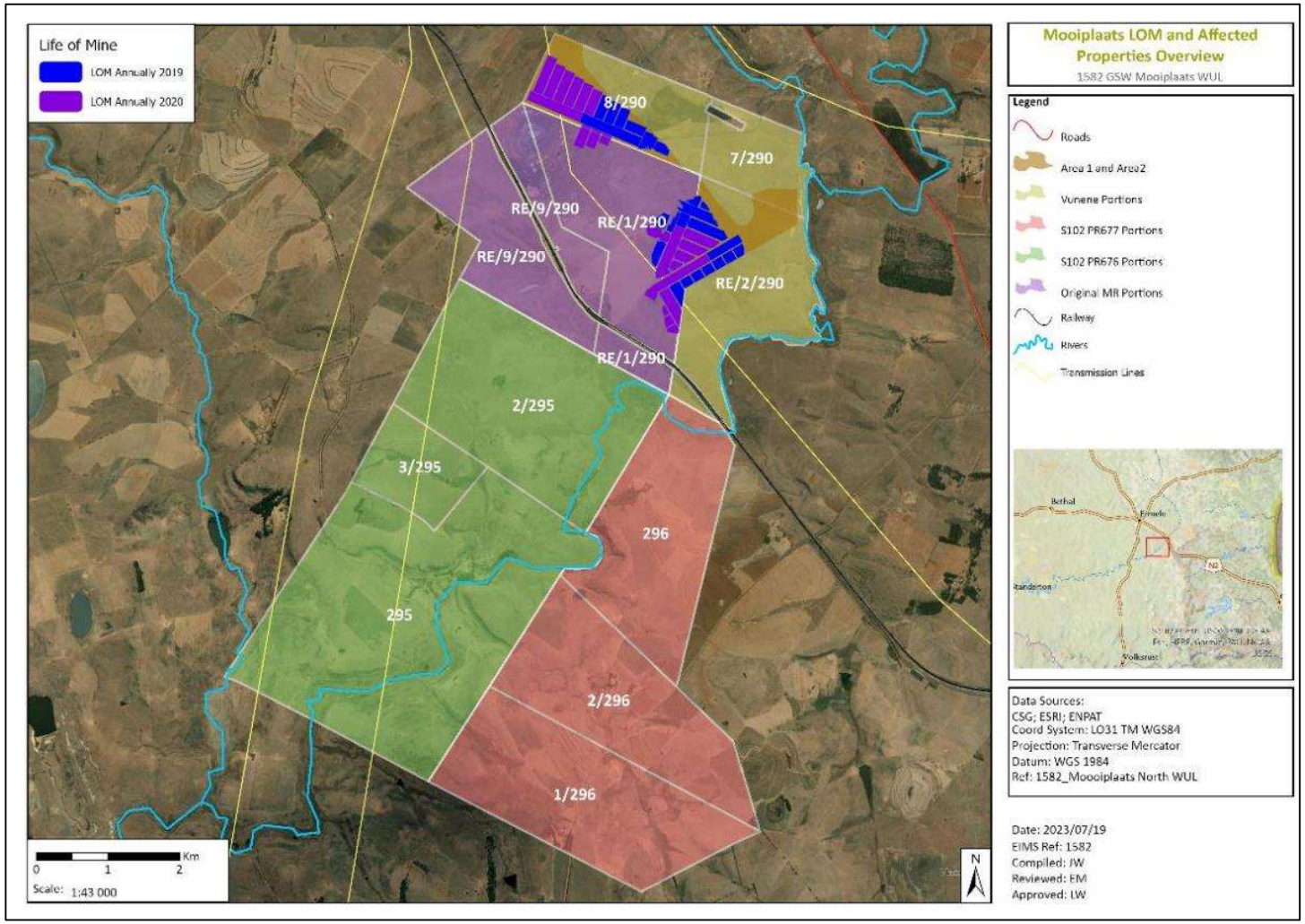


Figure 3: The Life of Mine for the Mooiplaats Colliery including the Mooiplaats Colliery Vunene Project area as well as the initial proposed Mooiplaats South Project which has not been followed through with.

2.3 KEY ACTIVITY RELATED PROCESSES AND PRODUCTS

Mooiplaats Colliery removal of coal from underground or mining ceased on 31 December 2021, with only the coal washing plant being operational. However, washing has ceased since June 2025. Final engineer's audit or inspection was undertaken, wall was drilled, sealed and passing certificates were issued by OEM Civil Engineer in May 2023. Five (5) rescue boreholes were rehabilitated (opened 3m deep, capped with concrete slab topsoiled and grassed). The rehabilitation of the exploration boreholes (42) which were identified underground with the holes staked out and the shaft area in 2023 were reportedly completed in 2024. The mining area lies within the Ermelo Coalfield.

2.4 ACTIVITY LIFE DESCRIPTION

The originally projected Life of Mine (LoM) for Mooiplaats Colliery was estimated at approximately twelve years (2023–2034), based on the availability of coal reserves in the southern portions of the mining right area. At present, no mining activities are taking place on site and all underground workings have been sealed off. However, further mining is envisaged in future.

2.5 ACTIVITY INFRASTRUCTURE DESCRIPTION

Surface infrastructure associated with the existing Mooiplaats Colliery includes the following:

- Upslope diversion berms;
- Mining area:
    - Sealed off accesses (five);
    - Diversion berms and channels;
    - Overburden and soil stockpiles;
    - Conveyors for coal transports within plant only (no underground conveyors);
    - Three settling dams;
    - Erikson dams/tanks;
- Office and admin area:
    - Potable water tank;
    - Change house;
    - Sewage treatment plant;
    - Sump to collect run-off from office area fitted with a pump;
    - Office and administrative buildings;
    - Workshop;
    - Washbay;

- Scrapyard;
- Substation;
- Generators;
- Diesel storage;
- Powerlines;
- Parkade;
- Stores;
- First aid room;
- Lamp room;

- Plant area:
  - Workshop;
  - Laboratory;
  - Processing plant and control room;
  - Coal stockpiling area;
  - Conveyors;
  - Substation;
  - Power lines; and
  - Erikson dams/tanks.
- Mine residue:
  - Co-disposal facility;
  - Return water dams;
- General:
  - Clean water storage tanks;
  - Pollution control dams;
  - Access road and secured access control;
  - Weighbridge and haul roads;
  - Flow meters; and
  - Boreholes.

Figure 4 below indicates the infrastructure on the original Mooiplaats Colliery section, and Figure 5 indicates the infrastructure in relation to affected properties and key adjacent properties as well as infrastructure relationships with wetland areas.

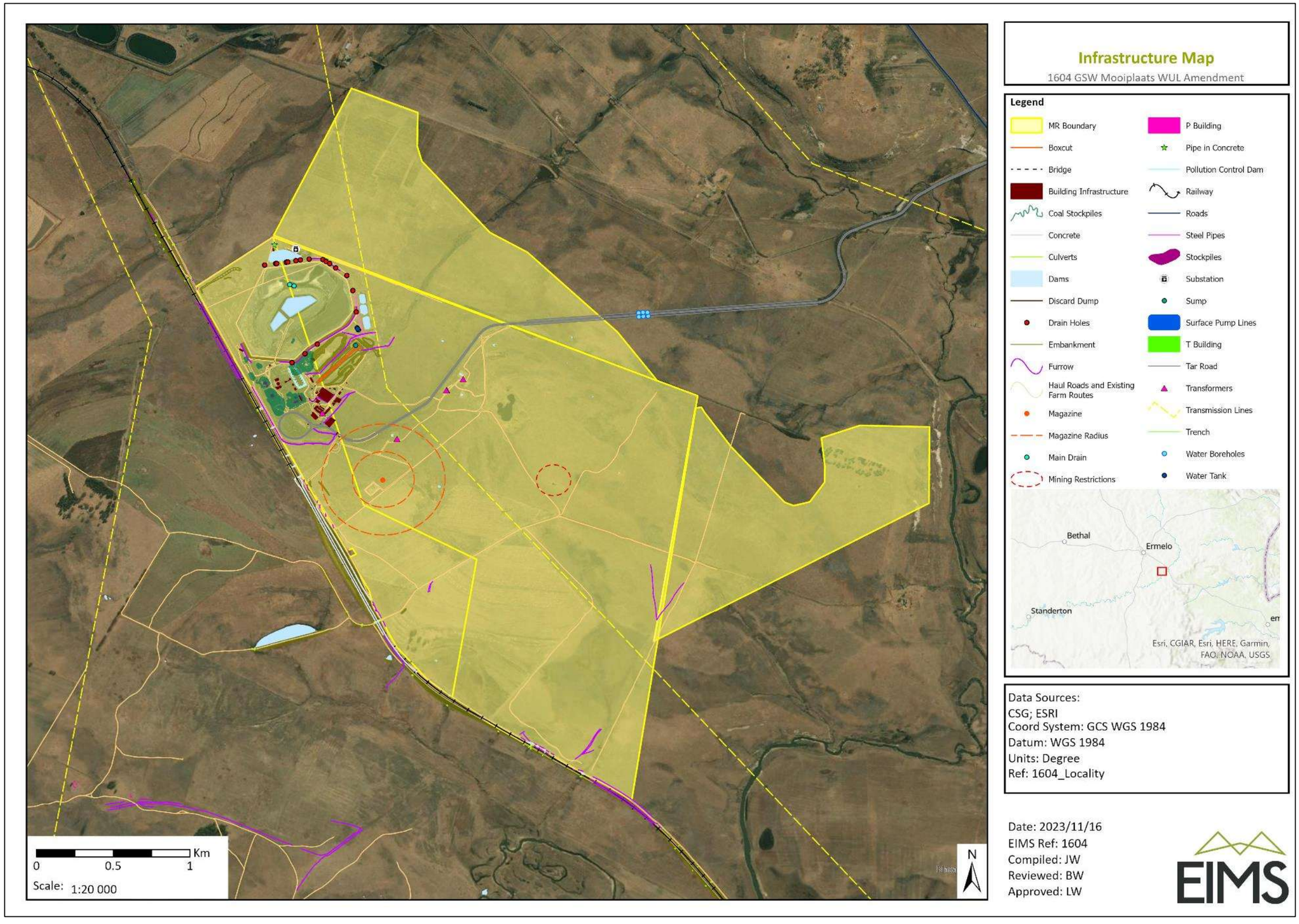
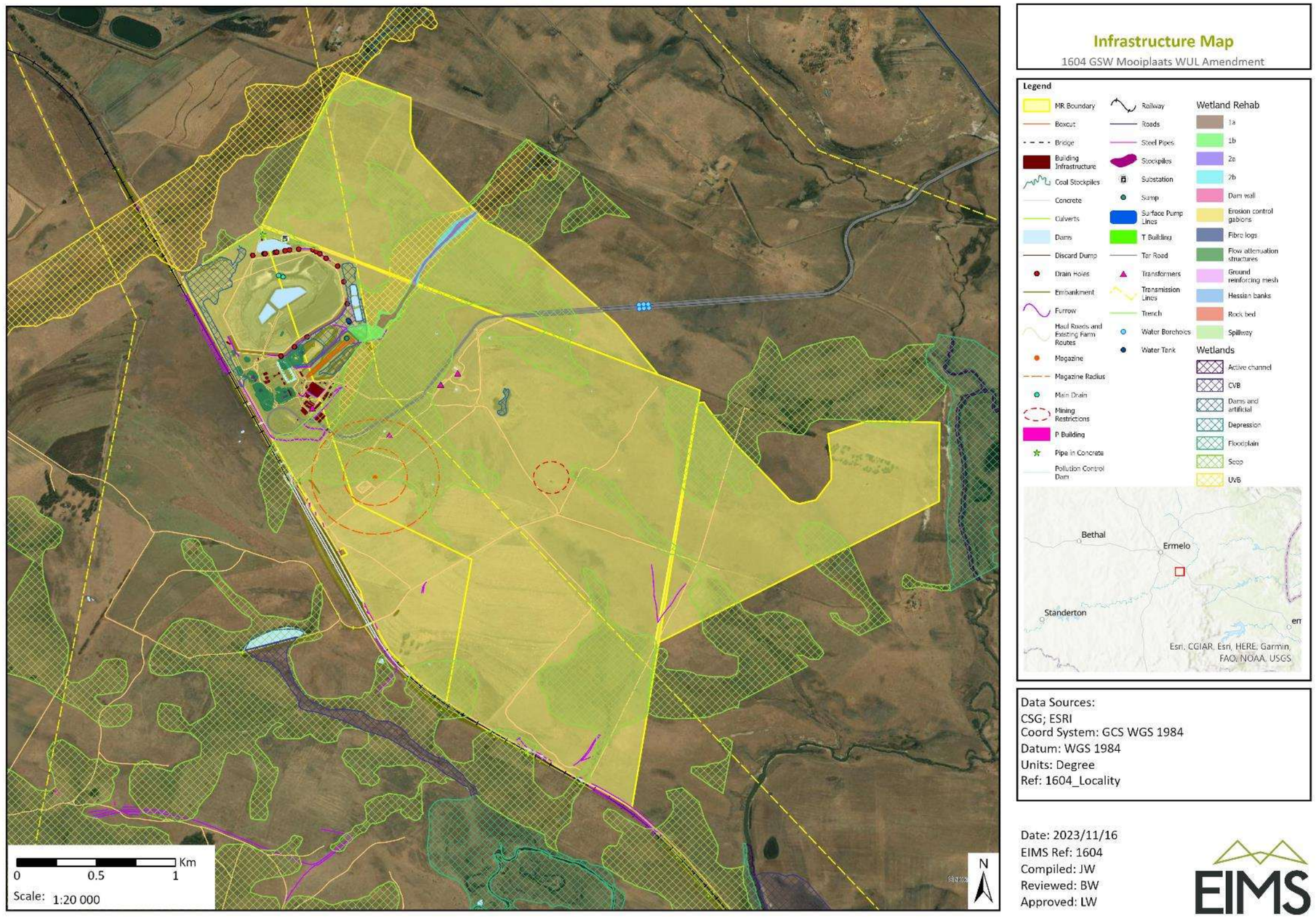


Figure 4: Existing infrastructure layout at the Mooiplaats Colliery



Data Sources:
CSG; ESRI
Coord System: GCS WGS 1984
Datum: WGS 1984
Units: Degree
Ref: 1604_Locality

Date: 2023/11/16
EIMS Ref: 1604
Compiled: JW
Reviewed: BW
Approved: LW

EIMS

Figure 5: Mine and infrastructure layout of the Mooiplaats Colliery in relation to affected properties and wetlands.

2.5.1 MINERAL DEPOSIT

The mining area lies within the Ermelo Coalfield Three coal seams occur on the target properties and can be identified from top to bottom as A, B and C respectively. The A and C seams are poorly developed with an average width of less than 40cm and have been excluded as viable entities for the purposes of this project. Only the B Upper seam is sufficiently developed to form a viable economic entity and because of the depth of this reserve (>100m below surface). It should be noted that all underground mining activities have been stopped and the associated shafts have now been closed.

2.5.2 MINE PRODUCTS

The following is an overview of the design of the mine at the time of operation in terms of underground mining and coal production:

> *"The design allows for the processing of 220 000 tons per month nominal feed through the DMS plant and with a yield of 65% will result in 143 000 tons per month of washed product. The bituminous or lean coal crusher has capacity to crush 220 000 tons per month which provides flexibility to Mooiplaats Colliery to ensure there is sufficient stockpile capacity of the bituminous / lean coal. The Run of Mine (RoM) production will be approximately 190 000 tons per month, with infrastructure design allowing for extraction at any given time of either anthracite or bituminous coal."*

It must be noted that coal mining at the facility has now been stopped, and the underground workings associated with the facility have been closed.

2.5.3 ACCESS TO THE WORKINGS

Access to the underground workings has since been sealed off, and currently the mine is making use of third-party miners receiving coal and washing at the plant. Importantly, this activity has ceased since June 2025. All five accesses (adits) to the underground workings situated near the northern boundary of the Mooiplaats property are sealed off the shaft area was sealed off in 2023 and is being rehabilitated.

2.5.4 THE MINERAL PROCESSING PLANT

RoM coal from the stockpile is reclaimed at a controlled rate by a combination of two vibrating feeders onto a 1200 mm reclaim conveyor belt feeding a 48" x 36" Shumar double roll primary crusher. This conveyor is fitted with a two weigh-idler electro-mechanical belt scale and an electro-magnet for tramp removal. The crusher discharge is then fed onto a 1050 mm conveyor feeding a 2.4 x 4.8 m inclined vibrating scalping screen fitted with a 50 mm aperture polyurethane screen panel deck. The +50 mm oversize discharges onto a 750 mm conveyor feeding the 36" x 30" Shumar double roll secondary crusher while the –50 mm discharge from the screen joins the secondary crusher sized coal on a 900 mm conveyor belt feeding the plant surge bin. The surge bin has a live capacity of 200 tons with a tilt switch probe on the surge bin feed conveyor to prevent over-filling of the bin. The capacity of the RoM section from feeders to surge bin is 400 tons per hour.

2.5.4.1 PRIMARY WASHING

Raw coal is reclaimed from the Surge bin at a controlled rate of up to 200 tons per hour per module by a single vibrating feeder feeding a 750mm wide conveyor belt duplicated for Module A and B. The nominal combined capacity between the two feeders is 400 tons per hour with both modules operational as the rewash feed capacity

is limited. The two modular feed conveyors discharges onto a Vibramech 2.44 x 5.6 m desliming screen fitted with a 0.8 mm Wedge wire Sieve bend on the incline to the screen and 0.8 mm polyurethane de-sliming panels installed on the screen deck. Each modular feed conveyor belt is equipped with a Process Automation EMB220/750/ACC.4 four weigh-idler electro-mechanical belt scales for accounting purposes and an automatic sampler on Module A feed conveyor only. The 50 x 0.8 mm deslimed raw coal is discharged into a mixing tube, where magnetite medium of a pre-determined density is added from where it is pumped by a Weir-Warman 10/8 pump to a 800 mm diameter Multotec dense medium washing cyclone, where the primary separation occurs.

Both the cyclone overflow (product) and underflow (rewash feed) are discharged onto a Vibramech 2.44 x 5.6 m drain and rinse split screen with a ratio of 1.5 m width for primary product and 0.9 m for the cyclone underflow refuse where with the use of sprays magnetite is washed and recovered. The screen utilizes 0.63 mm polyurethane screen panels throughout the deck except for the second and third last row on the primary product side where 20 mm square aperture polyurethane panels are installed to separate coarse and fine material. The fine primary product discharges onto a separate 750 mm wide Centrifuge feed conveyor feeding to a Malvern VM1300 vibrating centrifuge to remove excess moisture transferring to the 900 mm wide Primary product stack-out conveyor. The coarse primary product discharges onto a 750 mm wide Primary product conveyor which transfers the material also onto the primary product stack-out conveyor.

The desliming screen –0.8 mm fine material gravitates to the underpan of the desliming screen where it is pumped by a Weir-Warman 6/6 pump to a cluster of four Multotec 350 mm polyurethane classifying cyclones. The cyclones separate with water according to material size with the –0.2 mm material overflowing to the high capacity 13-meter diameter thickener. Flocculants is added from a mixing / curing / distribution system to aid the settling of the fine coal at the bottom of the thickener where it gravitates into a buffer tank. Dilution water is added from the adjacent clarified water (recovered from the thickener overflow to re-use as process water) and the slurry mixture pumped approximately 1 km to a co-disposal pond by a Weir-Warman 4/3 pump.

The 0.8 x 0.2 mm material discharging for the classifying cyclone underflow feeds two banks (one bank per module) of four Multotec MX7 triple start spiral concentrators where through centrifugal force less dense product gravitates towards the outside of the spiral and refuse towards the inner channel with product and discard discharging into a spiral product and discard tanks respectively. The spiral product and discard tanks each pump to a cluster of two Multotec 350 mm polyurethane classifying cyclones to aid in dewatering by Weir-Warman 6/4 pumps ultimately gravitating to a 1.2 x 2.7 meter spiral product and spiral discard dewatering screens fitted with 0.3 mm slotted aperture polyurethane screen panels. The discharge from the spiral product dewatering screen falls onto the Primary product conveyor combining with the coarse primary product that discharged from the drain and rinse screen. The spiral discard dewatering screen discharges onto a 750 mm final discard conveyor with a capacity of 100 tons per hour.

Both the product conveyor belt and the common discard conveyor belts are equipped with Process Automation EMB220/750/ECO.2 two weigh-idler belt scales and Multotec hammer-type automatic samplers.

2.5.4.2 MIDDLINGS WASHING

Primary discard is discharged from the Primary drain and rinse screen onto a 750 mm Rewash Feed conveyor equipped with a EMB220/750/ECO.2 two weigh-idler belt scale. The material discharges into a mixing box where magnetite at a pre-determined density is added and the mixture pumped into by a Weir-Warman 8/6 pump into a Multotec 660 mm dense medium cyclone. Both the cyclone overflow (product) and underflow (discard) discharges

firstly onto static sieve bends with an aperture of 0.8 mm to a 1.8 x 4.8 m Vibramech split deck drain and rinse screen with apertures of 0.63 mm utilising polyurethane screen panels in order to recover magnetite. Secondary product discharges onto a 750 mm Eskom Product stack-out conveyor while the final discard is conveyed by the common discard conveyor to a 100-ton capacity discard bin. Tipper trucks are utilised to truck the final discard to the co-disposal dump where levelling and compacting is done.

Only the common discard conveyor belts exist which are equipped with Process Automation EMB220/750/ECO.2 two weigh-idler belt scales and Multotec hammer-type automatic samplers.

2.5.5 TRANSPORT

The mine currently loads and hauls product (washed coal) with road trucks to the Anthra siding located close to Piet Retief where a third party is responsible for material handling, shunting and loading of trains. Currently only Jumbo wagons with a capacity of 83 tons per truck and 100 wagons per train are loaded at the siding. The Inland market can also be catered for in the form of small nuts or peas where a mobile screen is utilized to separate the various size fractions. At the time when coal was being mined or produced from the underground workings, a portion of the coal product is delivered to Camden Power Station. All products leaving the mine are trucked and weighed at a static weigh bridge on site.

2.5.6 ESTIMATED COAL RESERVES

It is anticipated that the total coal reserve will be 12 853 796 tons based on LoM schedule 2019 to 2034.

As of 2024, Mooiplaats no longer does underground mining. However, the facility does participate in toll washing addressing produced third-party coal. It is important to note that toll washing has ceased since June 2025.

2.5.7 PLANNED LIFE OF MINE

The originally projected Life of Mine (LoM) for Mooiplaats Colliery was estimated at approximately twelve years (2023–2034), based on the availability of coal reserves in the southern portions of the mining right area. All underground workings have been sealed and rehabilitated, and the operation has transitioned exclusively to processing third-party coal through the existing wash plant, an activity which itself ceased in June 2025. Given these constraints, Mooiplaats no longer maintains an active mining LoM trajectory, and future operational planning is now focused solely on maintaining compliance, managing water and waste infrastructure, and supporting the long-term rehabilitation and closure objectives of the site. Refer to Section 2.4 relating to the Life of Mine. No underground mining activities are currently taking place due to not being economically viable at the present moment.

2.5.8 KEY WATER USES

Mooiplaats Colliery has an existing WUL (Licence No: 08/C11B/AGJ/2141) issued on 5 May 2013 for the following water uses:

- Section 21(a) Taking water from a water resource;
- Section 21(g) Disposing of waste or water containing waste in a manner that may detrimentally impact on a water resource;

- Section 21(j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.

This IWWMP addresses the existing water uses as well as the new water uses. Mooiplaats submitted an application for the additional water uses and amendments to the existing licence in 2020. In August 2022 the DWS requested additional information on the application which the applicant was not able to provide and the application was subsequently withdrawn. A new WUL amendment application was commenced in 2023 to include new and existing water uses. This application is in Phase 3 as of March 2026.

Water Uses for the Mooiplaats Colliery, including the existing water uses licenced in terms of IWUL Licence no.: 08/C11B/AGJ/2141 and changes required to be made to the existing IWUL are presented in Table 5.

Table 5: Water uses that form part of the Mooiplaats Colliery and changes that need to be made to the existing approved water uses.

Water Use	Name	Purpose	Quantity/capacity/ volume	Co-ordinates	Property	Title Deed	Changes required to IWUL Licence no.: 08/C11B/AGJ/2141
S 21(a) (Existing)	Usutu Borehole 1	Process water	87 500 m3/a	26°38'28.5"S 30°07'00.1"E	Portion 8 of Mooiplaats 290IT	T2301/2008	Usutu Boreholes have a total abstraction volume of 350 000 m3/a When doing the eWULAAS, each borehole will be registered with the volume of 87 500 m3/a which equates to a quarter of the total volume to be abstracted per annum.
S 21(a) (Existing)	Usutu Borehole 2	Process water	87 500 m3/a	26°38'28.5"S 30°07'01.0"E	Portion 8 of Mooiplaats 290IT	T2301/2008	
S 21(a) (Existing)	Usutu Borehole 3	Process water	87 500 m3/a	26°38'29.4"S 30°06'59.1"E	Portion 8 of Mooiplaats 290IT	T2301/2008	
S 21(a) (Existing)	Usutu Borehole 4	Process water	87 500 m3/a	26°38'29.4"S 30°07'00.1"E	Portion 8 of Mooiplaats 290IT	T2301/2008	
S 21 (a) (Existing)	Potable Water Borehole	Potable water	10 000 m3/a	26°38'51.64"S 30°6'44.10"E	Portion 1 of Mooiplaats 290IT	T13234/79	Currently used potable water borehole. Application for increasing volume to 10 000 m3/a.
S 21 (c) and 21 (i) (New)	Pipeline from Usutu Boreholes to Settling Dam 1	Aboveground pipeline to transfer water from Usutu Boreholes to Settling Dam 1	586m of pipeline crossing delineated watercourse/wetland	Watercourse Crossing start and end coordinates: Start: 26°38'30.90"S; 30° 6'29.72"E End: 26°38'23.79"S; 30° 6'10.16"E	Portion 1 of Mooiplaats 290IT	T13234/79	New water uses to add based on DWS advice during site meeting.
S 21 (c) and 21 (i) (New)	Pipeline from Potable Water Borehole to Office Complex	Aboveground pipeline to transfer water from Potable Water Borehole to Office Complex	853m of pipeline crossing delineated watercourse/wetland	Watercourse Crossing start and end coordinates: Start: 26°38'39.93"S 30° 6'21.42"E	Portion 1 of Mooiplaats 290IT	T13234/79	New water uses to add based on DWS advice during site meeting.

Water Use	Name	Purpose	Quantity/capacity/ volume	Co-ordinates	Property	Title Deed	Changes required to IWUL Licence no.: 08/C11B/AGJ/2141
				End: 26°38'49.49"S 30° 5'55.05"E			
S 21 (c) and 21 (i) (New)	Pedestrian Bridge	Pedestrian Bridge over water channel at car parking area	15m long bridge crossing channel	Watercourse Crossing start and end coordinates: Start: 26°38'50.94"S 30° 5'54.91"E End: 26°38'50.70"S 30° 5'54.53"E	Portion 1 of Mooiplaats 290IT	T13234/79	New water uses to add based on DWS advice during site meeting.
S 21 (c) and 21 (i) (New)	Underground mining	Undermining of wetlands	-	Start: 26°38'2.87"S 30° 5'50.14"E End: 26°38'37.11"S 30° 6'55.61"E	Portion 8 of Mooiplaats 290IT	T2301/2008	-
S 21 (c) and 21 (i) (New)	Middling's Stockpile	Middling's stockpile located within 500m of wetlands.	-	26°38'37.10"S 30°5'35.8"E	Portion 9 of Mooiplaats 290IT	T33424/2004	-
S 21 (c) and 21 (i) (New)	Underground mining	Undermining of wetlands	-	Start: 26°39'28.00"S 30° 6'47.14"E End: 26°39'7.54"S 30° 7'20.57"E	Portion 1 of Mooiplaats 290IT and Re of Portion 2 of Mooiplaats 290IT	T13234/79 T84901/2002	-
S 21 (c) and 21 (i) (New)	General Mining Infrastructure (GMI)	Mining infrastructure located within 500m of wetlands.	Give height width and length of infrastructure	26°38'45.719"S 30° 5'53.819"E	Portion 1 and 9 of Mooiplaats 290IT	T33424/2004	-

Water Use	Name	Purpose	Quantity/capacity/ volume	Co-ordinates	Property	Title Deed	Changes required to IWUL Licence no.: 08/C11B/AGJ/2141
S 21 (c) and 21 (i) (New)	Waste Water Treatment Plant	WWTP located within 500m of wetlands.	-	26°38'47.609"S 30°5'55.849"E	Portion 1 of Mooiplaats 290IT	T33424/200	
S 21 (c) and 21 (i) (New)	Pollution Control Dam	PCD located within 500m of wetlands	-	26°38'41.838"S 30°5'48.217"E	Portion 9 of Mooiplaats 290 IT	T33424/2004	
S 21 (c) and 21 (i) (New)	Co-disposal facility	Disposal of discard	Height width and length	26°38'35.123"S 30°5'47.397"E	Re of Portion 9 and Re of Portion 1 of Mooiplaats 290IT	T13234/71	-
S 21 (c) and 21 (i) (New)	Settling Dam 1	Collects water from PCD and shaft water, sewage effluent and water from boreholes (dry periods only)	459 030 m3/a	26°38'24.94"S 30° 6'1.35"E	Portion 1 of Mooiplaats 290IT	T13234/79	
S 21 (c) and 21 (i) (New)	Settling Dam 2	Stores water from Settling Dam 1	452 145 m3/a	26°38'29.992"S 30°6'3.589"E	Portion 1 of Mooiplaats 290IT	T13234/79	-
S 21 (c) and 21 (i) (New)	Settling Dam 3	Water collected from Settling Dam 2	402 112 m3/a	26°38'30.0"S 30°06'02.1"E	Portion 1 of Mooiplaats 290IT	T13234/79	-
S 21 (c) and 21 (i) (New)	RoM Stockpile 1	Coal from mining before processing	299 500 tons	26°38'40.287"S 30°5'48.859"E	Portion 9 of Mooiplaats 290IT	T13234/79	-
S 21 (c) and 21 (i) (New)	RoM Stockpile 2	Coal from mining before processing	793 761 tons	26°38'40.10"S 30° 5'46.70"E	Portion 9 of Mooiplaats 290IT	T13234/79	

Water Use	Name	Purpose	Quantity/capacity/ volume	Co-ordinates	Property	Title Deed	Changes required to IWUL Licence no.: 08/C11B/AGJ/2141
S 21 (c) and 21 (i) (New)	Plant Erickson Dam	Receives water from Settling Dam 3	1 000 000 m3/a	26°38'44.3"S 30°05'44.3"E	Portion 9 of Mooiplaats 290IT	T13234/79	Volume of Plant Erickson Dam adjusted to 1 000 000 m3/a
S 21 (c) and 21 (i) (New)	Office Complex	Administrative offices	-	26°38'45.73"S 30° 5'53.82"E	Portion 9 of Mooiplaats 290IT	T13234/79	-
S 21 (c) and 21 (i) (New)	Conveyor belt	Conveying of coal	-	Start: 26°38'36.32"S 30° 6'0.53"E End: 26°38'46.56"S 30° 5'48.68"E	Portion 1 and Portion 9 of Mooiplaats 290IT	T13234/79	-
Section 21 (g) (New)	Dust suppression	Dust Suppression water piped from Underground Erickson dams to gooseneck	21 900 m3/a	Gooseneck coords 26°38'43.962"S 30°5'53.38"E			
S 21 (g) (Existing)	North Shaft Settling Dam 1	Collects water from PCD and shaft water, sewage effluent and water from boreholes (dry periods only)	459 030 m3/a Capacity 13 320 m3	26°38'28.669"S 30°6'2.226"E	Portion 1 of Mooiplaats 290IT	T13234/79	Existing water use to be included in new WUL.
S 21 (g) (Existing)	North Shaft Settling Dam 2	Stores water from Settling Dam 1	452 145 m3/a Capacity 13 500m2	26°38'29.992 "S 30°6'3.589"E	Portion 1 of Mooiplaats 290IT	T13234/79	Existing water use to be included in new WUL.
S 21 (g) (Existing)	North Shaft Settling Dam 3	Water collected from Settling Dam 2	402 112 m3/a Capacity 20 160 m3	26°38'30.0"S 30°06'02.1"E	Portion 1 of Mooiplaats 290IT	T13234/79	Existing water use to be included in new WUL.
S 21 (g) (Existing)	North Shaft Return Water Dam	Collects water from co-disposal facility	320 645 m3/a Capacity 17 438 m3	26°38'15.6"S 30°05'42.9"E	Portion 1 of Mooiplaats 290IT	T13234/79	Existing water use to be included in new WUL.
S 21 (g) (Existing)	Plant Erickson Dam 1	Receives water from Settling Dam	1 000 000 m3/a Capacity 500m3	26°38'44.45"S 30° 5'44.07"E	Portion 9 of Mooiplaats 290IT	T13234/79	Changed to 1 000 000 m3/a

Water Use	Name	Purpose	Quantity/capacity/ volume	Co-ordinates	Property	Title Deed	Changes required to IWUL Licence no.: 08/C11B/AGJ/2141
		3 for use in washplant					
S 21 (g) (New)	Plant Erickson Dam 2	Receives water from Settling Dam 3 for use in washplant	1 000 000 m3/a Capacity 500m3	26°38'44.22"S 30° 5'44.57"E	Portion 9 of Mooiplaats 290IT	T13234/79	Changed to 1 000 000 m3/a
S 21 (g) (Existing)	Pollution Control Dam	Collects dirty water run-off	111 870 m3/a Capacity 23 000 m3	26°38'41.856"S 30°5'48.214"E	Portion 9 of Mooiplaats 290IT	T13234/79	Existing water use to be included in new WUL.
S 21 (g) (New)	Genset Dam	Collects dirty water run-off from the contractor yard and office area	30m x 10m x 2m deep = 600 m3	26°38'46.48"S 30° 5'55.55"E	Portion 1 of Mooiplaats 290IT	T13234/79	Water pumped to settling Dam 1
S 21 (g) (Existing)	Co-disposal facility (North Shaft)	Slurry and discards	325 133 m3	26°38'35.123"S 30°5'47.397"E	Portion 9 of Mooiplaats 290IT	T13234/79	Existing water use to be included in new WUL.
S 21 (g) (Existing)	Middling's Stockpile	Coal Stockpile	282 000 tons	26°38'37.10"S 30° 5'35.80"E	Portion 9 of Mooiplaats 290IT	T13234/79	Existing water use to be included in new WUL.
S 21 (g) (Existing)	Primary Stockpile	Coal product from coal washing plant	760 000 tons	26°38'46.16"S 30° 5'42.61"E	Portion 9 of Mooiplaats 290IT	T13234/79	Existing water use to be included in new WUL.
S 21 (g) (Existing)	RoM 01 Stockpile	Coal from mining before processing	299 500 tons	26°38'46.86"S 30° 5'48.64"E	Portion 9 of Mooiplaats 290IT	T13234/79	Existing water use to be included in new WUL.
S 21 (g) (Existing)	RoM 02 Stockpile	Coal from mining before processing	793 761 tons	26°38'46.90"S 30° 5'48.39"E	Portion 9 of Mooiplaats 290IT	T13234/79	Existing water use to be included in new WUL.

2.5.9 KEY WASTE STREAMS

The key waste streams that have been and are expected to be generated on the site (to an extent limited to current activities) are as follows:

- Solid waste:
- Waste rock dump - related to previous mining activities;
- Industrial waste;
- Domestic waste;
- Liquid effluent;
- Dirty water and stormwater in Pollution Control Dams, settlement dams and Genset Dam;
- Sewage; and
- Hazardous waste including hydrocarbons.

2.5.9.1 WASTE ROCK DUMP

Overburden rock from the development of the box cut and decline shaft, are stockpiled on the waste rock dump located upslope of the box cut. A sacrificial layer is compacted beneath the waste rock dump to prevent the ingress of water into the groundwater regime.

2.5.9.2 GENERAL, INDUSTRIAL AND DOMESTIC WASTE

A central waste collection area is demarcated at the plant area. The waste collection area is situated on an impermeable layer, within the dirty water area. Waste skip bins of different colours are provided for the different waste streams generated. The small quantities of general industrial (approximately 5 tons per month) and domestic waste (approximately 1 ton per month) generated at Mooiplaats Colliery, are disposed of at an approved industrial waste site. A registered contractor is used to transport and dispose of the waste. A waste contractor is utilised for the collection of general waste and is disposed of at a nearby general, licensed landfill site. A recycling station is set up at the Mooiplaats Colliery for the recycling of scrap metal, glass, paper, cans and used lubricants. Contractors specialising in the recycling of these materials are utilised for the recycling of the materials. Waste training is provided to employees in order to ensure that correct waste separation and recycling is conducted at source. An inventory is kept of all waste types and volumes generated and disposed of or recycled.

2.6 ORGANISATIONAL STRUCTURE OF ACTIVITY

The organisational structure of for the Mooiplaats Colliery is indicated in Figure 6.

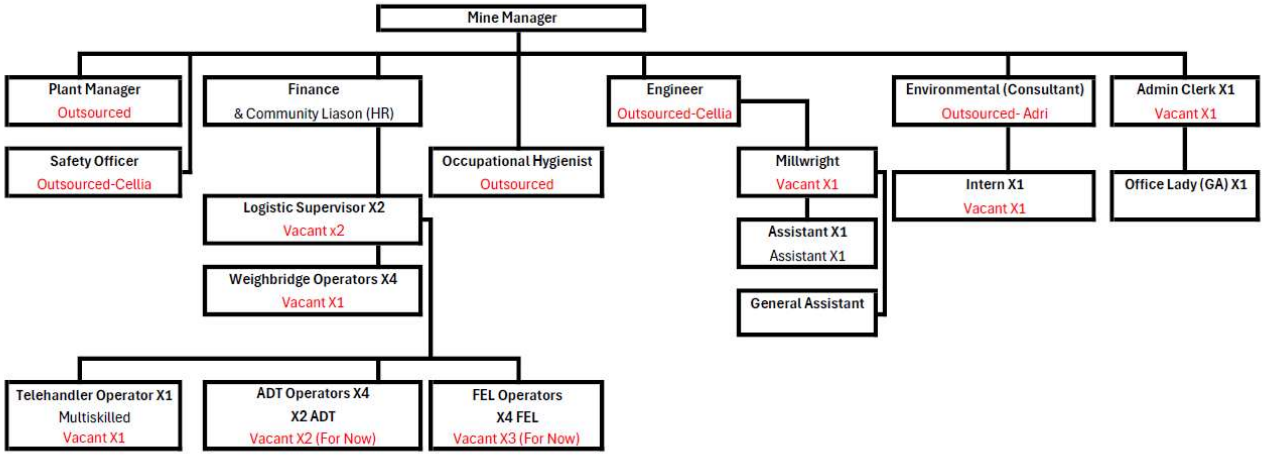


Figure 6: Organogram for the Mooiplaats Colliery

2.7 BUSINESS AND CORPORATE POLICIES

Mooiplaats Colliery is committed to the health and safety of its employees and the environment in which it operates. Mine Management will ensure that all health and safety regulations as contained in the Mine Health and Safety Act (Act No. 29 of 1996) (MHSA) are complied with to ensure a safe working environment for all employees. All on site legal appointments of Mooiplaats Colliery personnel will be according to the MHSA, as well as safety representatives as required by the MHSA. All safety equipment, including personal protective equipment is provided by the mine to all employees. Mine management are also responsible to ensure that emergency procedures are in place, updated on a regular basis and complied with.

The target areas for health, safety and the environment include:

- Health and safety:
  - Zero fatalities;
  - Zero lost time injuries; and
  - Management of the health and safety management system.
- Environment:
  - Zero significant impacts;
  - Minimising water consumption;
  - Minimising pollutants in effluents;
  - Minimising waste; and
  - Recycling/re-using waste where possible.

The safety and health objectives of the management system are to:

- Have an injury free working environment combined with zero tolerance for non-compliance or unsafe behaviour; Minimise major occupational risk in the work environment in order to eliminate occupational illness and disability; and
- Maintaining high safety standards in respect of the entire mine.

The Environmental objectives involve ensuring the sustainable exploitation of natural resources through dedicated programmes that focus on water resource, air quality and biodiversity management. Different environmental aspects were identified in the EMPR and objectives were set for each of the following environmental components:

- Geology;
- Climate;
- Topography;
- Soils;
- Flora and Fauna;
- Surface water;

- Groundwater;
- Wetlands;
- River crossings;
- Air quality;
- Noise;
- Vibration and blasting; and
- Archaeological and cultural sites.

There are a number of key performance areas identified for Mooiplaats Colliery in the different disciplines, which are depicted below:

- Marketing:
  - Product portfolio management;
  - Pricing strategy;
  - Production strategy;
  - Sales and distribution strategy;
  - Distribution;
  - Strategic outsourcing;
  - Information technology; and
  - Marketing forecast.
- Environmental Management:
  - Key issues management;
  - Regulatory authorisations;
  - Community involvement; and
  - Other interested and affected parties.
- Human Resources:
  - Talent management and development;
  - Organisational architecture;
  - Employment equity; and
  - Training and competency.
- Technical Support:
  - Safety and health regulatory requirements;

- Mining operational effectiveness;
- Planned maintenance programmes;
- Machinery and equipment optimisation;
- Equipment utilisation;
- Effective cost control; and
- Asset management.

- Information Systems:
  - Support of core and support strategies;
  - Outsourcing and project delivery; and
  - Integrated information systems.
- Finance Support:
  - Commercial competence;
  - Core business strategy support;
  - Corporate governance; and
  - Finance efficiency.
- Planning:
  - Production and mine planning;
  - Production scheduling, geological reserves control;
  - Production forecasting; and
  - Capacity planning and leverage

3 REGULATORY WATER AND WASTE MANAGEMENT FRAMEWORK

The Mooiplaats Colliery has been in existence for several years and as such a number of licenses and authorisations are held by the mine. The following rights, licenses, authorisations and approvals are currently in place and have been considered in the compilation of this report:

Table 6: Existing rights, licenses and authorisations for Mooiplaats Coal Mine.

Type	Competent authority	Reference #	Property	Description
Environmental Authorisation	Mpumalanga Department of Agriculture and Land Administration	17/2/1/15 MP-29	Ptn 1 290IT	Helicopter landing pad
	Mpumalanga Department of Economic Development, Environment and Tourism.	17/2/4/G(GS)-36	Ptn 1 and 9, 290IT	Coal Stockpiles (GNR544m activity 2, and 11x)
	Mpumalanga Department of Economic Development, Environment and Tourism.	17/2/4/G(GS)-36	Ptn 1 and 9, 290IT	Office and admin buildings, PCD and sewage treatment plants, roads. - GNR544 activity 11x, 11iii, 12, 18 and - GNR545 activity 5) - GNR 546 activity 4iicc
	Mpumalanga Department of Economic Development, Environment and Tourism.	17/2/3/GS-58	Ptn 1 and 9, 290IT	Construction of PCD and stormwater management facilities.

Type	Competent authority	Reference #	Property	Description
Water Use Licence	Department of Water Affairs	08/C11B/AGJ/2141	Ptn 1, 2, and 9 290IT	Abstraction from boreholes, dirty water dams, dust suppression, co-disposal facility, dewatering of shaft.
Approved EMPR	Department of Mineral Resources	MP30/5/1/2/3/2/1 (68) EM	Ptn 1 and 9, 290IT	Approval of Mine EMPR (2012)

3.1 SUMMARY OF WATER USES

A detailed list of the current and proposed water uses is included in Section 2.6 Table 5. A summary of the water uses covered by this IWWMP is as follows:

- Section 21(a) – abstraction of water from boreholes;
- Section 21(b) – storage of water;
- Section 21(c&i) – impeding or diverting or altering the beds, banks, course or characteristics of a watercourse;
- Section 21(g) – disposal of waste or water containing waste (stockpiles / PCD's); and
- Section 21(j) – dewatering underground for safe operations.

Mooiplaats appointed Geo Soil and Water cc (GSW) to report on the water quantities used in terms of - APPENDIX II, III and IV: Section 21 (a), (g) and (j) of the Act: –the approved IWUL.

Note: removing coal from underground / mining ceased on 31 December 2021, with only the coal washing plant being operational, which has since ceased as of June 2025. New flow meters were installed during April 2023. Further mining is however envisaged in the future.

The summary for the annual reporting period from July 2023 to June 2024 is provided below.

All quantities of water removed and disposed, are metered in the form of self-registering flow meters, installed on the delivery lines. Volumes are recorded on a daily basis. The daily and monthly flow meter readings are captured into the Mooiplaats Information Management System Database for Flow Meter Readings (MIMS-FM), which are updated on a monthly basis for submission to the Regional Head.

- Section 21(a) – Potable Water – 898 m3 water was recorded from the abstraction boreholes for the duration of the reporting period, well within the limit of 18 249 m3/annum. Potable water for use at the change house and offices are abstracted and reticulated. As per monthly flow meter reading, it is noted that a minimum volume of 203.0m3/d were measured in May 2024 whereas a maximum volume of 854.0m3/d was recorded July 2025. With a standard deviation of 180.18 and Coefficient of Variation (CV) of >48.0%, the data variance at this flow meter over the past year is considered moderate to high. The latter can be attributed to seasonal

variation in rainfall which will have an influence on water demand. However, Mooiplaats Colliery uses a Reverse Osmosis (RO) plant to replace / supplement the Potable water supply.

- Section 21(a) – 256 225 m^3 Process Water was abstracted during the reporting period from the Usutu boreholes. However, the annual limit is 65 700 m3, therefore exceeding the set IWUL limit. Make-up water for the wash-plant is abstracted from a series of boreholes targeting the flooded Usutu underground workings. It is noted that a minimum volume of 7474.0m^3/d were measured in December 2023 whereas a maximum volume of 39 313.0m^3/d was recorded in July 2023. With a standard deviation of 0.61 and Coefficient of Variation of >46.0%, the data variance at this flow meter over the past year is considered moderate to high. The latter can be attributed to seasonal variation in rainfall which will have an influence on water demand. According to the IWUL, water may only be abstracted during dry periods ("dry periods" not subjected to the dry season only).
- Section 21(g) – Water quantities used in the Plant remained within the annual limit. 302 348 m^3 was used in the plant, well within the set IWUL limit of 423400 m^3. It is noted that a minimum volume of 12 488.0m3/d were measured in December 2023 whereas a maximum volume of 39 786.0m3/d was recorded in July 2023. With a standard deviation of 6751.9 and Coefficient of Variation of 27.8%, the data variance at this flow meter over the past year is considered moderate. The latter can be attributed to seasonal variation in rainfall which will have an influence on water demand.
- Section 21(g) – Water from the Co-disposal facility and water disposed into the North Shaft Settling Dam 1 remained within the annual limit. 6 m^3 was disposed / metered into Settling Dam 1, well within the set IWUL limit of 325 133 m^3.
- Section 21(g) – No water was used underground as underground mining activities ceased at the end of 2021.
- Section 21(g) – 16 994 m^3 of water was used for dust suppression for the annual period, well within the set limit of 21 900 m^3. Recycled water is used for dust suppression purposes. It is noted that a minimum volume of 383.0m3/d were measured in December 2023 whereas a maximum volume of 3421.0m3/d was recorded in August 2024. With a standard deviation of 857.8 and Coefficient of Variation of73.2%, the data variance at this flow meter over the past year is considered high.

  Section 21 (j) – No water was removed from underground during the reporting period as underground mining activities ceased at the end of 2021. Before sealing the shaft, remaining water was removed until March 2022

3.2 EXISTING LAWFUL WATER USES

In terms of Section 32 of the NWA, an existing lawful water use is defined as a: "Water use which has taken place at any time during a period of two years immediately before the date of commencement of the Act (1 October 1996 to 30 September 1998) and which was authorised by or under any law which was in force immediately before the date of commencement of the NWA, or which has been declared an existing lawful water use in terms

of Section 33 of the Act". Mooiplaats Colliery began mining in 2001-2002 and as such, no existing lawful water uses apply to the mine in terms of Section 32 of the NWA.

Mooiplaats Colliery does have an existing water use licence dated 02 May 2013 (Licence number 08/C11B/AGJ/2141). An Integrated Water Resource Management Plan (IWRMP) for Mooiplaats Colliery was compiled by Groundwater Consulting Solutions (GCS) in May 2010.

3.3 EXEMPTION OF THE REQUIREMENTS OF GN704

General Notice (GN) 704 (dated 4 June 1999) place certain restrictions on mining and related activities for the protection of water resources. In terms of Regulation 3, the Minister may in writing authorise an exemption from the requirements of regulations 4, 5, 6, 7, 8, 10 or 11 on his or her own initiative or on application, subject to such conditions as the Minister may determine. Certain of the existing and proposed mining activities on Mooiplaats Colliery trigger in terms of GN704 and these activities are presented in Table 7 below.

Table 7: GN 704 applicability to Mooiplaats Mining Operations.

Ref:	Regulation Description	Mining Aspect
4(a)	**No person in control of a mine or activity may -** locate or place any associated structure or any other facility within the 1:100-year flood-line or within a horizontal distance of 100 metres from any watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on water-logged ground, or on ground likely to become water-logged, undermined, unstable or cracked;	The main underground boxcut is located within 100m of a delineated watercourse. SWMP infrastructure within 100m of a watercourse.
4(b)	**No person in control of a mine or activity may -** except in relation to a matter contemplated in regulation 10, carry on any underground or opencast mining, prospecting or any other operation or activity under or within the 1:50 year flood-line or within a horizontal distance of 100 metres from any watercourse or estuary, whichever is the greatest;	Underground mining was occurring approximately 100m below watercourses where the coal seam is located.
4(c)	**No person in control of a mine or activity may -** place or dispose of any residue or substance which causes or is likely to cause pollution of a water resource, in the workings of any underground or opencast mine excavation, prospecting diggings, pit or any other excavation; or	The backfilling of the underground access box cut was undertaken with overburden material as part of rehabilitation process.
5	**Restrictions on use of material** No person in control of a mine or activity may use any residue or substance which causes or is likely to cause pollution of a water resource for the construction of any dam or other impoundment or any embankment, road or railway, or for any other purpose which is likely to cause pollution of a water resource.	The co-disposal dam was constructed from carbonaceous materials long before the regulation came into effect and is not currently lined.
11(b)	**Additional regulations for rehabilitation of coal residue deposits** Any person mining or establishing coal residue deposits must rehabilitate such residue deposits so that the rehabilitation of the residue deposits is implemented concurrently with the mining operation.	Rehabilitation of the co-disposal dump has not commenced concurrently with mining activities due to operational constraints.

Mooiplaats Colliery will require exemption from the Department of Water and Sanitation (DWS) in terms Regulation 4(a), (b), (c), 5 and 11(b) of GN 704 as presented in Table 7 above and expanded upon in Section 3.6 and Section 4.4 to 4.6.

3.4 GENERAL AUTHORISATION WATER USES

In terms of Section 22 (1) of the NWA, a person may use water without a licence if that water use is permissible in terms of the General Authorisations (GAs) issued under Section 39 of the NWA. All the water uses at the study area and proposed operations were assessed to determine whether they require authorisation in terms of a GA and it was found that the water uses do not fall in the specifications of the GAs and can't be generally authorised.

3.5 NEW WATER USES TO BE LICENCED

A summary of new water uses that are applicable to Mooiplaats are indicated in Table 8 while a comprehensive list of all water uses is presented in Section 2.6 Table 5. The completed Water Use Licence Forms and this IWWMP will be submitted to the DWS via the EWULAAS online system.

Table 8: New water uses.

Section 21 Water Use	Water Use Name	Description / purpose	Co-ordinates
Section 21 (c) and (i)	Pipeline from Usutu Boreholes to Settling Dam 1	Aboveground pipeline to transfer water from Usutu Boreholes to Settling Dam 1	Watercourse Crossing start and end coordinates: Start: 26°38'30.90"S; 30° 6'29.72"E End: 26°38'23.79"S; 30° 6'10.16"E
Section 21 (c) and (i)	Pipeline from Potable Water Borehole to Office Complex	Aboveground pipeline to transfer water from Potable Water Borehole to Office Complex	Watercourse Crossing start and end coordinates: Start: 26°38'39.93"S 30° 6'21.42"E End: 26°38'49.49"S
Section 21 (c) and (i)	Pedestrian Bridge	Pedestrian Bridge over water channel at car parking area	Watercourse Crossing start and end coordinates: Start: 26°38'50.94"S 30° 5'54.91"E End: 26°38'50.70"S 30° 5'54.53"E

Section 21 (c) and (i)	Underground mining	Undermining of wetlands	Start: 26°38'2.87"S 30° 5'50.14"E End: 26°38'37.11"S 30° 6'55.61"E
Section 21 (c) and (i)	Middling's Stockpile	Middling's stockpile located within 500m of wetlands.	26°38'37.10" 30°5'35.8"E
Section 21 (c) and (i)	Underground mining	Undermining of wetlands	Start: 26°39'28.00"S 30° 6'47.14"E End: 26°39'7.54"S 30° 7'20.57"E
Section 21 (c) and (i)	General Mining Infrastructure (GMI)	Mining infrastructure located within 500m of wetlands.	26°38'45.719"S 30° 5'53.819"E
Section 21 (c) and (i)	Waste Water Treatment Plant	WWTP located within 500m of wetlands.	26°38'47.609"S 30°5'55.849"E
Section 21 (c) and (i)	Pollution Control Dam	PCD located within 500m of wetlands	26°38'41.838"S 30°5'48.217"E
Section 21 (c) and (i)	Co-disposal facility	Disposal of discard	26°38'35.123"S 30°5'47.397"E
Section 21 (c) and (i)	Settling Dam 1	Collects water from PCD and shaft water, sewage effluent and water from boreholes (dry periods only)	26°38'24.94"S 30° 6'1.35"E

Section 21 (c) and (i)	Settling Dam 2	Stores water from Settling Dam 1	26°38'29.992"S 30°6'3.589"E
Section 21 (c) and (i)	Settling Dam 3	Water collected from Settling Dam 2	26°38'30.0"S 30°06'02.1"E
Section 21 (c) and (i)	RoM Stockpile 1	Coal from mining before processing	26°38'40.287"S 30°5'48.859"E
Section 21 (c) and (i)	RoM Stockpile 2	Coal from mining before processing	26°38'40.10"S 30° 5'46.70"E
Section 21 (c) and (i)	Plant Erickson Dam	Receives water from Settling Dam 3	26°38'44.3"S 30°05'44.3"E
Section 21 (c) and (i)	Office Complex	Administrative offices	26°38'45.73"S 30° 5'53.82"E
Section 21 (c) and (i)	Conveyor belt	Conveying of coal	Start: 26°38'36.32"S 30° 6'0.53"E End: 26°38'46.56"S 30° 5'48.68"E
Section 21 (g)	Dust suppression	Dust Suppression water piped from Underground Erickson dams to gooseneck	Gooseneck coords 26°38'43.962"S 30°5'53.38"E
Section 21 (g)	Plant Erickson Dam 2	Receives water from Settling Dam 3 for use in washplant	26°38'44.22"S 30° 5'44.57"E
Section 21 (g)	Genset Dam	Collects dirty water run-off from the contractor yard and office area	26°38'46.48"S 30° 5'55.55"E

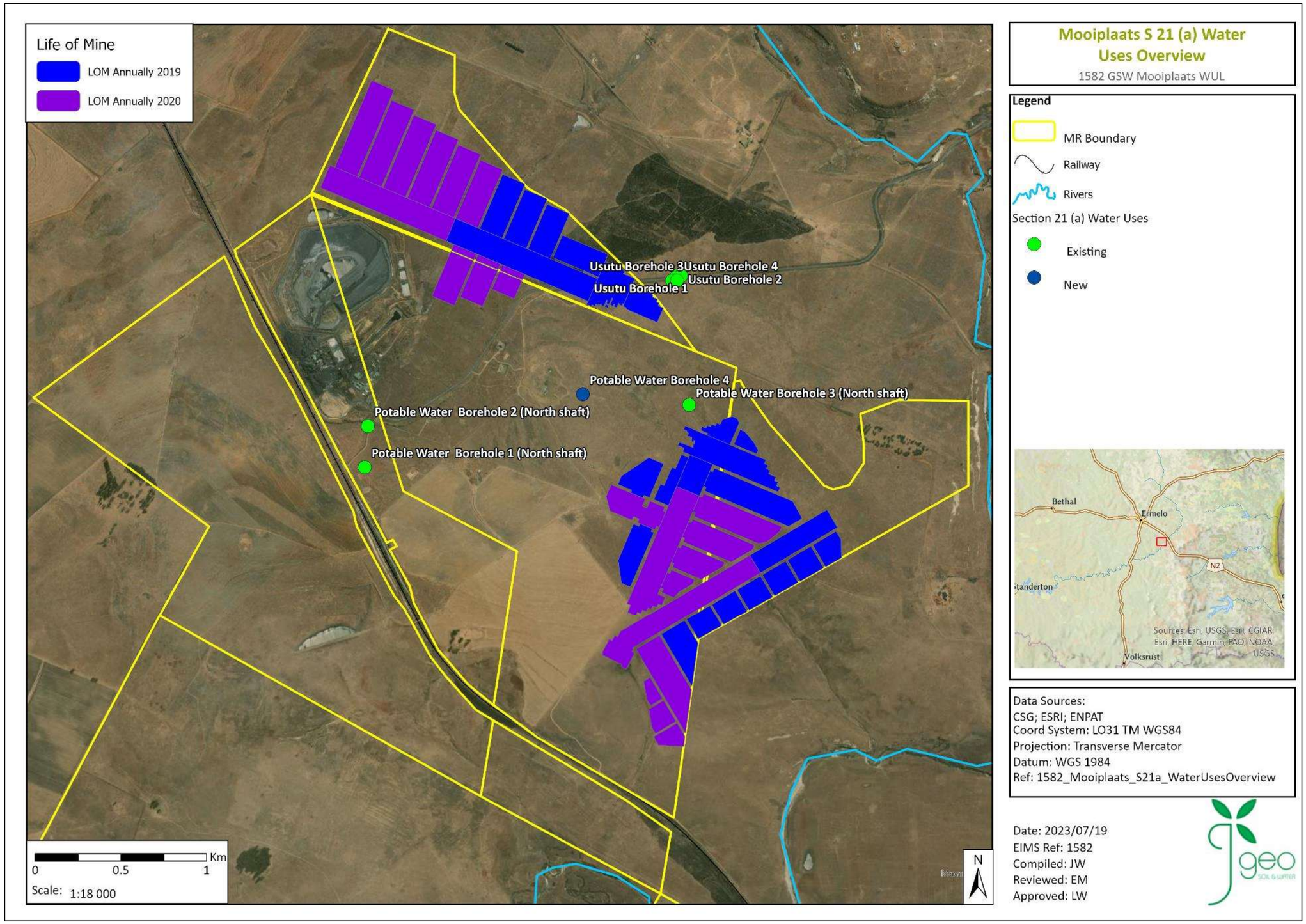


Figure 7: NWA Section 21(a) water uses inset.

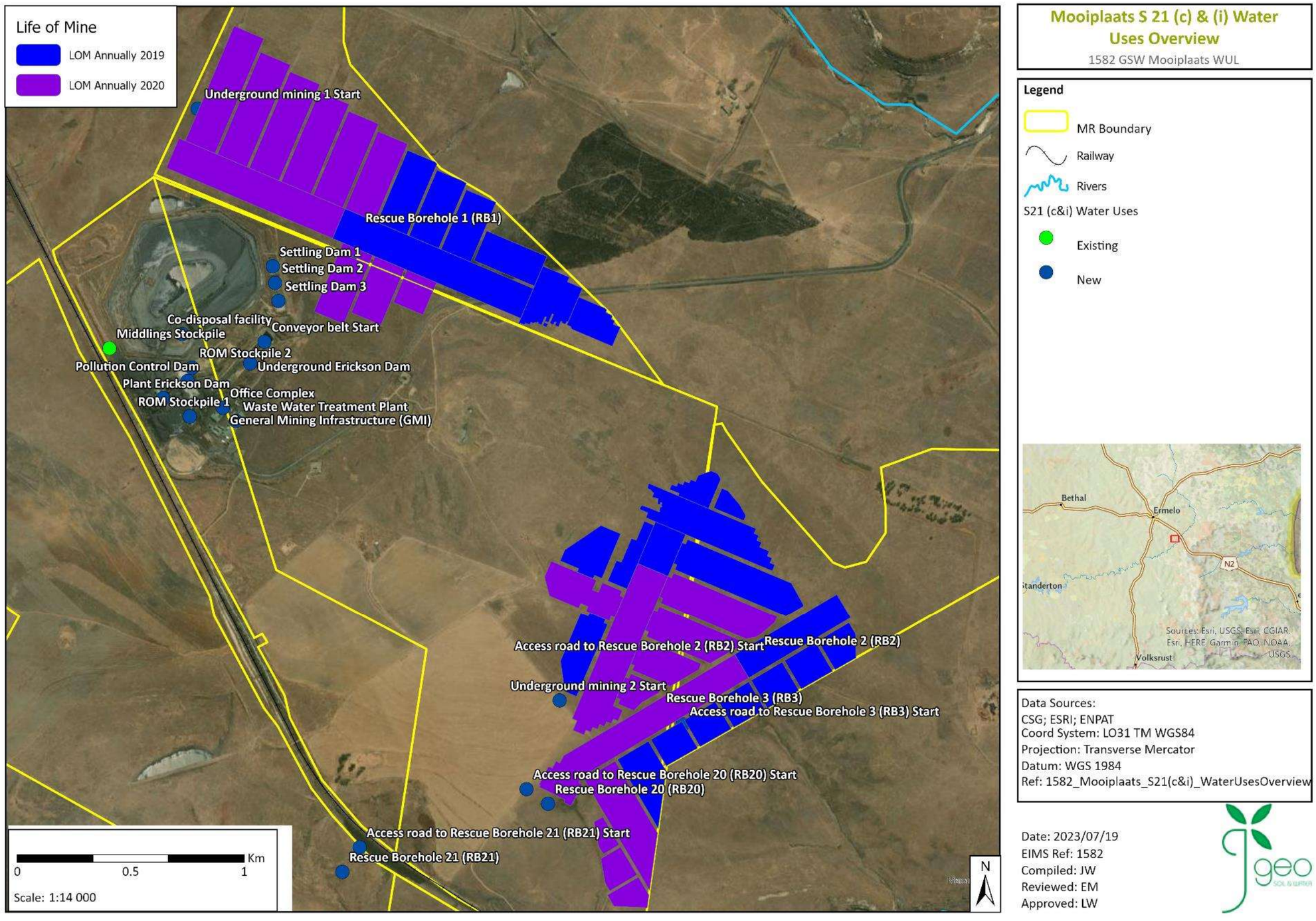


Figure 8: NWA Section 21(c & i) water uses inset

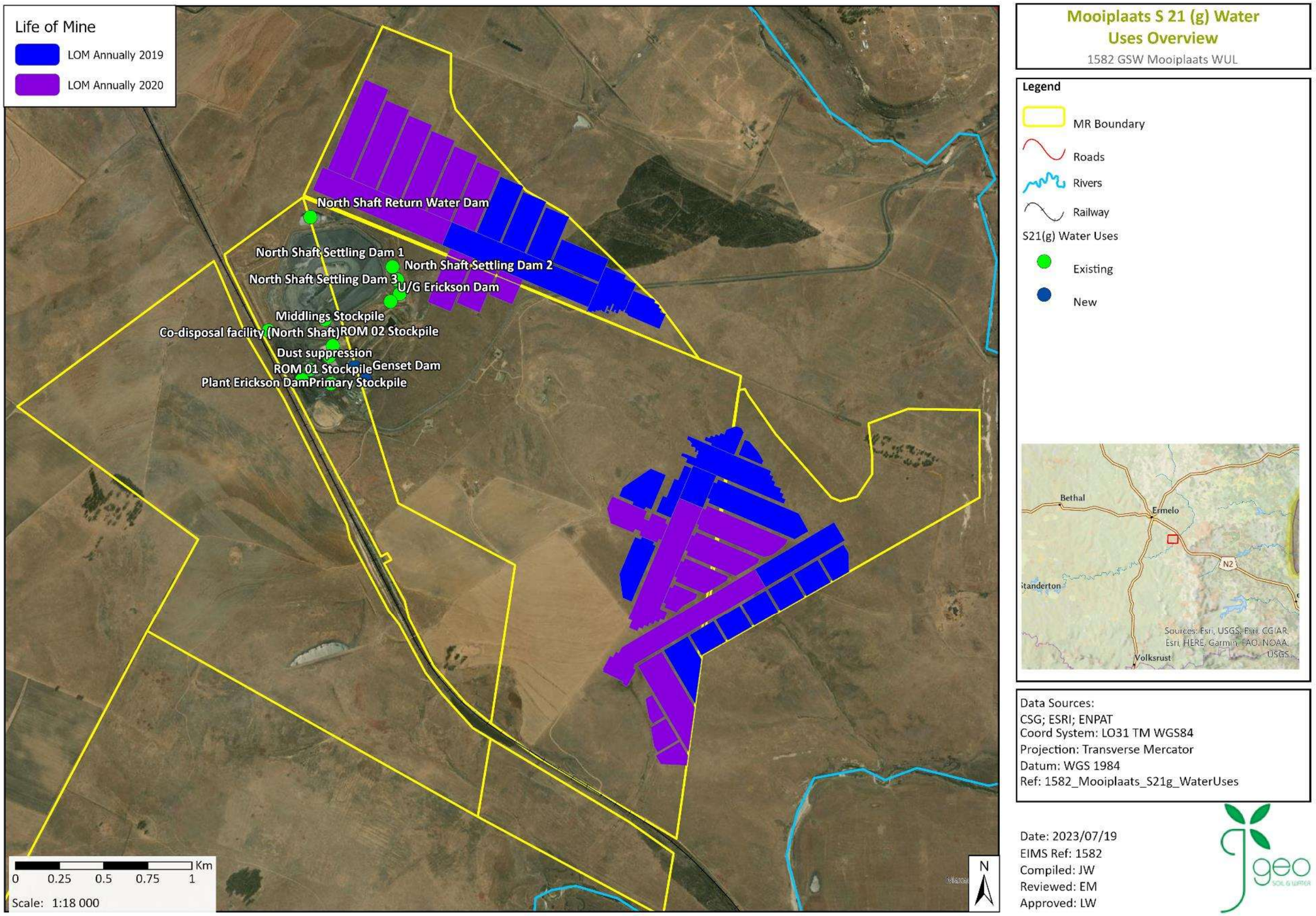


Figure 9: NWA Section 21(g) water uses overview.

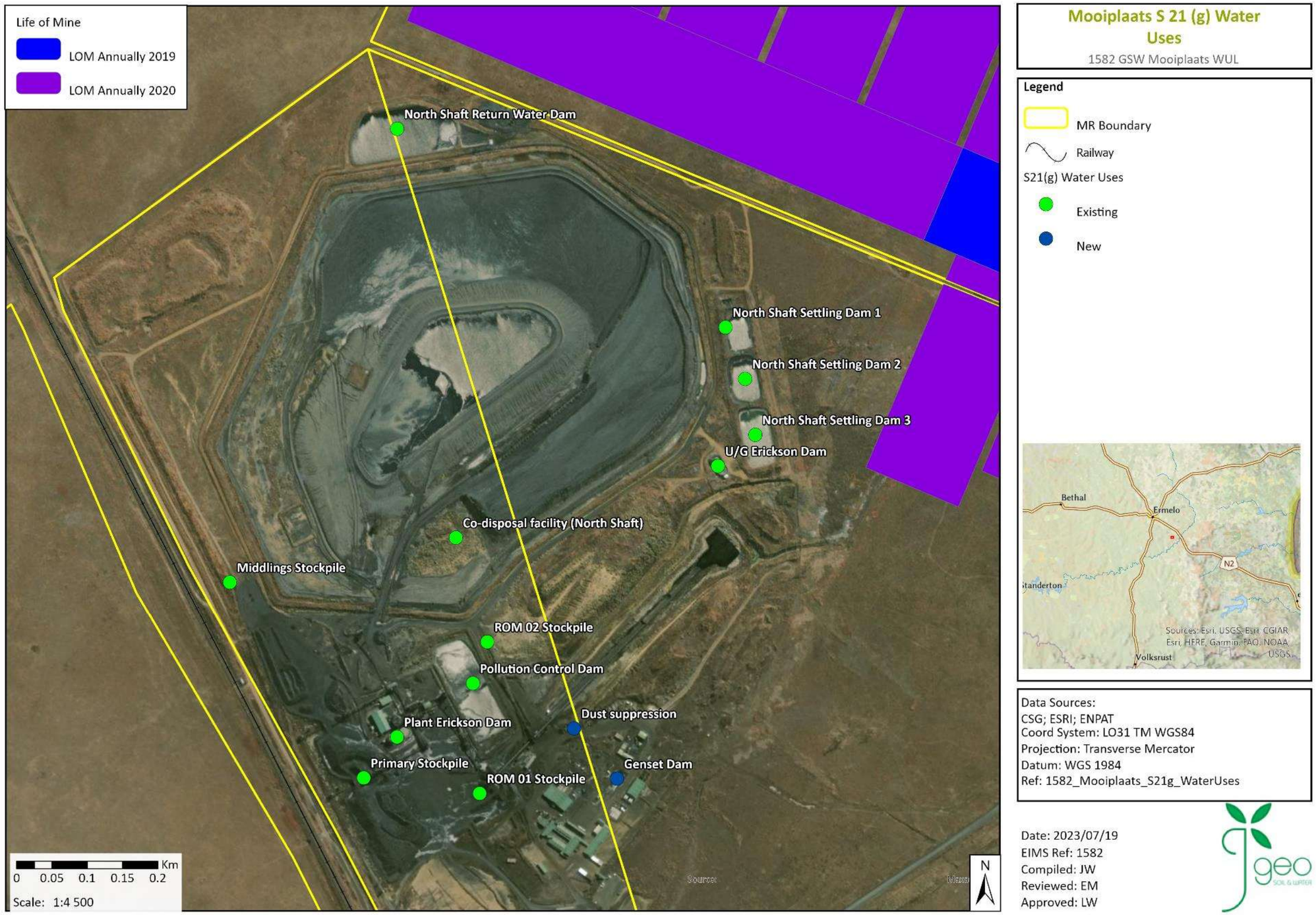


Figure 10: NWA Section 21(g) water uses inset.

3.6 WASTE MANAGEMENT ACTIVITY (NEMWA)

Although none of the listed activities detailed in National Environmental Management: Waste Act, 2008 (NEMWA) regulations are applicable to the Mooiplaats Colliery Vunene project, the requirements of this act must be taken into consideration for the remainder of the existing Mooiplaats operations. The National Environmental Management: Waste Amendment Act came into force on 2 June 2014. Waste is accordingly no longer governed by the MPRDA but is subject to all the provisions of the National Environmental Management: Waste Act, 2008 (NEMWA).

Section 16 of the NEMWA must also be considered which states as follows:

1. A holder of waste must, within the holder's power, take all reasonable measures to-
    a) "Avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated;
    b) Reduce, re-use, recycle and recover waste;
    c) Where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;
    d) Manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour, or visual impacts;
    e) Prevent any employee or any person under his or her supervision from contravening the Act; and
    f) Prevent the waste from being used for unauthorised purposes."

These general principles of responsible waste management will be incorporated into the requirements in the EMPR to be implemented for this project.

Waste can be defined as either hazardous or general in accordance to Schedule 3 of the NEMWA (2014) as amended. "Schedule 3: Defined Wastes" has been broken down into two categories – Category A being hazardous waste; and Category B being general waste. Under Category A (hazardous waste), the act makes allowance for, but not limited to, "wastes from petroleum refining, natural gas purification and pyrolytic treatment of coal; oil wastes and wastes of liquid fuels; and construction wastes".

In order to attempt to understand the implications of these waste groups, it is important to ensure that the definitions of all the relevant terminologies are defined:

- Hazardous waste: means "any waste that contains organic or inorganic elements or compounds that may, owning to the inherent physical, chemical or toxicological characteristic of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles."
- Residue deposits: means "any residue stockpile remaining at the termination, cancellation or expiry of a prospecting right, mining right, mining permit, exploration right or production right."
- Residue stockpile: means "any debris, discard, tailings, slimes, screening, slurry, waste rock, foundry sand, mineral processing plant waste, ash or any other product derived from or incidental to a mining operation and which is stockpiled, stored or accumulated within the mining area for potential re-use, or which is disposed of, by the holder of a mining right, mining permit

or, production right or an old order right, including historic mines and dumps created before the implementation of this Act."

- General waste: means "waste that does not pose an immediate hazard or threat to health or to the environment and includes – domestic waste; building and demolition waste; business waste; inert waste; or any waste classified as non-hazardous waste in terms of the regulations made under Section 69."

NEMWA Planning and Management of Residue Stockpiles and Residue Deposits Regulations, 2015 (GN R 632):

The purpose of these Regulations is to regulate the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation. The identification and assessment of environmental impacts arising from residue stockpiles and residue deposits must be done as part of the environmental impact assessment conducted in terms of the NEMA. A risk analysis based on the characteristics and the classification set out in Regulation 4 and 5 must be used to determine the appropriate mitigation and management measures. The pollution control barrier system shall be defined by the-

- National Norms and Standards for the Assessment of Waste for Landfill Disposal, 2013; and
- National Norms and Standards for Disposal of Waste to Landfill, 2013.

The planning, management and reporting of residue stockpiles and residue deposits is shown schematically in **Figure 11** below.

Figure 11: Overview of the planning and management of residue stockpiles and residue deposits regulations

3.7 WASTE RELATED AUTHORISATIONS

Mooiplaats North Colliery has a MR in terms of the Mineral and Petroleum Resources Development Act (2002) for the Mooiplaats Colliery with an original EMPR dated 2005. This MR (MP 30/5/1/2/2/68 MR) was granted to Langcarel (Pty) Ltd in 2007. This mining right allowed for the underground mining of coal and on-site processing and associated infrastructure as discussed in the original EMPR. A subsequent revision to the original EMPR was undertaken in 2012 under the instruction of the DMRE.

The transitional provisions of GNR 921 as amended on 24 July 2015 states that "an environmental management programme or plan approved in terms of the Mineral and Petroleum Resources Development Act, 2002 shall be deemed to have been approved and issued in terms of this Act". As such, the waste related activities (e.g.: residue stockpiles or residue deposits) that currently occur on Mooiplaats Colliery do not require further waste related authorisations in terms of the NEMWA.

3.8 OTHER AUTHORISATIONS

The MPRDA aims to "make provision for equitable access to, and sustainable development of, the nation's mineral and petroleum resources". The MPRDA outlines the procedural requirements that need to be met to acquire mineral and petroleum rights in South Africa. The MPRDA further governs the sustainable utilisation of South Africa's mineral resources. In the event that the proposed activities require material (e.g., sand, gravel, aggregate) for the purposes of construction then the provisions of the MPRDA may apply.

Several amendments have been made to the MPRDA. These include, but are not limited to, the amendment to Section 102 which concerns the amendment of rights, permits, programmes and plans, to requiring the written permission from the Minister for any amendment or alteration; and the Section 5A(c) requirement that landowners or land occupiers receive twenty-one (21) days' written notice prior to any activities taking place on their properties. One of the most recent amendments requires all mining related activities to follow the full NEMA process as per the 2014 EIA Regulations, which came into effect on 4 December 2014 as was amended in April 2017.

3.8.1 NATIONAL ENVIRONMENTAL MANAGEMENT ACT

The main aim of the National Environmental Management Act, 1998 (Act 107 of 1998 – NEMA) is to provide for co-operative governance by establishing decision-making principles on matters affecting the environment. In terms of the NEMA EIA Regulations, the applicant is required to appoint an EAP to undertake the EIA process, as well as conduct the public participation process towards an application for EA. In South Africa, EIA's became a legal requirement in 1997 with the promulgation of regulations under the Environment Conservation Act (ECA). Subsequently, NEMA was passed in 1998. Section 24(2) of NEMA empowers the Minister and any MEC, with the concurrence of the Minister, to identify activities which must be considered, investigated, assessed and reported on to the competent authority responsible for granting the relevant EA. On 21 April 2006, the Minister of Environmental Affairs and Tourism (now DEA) promulgated regulations in terms of Chapter 5 of the NEMA. These regulations, in terms of the NEMA, were amended in June 2010 and again in December 2014 as well as April 2017. The 2014 NEMA EIA Regulations (as amended) are applicable to this project. Mining activities, including activities such as the Mooiplaats Colliery Vunene Project area, officially became governable under the NEMA EIA Regulations (as amended) in December 2014.

The objective of the EIA Regulations is to establish the procedures that must be followed in the consideration, investigation, assessment and reporting of the listed activities that have been identified to be triggered by the proposed development/ mining activity. The purpose of these procedures is to provide the competent authority with adequate information to make decisions which ensure that activities which may impact negatively on the environment to an unacceptable degree are not authorised, and that activities which are authorised are undertaken in such a manner that the environmental impacts are managed to acceptable levels.

In accordance with the provisions of Sections 24(5) and Section 44 of the NEMA the Minister has published Regulations (GN R. 982) pertaining to the required process for conducting EIA's in order to apply for, and be considered for, the issuing of an EA. These EIA Regulations provide a detailed description of the EIA process to be followed when applying for EA for any listed activity. The Regulations differentiate between a simpler Basic Assessment Process (required for activities listed in GN R. 983 and GN R. 985) and a more complete EIA process (activities listed in GN R. 984). At the time of this IWWMP update (2024), no additional NEMA listed activities other than those already authorised, are relevant.

3.8.2 NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT

The purpose of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008 - NEMWA) is to prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources, while promoting justifiable economic and social development. In addition, sustainable development requires that the generation of waste is avoided, or where it cannot be avoided, that it is reduced, re-used, recycled or recovered and only as a last resort treated and safely disposed of.

Section 19 of the Act allows that the Minister may, by notice in the Gazette, publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. Such activities require a waste management licence. The Act aims to address the likely environmental impacts associated with wastes on the cradle to grave basis.

The activities listed include the following categories:

- Storage of waste;
- Reuse, recycling and recovery;
- Treatment of waste;
- Disposal of waste;
- Storage, treatment and processing of animal waste; and
- Construction, expansion or decommissioning of facilities and associated structures and infrastructure.

Each of the listed activities has a threshold which would trigger the need for a waste management licence (WML) (thresholds relate to, inter alia, volumes, time, and throughputs). As from the 2nd of September 2014, WML's are required for all new residue stockpiles and deposits relating to prospecting, mining, exploration or production activities. As detailed in Section 3.7, the waste related activities that occurred prior to 2015 are considered authorised under the transitional provisions of the NEMWA GNR 921.

The Act also addresses contaminated land and requires that on identification of such land the DEA must be notified and relevant site assessment / contamination assessments undertaken. If contaminated, then such land is recorded as contaminated on a national contaminated land register.

It is further important to consider the provision of Section 16 of the Act which requires that:

"A holder of waste must, within the holders' power, take all reasonable measures to-

- *avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated;*
- *reduce, re-use, recycle and recover waste;*
- *where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;*
- *manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour, or visual impacts;*
- *prevent any employee or any person under his or her supervision from contravening the Act; and*
- *prevent the waste from being used for unauthorised purposes."*

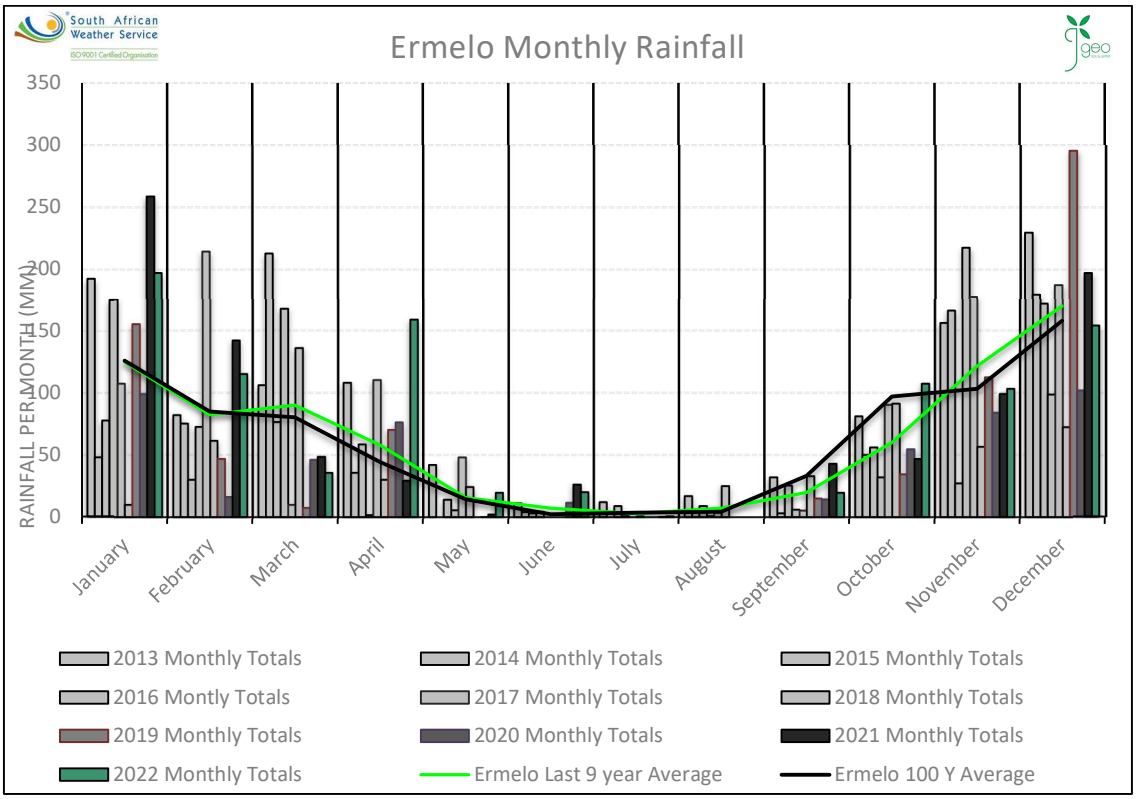
4 PRESENT ENVIRONMENTAL ATTRIBUTES

4.1 CLIMATE

The Mooiplaats Colliery site falls within the Highveld region, which is typically characterised by warm wet summers and cold dry winters. The mean annual temperature ranges between 16°C in the west to 12° in the east, with an average of about 15°C for the catchment as a whole. Maximum summer temperatures occur in January and minimum winter temperatures are experienced in July. Rainfall is seasonal and most rain occurs in the summer months (October to April). Precipitation occurs as showers and thunderstorms and is sometimes accompanied by hail. Frost occurs in winter, with occasional light snow on high lying areas. The mean annual rainfall decreases from the east (1000mm) to the west (500mm), with the mean annual precipitation (MAP) of approximately 700mm.

4.2 REGIONAL CLIMATE RAINFALL

The study area receives approximately 705mm of rain per year with most of the rainfall during summer periods. The minimum temperatures in the winter months can be very low, especially over June and July, however the average maximum temperatures remain mild.



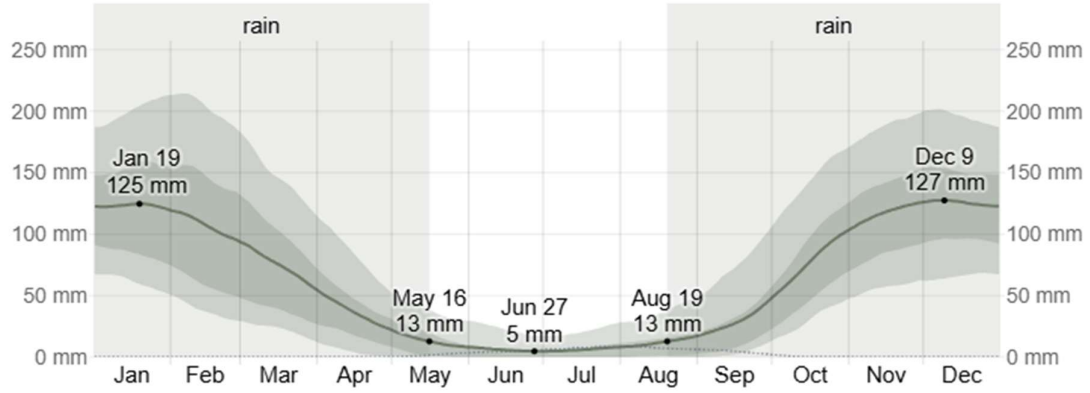
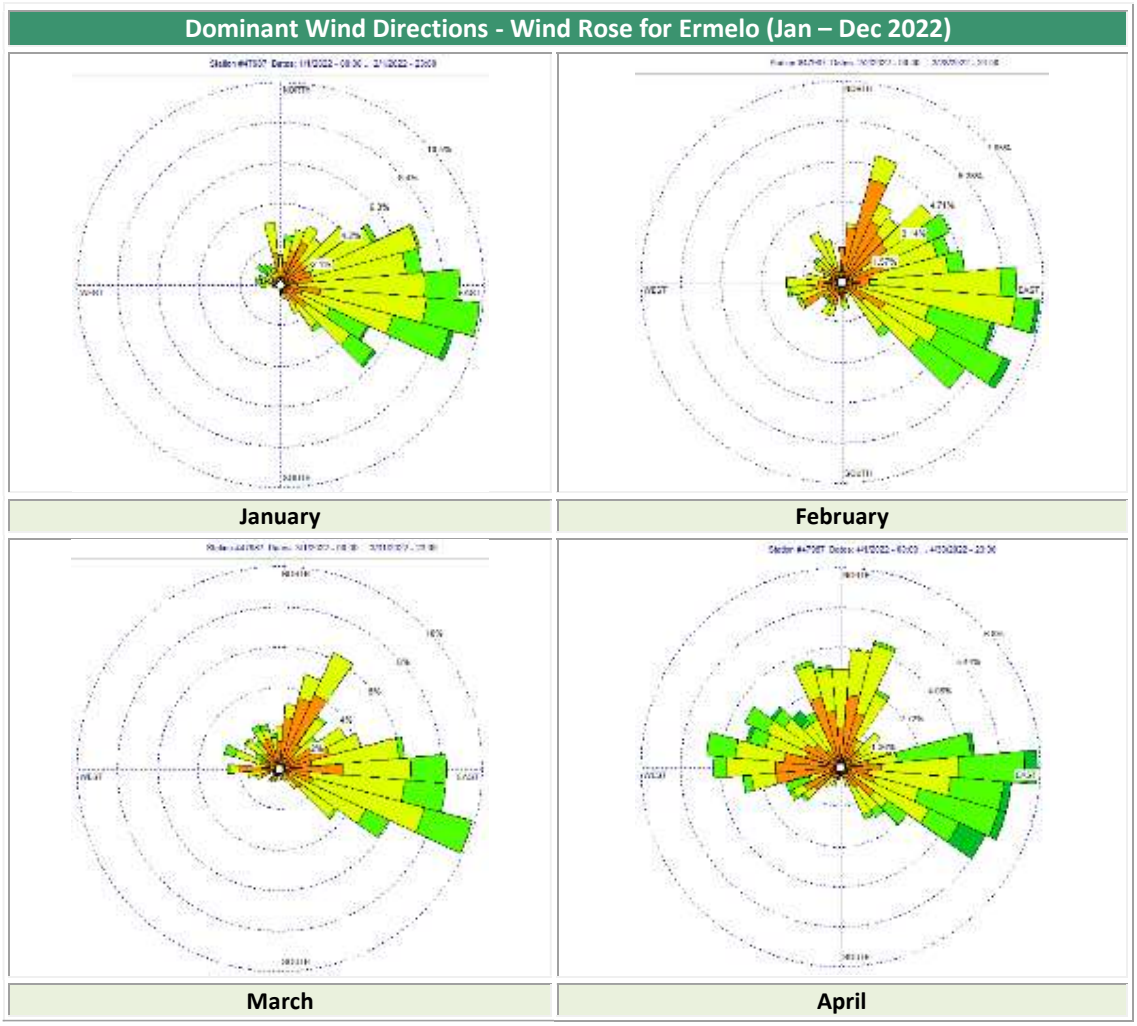


Figure 12: Ermelo monthly and historic rainfall data (Above: Historical records between 2013-2021, Below: current data as of 2026).

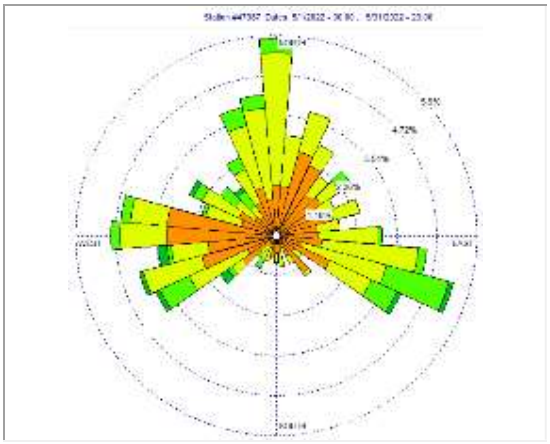
4.3 EVAPORATION

Prevailing spring daytime wind direction in the proximity of the site are north and east (refer to Table 9). Prevailing summer daytime wind direction in the proximity of the site is east and north-east, with a few milder winds coming from the north. The autumn months are very windy, with wind coming from all directions. Prevailing winter daytime wind direction in the proximity of the site is mainly from the west; west-northwest; northwest; north-northwest and north. The dominant wind direction fluctuated from west, north and east with north and east being the most dominant. The Mean Annual Evaporation (MAE) at this station is 1 518mm, while interpolation of evaporation data from WR90 indicates a value between 1 550mm and 1 600mm per annum. Evaporation is much less variable, both in terms of seasonal and annual, than the rainfall. Annual totals vary between 1 350 and 1 800mm.

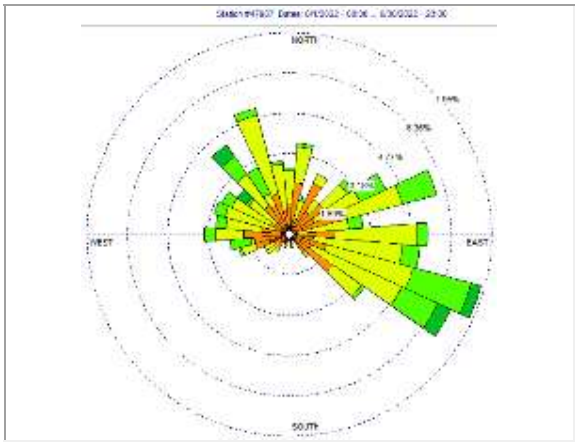
Table 9: Wind rose for Ermelo which indicate dominant wind directions.



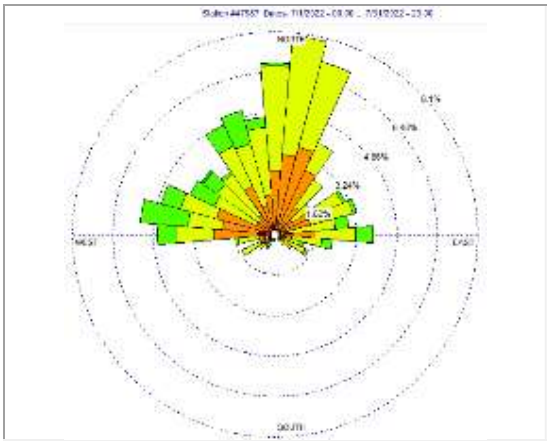
Dominant Wind Directions - Wind Rose for Ermelo (Jan – Dec 2022)



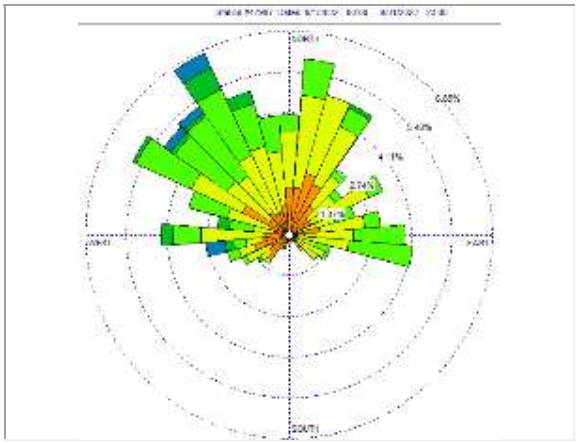
May



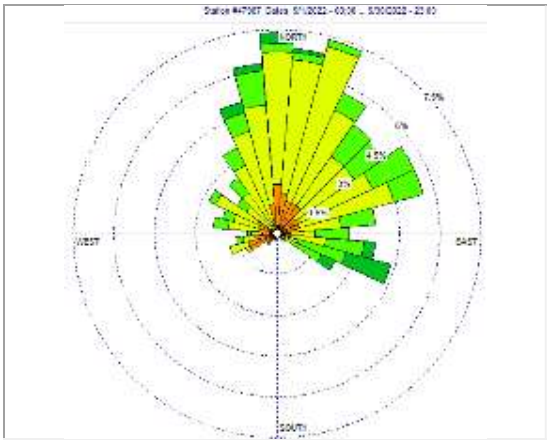
June



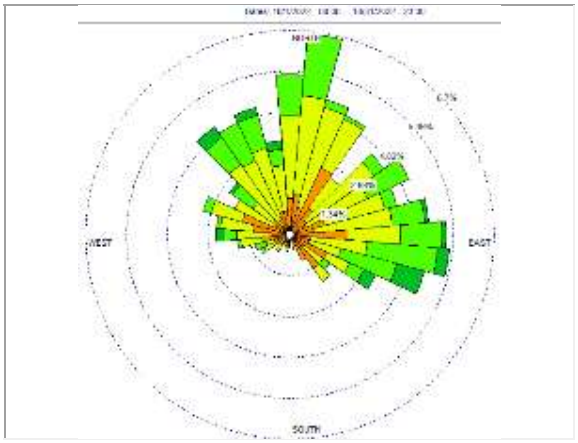
July



August

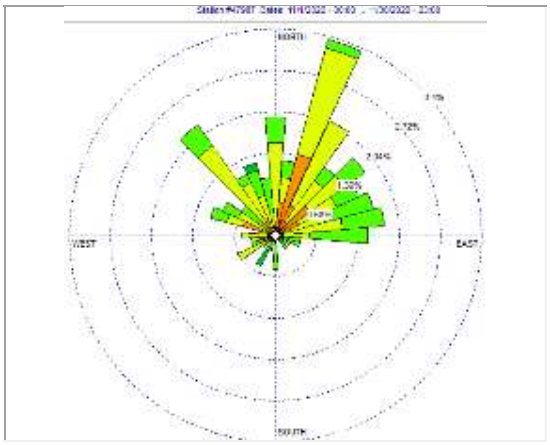


September

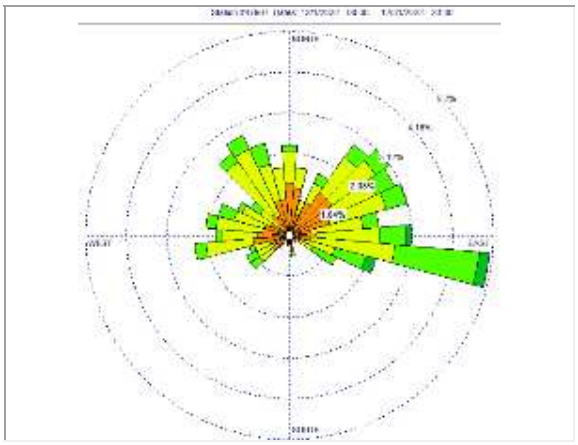


October

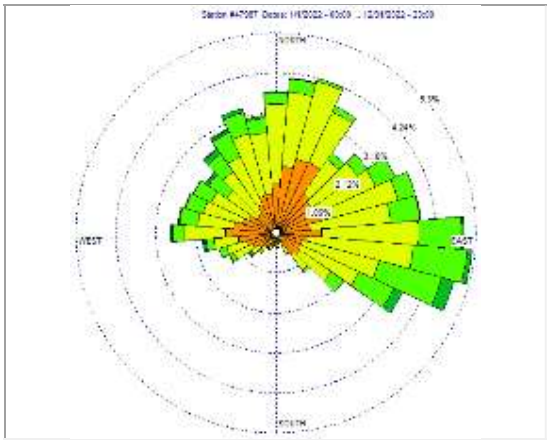
Dominant Wind Directions - Wind Rose for Ermelo (Jan – Dec 2022)



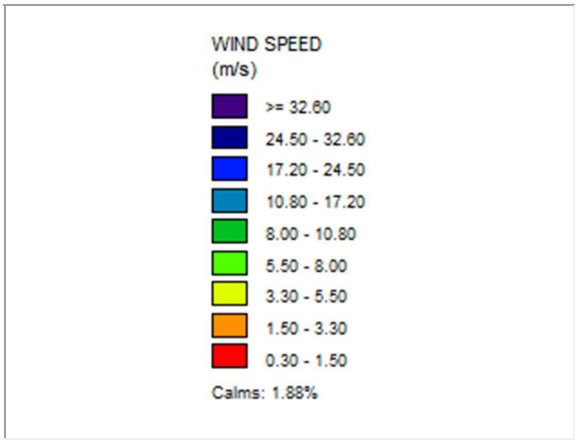
November



December



Annual Average – 36 Directions



Legend

In terms of extreme weather conditions, Ermelo hardly ever experiences snow and the incidences of hail are also limited. However, the trend of hail follows the trend of thunderstorms, which occur in the summer months between October and March. There is a very high incidence of fog in the area, especially during autumn and winter, and sometimes experienced during the summer months.

4.4 SURFACE WATER

Several streams, wetlands and springs are located in the area which drains south and east towards the Witpuntspruit and Vaal River in the Grootdraai Dam, located within the Upper Vaal Catchment.

4.4.1 WATER MANAGEMENT AREA

The Mooiplaats Colliery is situated in the Upper Vaal Water Management Area (WMA 8) specifically the C11B quaternary catchment.

Figure **16: Mooiplaats Colliery surface water features (excluding wetland delineations)** presents the WMA and quaternary catchment in relation to the site and catchment information is presented in Table 10. The Vaal River is the main tributary within the area flowing in a north south direction towards the Vaal Dam. Other tributaries include the Witpunspruit, Sterkspruit and Wolwespruit, which drain to the Vaal River.

Table 10: WMA and Quaternary Catchment Information.

WMA	Quaternary Catchment	Catchment Area (km²)	MAP (mm)	MAE (mm)	MAR (mcm)
Upper Vaal WMA	C11B	536	705	1400	32.37

4.4.2 SURFACE WATER HYDROLOGY

The Mooiplaats Colliery is situated in the Upper Vaal Water Management Area (WMA 8) specifically the C11B quaternary catchment. The Vaal River is the main tributary within the area flowing in a north south direction towards the Vaal Dam. Other tributaries include the Witpunspruit, Sterkspruit and Wolwespruit, which drain to the Vaal River.

The US Army Corp of Engineers (USACE) Hydrologic Engineering Centre River Analysis System (HEC-RAS) model was used to calculate the relevant flood levels. The available 5 m contour data were used to generate a Digital Elevation Model (DEM) in order to analyse the hydraulic flow characteristics of the terrain at the project site. The relevant Manning's roughness coefficients (n) were estimated for channel characteristics, riparian and bank areas based on observations made during the site assessment. Relevant values were obtained via data published in, 'Hec-RAS River Analysis System – Hydraulic Reference Manual Version 4.1' (January 2010).

The Manning's values that were assigned to the river reach were 0.01 for both the river channel and the riverbanks. A constant Manning's value (n) was utilised as the non-perennial watercourse did not have defined banks and as such the vegetation was considered consistent across the relevant cross sections.

The calculated flood extents for the 1:50- and 1:100-year flood events are depicted in Figure 13 and Figure 14 respectively. The flood extents for the 1:50- and 1:100-year flood events illustrate that the extend of the 1:50- and 1:100-year flood events pose a threat to the infrastructure. **Note** that these Figures include the floodline models for previously proposed mining activities which were part of the Mooiplaats South Project.

Figure 13: Calculated 1:50 year floodlines.

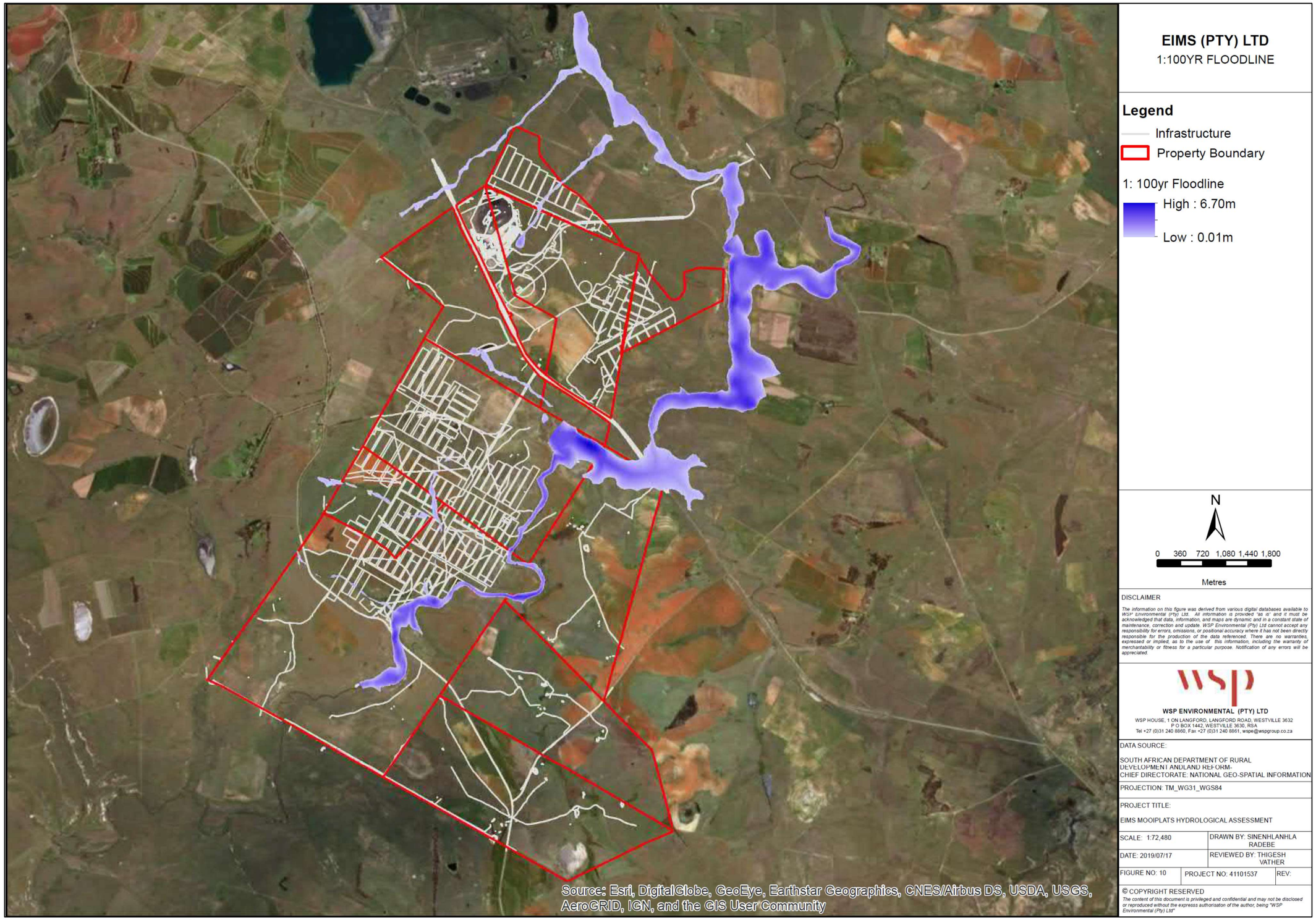


Figure 14: Calculated 1:100 year floodlines.

4.4.3 SURFACE WATER QUALITY

As Mooiplaats Colliery is an existing mine, there is an existing IWUL (Licence no. 08/C11B/AGJ/2141, dated 02 May 2013. As per the conditions of the IWUL, Mooiplaats Colliery is required to conduct monthly surface water monitoring to determine if the chemical water quality and the levels are in line as prescribed in the IWUL. As per the Annual water quality report 2024, monitoring occurred at fourteen (14) IWUL water monitoring points and zero (0) additional points. Refer to Figure 15 for the location of the surface water monitoring points.

Monthly surface water samples are analysed for:

- pH
- Electrical Conductivity (EC) mS/m
- Total Dissolved Salts (TDS) mg/L
- Total Hardness mg/L
- Alkalinity $CaCO_3$/L
- Calcium (Ca) mg/L
- Magnesium (Mg) mg/L
- Sodium (Na) mg/L
- Potassium (K) mg/L
- Fluoride (F) mg/L
- Chloride (Cl) mg/L
- Sulphate (SO_4) mg/L
- Nitrate (NO_3) mg/L
- Aluminium (Al) mg/L
- Iron (Fe) mg/L
- Manganese (Mn) mg/L
- Ammonia (NH_3) mg/L

Water qualities are compared to the IWUL Limits and the In-stream Water Quality Guidelines for the Grootdraai Dam Catchment - Vaal origin. The DWS Water Quality Guidelines (second edition). Volume 5: Agricultural Use: Livestock Watering and the South African National Standard, Drinking Water Standard (Edition 2) (SANS 241:2015) were included as supplementary comparative guidelines and not for compliance purposes.

The monitoring network provides information for risk-based decision making to Mooiplaats management with regard to effectiveness of pollution prevention measures and areas requiring management attention. The results for the surface water monitoring are provided in Table 12 to Table **14**.

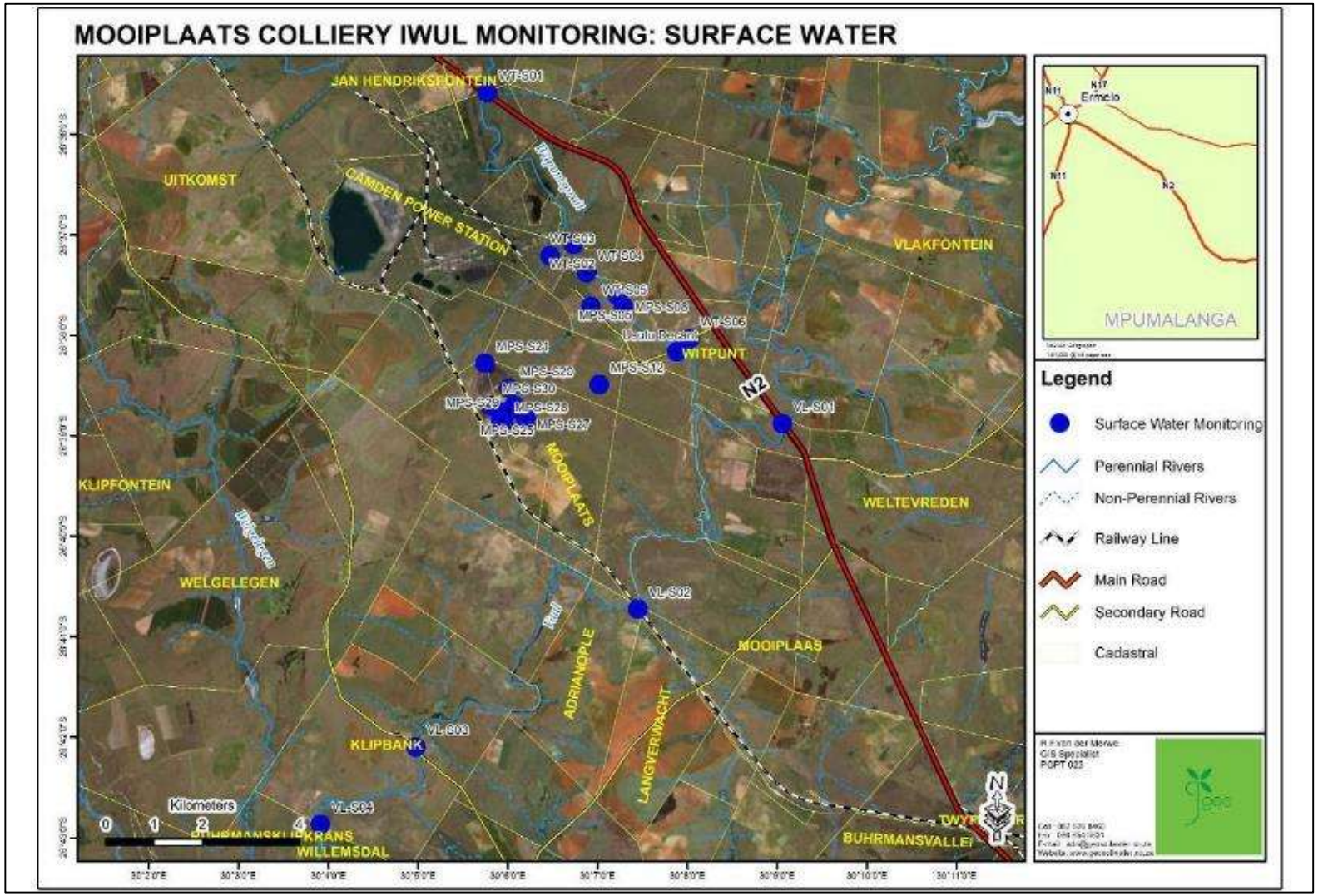


Figure 15: Location of the surface water monitoring points

Table 11: Summary of surface water monitoring points

Mooiplaats Colliery Monitoring Programme			
Surface Water Monitoring Points			
Locality	**Locality Description**	**Coordinates WGS 84 ddd.ddddd**	**Monitoring Frequency**
VL-S01	Vaal River 1 Upstream	S26.64616° E30.09890°	Monthly
VL-S02	Vaal River 2 Downstream 1	S26.64804° E30.15098°	Monthly
VL-S03	Vaal River 3 Downstream 2	S26.67879° E30.12411°	Monthly
VL-S04	Vaal River 4 Downstream 3	S26.70167° E30.08288°	Monthly
WT-S01	Witpuntspruit 1 Upstream	S26.71447° E30.06519°	Monthly
WT-S02	Witpuntspruit 2 Midstream	S26.59307° E30.09617°	Monthly
WT-S03	Witpuntspruit Tributary North DS 1	S26.61826° E30.11211°	Monthly
WT-S04	Witpuntspruit 3 Midstream	S26.62014° E30.10781°	Monthly
WT-S05	Witpuntspruit Tributary South DS 2	S26.62294° E30.11463°	Monthly
WT-S06	Witpuntspruit 6 Downstream	S26.62863° E30.11539°	Monthly
MPS-S08	Witpuntspruit 5 MS	S26.62873° E30.12149°	Ad Hoc
MPS-S12	Witpuntspruit Tributary @ Access Road	S26.64150° E30.11697°	Ad Hoc
MPS-S13	Runoff from Loading Area	S26.64837° E30.09888°	Ad Hoc
MPS-S14	Gen-sub PCD	S26.64616° E30.09890°	Monthly
MPS-S15	Stormwater trench @ Security	S26.64837° E30.09888°	Ad Hoc
MPS-S16	DS Area of Erikson's + Settling Dams	S26.64505° E30.10121°	Monthly
MPS-S20	Erickson Dams	S26.64505° E30.10121°	Monthly
MPS-S21	Main Holdings Dam	S26.64198° E30.10059°	Monthly
MPS-S25	Workshop Trench DS of Workshop	S26.63826° E30.09506°	Ad Hoc
MPS-S27	Witpuntspruit Tributary entering MP	S26.64716° E30.10336°	Ad Hoc
MPS-S28	Confluence of MPS-S13 and MPS-S15	S26.64808° E30.09925°	Ad Hoc
MPS-S29	Storm water @ Offices	S26.64743° E30.09802	Ad Hoc
MPS-S30	Plant PCD	S26.64508° E30.09674°	Monthly
MPS-S31	Decant from Old Usutu Workings decanting into the Witpuntspruit Upstream of WT-06 – via **surface.**	S26.63611°E30.13139°	Ad Hoc

Mooiplaats Colliery Monitoring Programme			
Surface Water Monitoring Points			
Locality	**Locality Description**	**Coordinates WGS 84 ddd.ddddd**	**Monitoring Frequency**
MPS-S32	Decant from Old Usutu Workings decanting into the Witpuntspruit Upstream of WT-06 – in cement **sump**	S26.63611°E30.13139°	Ad Hoc
	Additional Monitoring Points		
	IWUL Monitoring Points		

Table 12: Average water quality for wastewater monitoring points

Average Wastewater Quality for Mooiplaats February 2025 - April 2025									
Variable	Unit	IWUL Limit	Grootdraai Dam Guidelines Vaal Origin	SANS 241:2011	DWS Livestock Watering	MPS-S14	MPS-S20	MPS-S21	MPS-S30
pH	-	3.5 – 8.5	6.4 – 8.5	5.0 - 9.5	-	7.29	8.15	4.45	7.42
EC	mS/m	150	25	170	500	168.33	289.67	351.00	349.33
TDS	mg/L	1288	-	1200	3000	1297	2180	2982	2678
Total Hardness	mg/L	-	-	-	-	453	252	1125	738
Alkalinity	$CaCO_3$/L	-	75	-	-	286.667	843.000	5.933	439.333
Ca	mg/L	87	-	-	1000	115.533	40.933	219.083	162.333
Mg	mg/L	51.40	-	-	500	40.000	36.467	140.333	80.700
Na	mg/L	725	-	200	200	260.667	715.677	404.273	607.270
K	mg/L	-	-	-	-	8.833	11.500	13.910	20.967
F	mg/L	3.23	0.4	1.5	2	0.617	3.130	0.377	1.170
Cl	mg/L	116.66	20	300	3000	36.067	57.400	28.833	52.067
SO_4	mg/L	740	30	500	1000	650.990	798.083	2109.330	1480.667
NO_3	mg/L	-	0.5	11	-	2.653	1.333	0.630	2.117
NH_3	mg/L	0.24	-	1.5	-	-0.450	-0.450	1.173	-0.450
Al	mg/L	0.09	-	0.3	5	-0.010	-0.010	23.230	0.063
Fe	mg/L	0.001	-	0.3	10	0.017	-0.010	12.480	0.010
Mn	mg/L	0.15	-	0.1	10	0.443	0.277	21.967	0.190

- Variables highlighted in grey are specified by the IWUL where the remainder are additional analyses.
- Values highlighted in red exceeds the limits set in the IWUL where variables highlighted in green exceeds the Grootdraai Dam Catchment Guidelines of the Vaal Origin
- "-"Indicate values below laboratory detection limit.
- "*" indicate variables exceeding the IWUL limits and GD-VO Guidelines.

Table 13: Average water quality for the Witpuntspruit and associated tributaries

Average Witpuntspruit Water Quality for Mooiplaats February 2025 – April 2025											
Variable	**Unit**	**IWUL Limit**	**Grootdraai Dam Guidelines Vaal Origin**	**SANS 241: 2011**	**DWS Livestock Watering**	**WT-S01**	**WT-S03**	**WT-S02**	**WT-S04**	**WT-S05**	**WT-S06**
pH	-	3.5 – 8.5	6.4 – 8.5	5.0 - 9.5	-	6.78	6.89	6.86	6.93	5.18	6.48
EC	mS/m	150	25	170	500	46.07	51.87	39.47	40.00	256.00	51.80
TDS	mg/L	1288	-	1200	3000	292	331	250	251	2262	331
Total Hardness	mg/L	-	-	-	-	181	166	140	139	917	166
Alkalinity	$CaCO_3$/L	-	75	-	-	31.767	52.433	47.733	50.467	4.000	52.400
Ca	mg/L	87	-	-	1000	37.033	35.333	30.233	29.713	179.865	34.550
Mg	mg/L	51.40	-	-	500	21.500	18.867	15.733	15.767	113.650	19.275
Na	mg/L	725	-	200	200	19.233	41.267	22.033	23.533	341.500	38.680
K	mg/L	-	-	-	-	4.323	3.513	4.993	4.967	5.865	5.115
F	mg/L	3.23	0.4	1.5	2	0.167	0.163	0.190	0.187	0.255	0.175
Cl	mg/L	116.66	20	300	3000	16.900	12.250	16.567	16.233	19.550	16.100
SO_4	mg/L	740	30	500	1000	171.733	187.000	129.133	129.333	1581.965	185.000
NO_3	mg/L	-	0.5	11	-	-0.090	0.067	0.223	0.013	-0.350	-0.350
NH_3	mg/L	0.240	-	1.5	-	-0.450	-0.450	-0.450	-0.087	-0.450	0.030
Al	mg/L	0.090	-	0.3	5	0.107	0.020	-0.010	-0.010	0.515	-0.010
Fe	mg/L	0.001	-	0.3	10	0.420	0.210	0.047	0.053	0.540	0.050
Mn	mg/L	0.15	-	0.1	10	0.907	0.030	0.037	0.023	15.485	0.120

- Variables highlighted in grey are specified by the IWUL where the remainder are additional analyses.
- Values highlighted in red exceeds the limits set in the IWUL where variables highlighted in green exceeds the Grootdraai Dam Catchment Guidelines of the Vaal Origin
- "-"Indicate values below laboratory detection limit.
- "*" indicate variables exceeding the IWUL limits and GD-VO Guidelines.

Table 14: Average water quality for the Vaal River surface water monitoring points

Average Vaal River Water Quality for Mooiplaats February 2025 - April 2025								
Variable	**Unit**	**IWUL Limit**	**Grootdraai Dam Guidelines Vaal Origin**	**SANS 241:2011**	**DWS Livestock Watering**	**VL-S01**	**VL-S02**	**VL-S03**
pH	-	**3.5 – 8.5**	**6.4 – 8.5**	**5.0 - 9.5**	-	7.060	6.993	7.063
EC	mS/m	**150**	**25**	**170**	**500**	14.033	16.600	16.967
TDS	mg/L	**1288**	-	**1200**	**3000**	78.344	94.180	95.914
Total Hardness	mg/L	-	-	-	-	50.638	61.184	61.393
Alkalinity	$CaCO_3$/L	-	**75**	-	-	40.500	38.333	40.800
Ca	mg/L	**87**	-	-	**1000**	10.170	12.733	12.333
Mg	mg/L	**51.40**	-	-	**500**	6.130	7.137	7.430
Na	mg/L	**725**	-	**200**	**200**	7.127	8.500	8.393
K	mg/L	-	-	-	-	2.407	2.613	2.593
F	mg/L	**3.23**	**0.4**	**1.5**	**2**	0.133	0.140	0.143

Average Vaal River Water Quality for Mooiplaats February 2025 - April 2025								
Variable	**Unit**	**IWUL Limit**	**Grootdraai Dam Guidelines Vaal Origin**	**SANS 241:2011**	**DWS Livestock Watering**	**VL-S01**	**VL-S02**	**VL-S03**
Cl	**mg/L**	**116.66**	**20**	**300**	**3000**	11.767	11.467	11.933
SO_4	**mg/L**	**740**	**30**	**500**	**1000**	13.763	26.600	25.700
NO_3	**mg/L**	**-**	**0.5**	**11**	**-**	-0.047	-0.063	0.180
NH_3	**mg/L**	**0.24**	**-**	**1.5**	**-**	-0.450	-0.450	-0.450
Al	**mg/L**	**0.09**	**-**	**0.3**	**5**	0.567	0.470	0.507
Fe	**mg/L**	**0.001**	**-**	**0.3**	**10**	1.150	0.767	1.087
Mn	**mg/L**	**0.15**	**-**	**0.1**	**10**	-0.003	-0.010	-0.010

- Variables highlighted in grey are specified by the IWUL where the remainder are additional analyses.
- Values highlighted in red exceeds the limits set in the IWUL where variables highlighted in green exceeds the Grootdraai Dam Catchment Guidelines of the Vaal Origin
- "-"Indicate values below laboratory detection limit.
- "*" indicate variables exceeding the IWUL limits and GD-VO Guidelines.

The following is a summary of the results:

- Wastewater - wastewater qualities exceeded several IWUL limits and In-stream Water Quality Guidelines for the Grootdraai Dam Catchment - Vaal origin.

  Gensub PCD (MPS-S14), NS RWD (MPS-S21), Wash Plant PCD (MPS-S30) and Underground Erickson Dams (MPS-S20) are wastewater containment facilities, that reports to the co-disposal facility and ultimately again to the NS RWD (MPS-S21), from where it is recycled and distributed.

  The water compositions and concentrations of wastewater increased in terms of the dominating cations and anions which is the result of the reuse of water in the closed system. However, the difference in water quality and composition can be ascribed to the different inflows (from the different areas such as from the plant, workshop, Usuthu boreholes) into the direct waste facility before the water gets transferred to the next facility (into the system). Water quality and composition at MPS-S14 differed from the abovementioned wastewater facilities as runoff from the workshop areas reports to MPS-S14. Although water quality concentrations exceeded the IWUL limits, it must be noted that the containment facilities are HDPE lined or concreted.

  SO_4 is the dominant anion in terms of composition, well in line with water exposed to coal handling activities. Low pH values will have negative effects on water infrastructure; therefore, process water should be managed to prevent low pH values.

  Wastewater - Water quality from the mine water/pollution control dams exceeded limits in terms of EC, TDS, CaCO3, Ca, Mg, Cl, SO_4, Fe, and Mn - typical of water associated with coal washing/mining activities. Wastewater is contained in storage facilities and circulated in a closed circuit. The pH of process / wastewater should be closely monitored and managed to prevent damage to water infrastructure.

- Witpuntspruit Surface Water - Witpuntspruit monitoring points include WT-SW01 (Upstream), WT-S02, WT-S04 (Midstream) and WT-S06 (Downstream) where the adjoining tributaries include WT-S03 and WT-S05. The Witpuntspruit are impacted on, from upstream (WT-S01) to downstream (WT-S06), before the confluence with the Vaal River, exceeding the Grootdraai Dam Guidelines for the Vaal origin sub-catchment.

  The dilution and concentration varied during the wet and dry season due to the variation in freshwater inflow. Water quality generally improved during wet season and deteriorated during the dry season. Although the Witpuntspruit upstream of Mooiplaats at WT-SW01 recorded impacted water, additional impacts towards WT-S06 were recorded.

  The WT -S03 tributary receives water from neighbouring industrial activities, as well as from a small portion of Mooiplaats. However, the WT-S05 tributary receives water from Mooiplaats and farming activities in the sub-catchment.

  Water quality deteriorates slightly at WT-S02 after the confluence of WT-S03. From WT-S02 water quality remains stable or improves slightly downstream towards WT-S04, whereafter the WT-S05 tributary and a known decant (Usuthu decant) enters the Witpuntspruit upstream of WT-S06 which deteriorate the water quality further. Although the water quality improves from WT

-S01, to WT-S02, to WT-S06 in terms of pH and CaCO3 (Alkalinity), several variable concentrations increased (EC, Ca, Mg, Na, K, Cl, and SO_4) towards downstream (WT-S06).

Although, WT-S05 is possibly impacting downstream (WT-S06), the historical decant area from other historical mining activities (Usuthu) contribute to the impact on the Witpuntspruit, and SO_4 concentrations consistently increased towards WT-S06, where the CaCO3 (Alkalinity) changes the composition of the water at WT-S06. The addition of the Alkalinity to the Witpuntspruit and eventually the Vaal River is not necessary only a negative impact, but variables such as Na, Ca, Cl, and SO_4 in excessive concentrations over an extended period will have a detrimental effect on the receiving environment and Vaal River system.

Witpuntspruit – Although historic pollution from upstream of Mooiplaats is still evident, variable concentrations deteriorated towards downstream due to the inflow from WT-S03, WT-S05, and the Usuthu decant between WT-S02 and WT-S06 indicating that current and historical activities have a detrimental effect on this Spruit, which will have a long-term negative effect on the downstream environment of the Vaal River system.

- Vaal River: Although fewer water quality limits are exceeded in the Vaal River compared to the Witpuntspruit, the change in composition and the deterioration in water quality is evident after the confluence with the Witpuntspruit (VL-S01 to VL-S02).

  The trend in water quality at VL-S01 (upstream) can be ascribed to seasonal changes (dilution during wet season and concentration during the dry season) where the addition of elevated variable concentrations from the Witpuntspruit (WT-S06) into the Vaal River system can be clearly observed in the difference of variable concentrations as deterioration was recorded from VL-S01 towards VL-S02 (after confluence of Witpuntspruit).

  During the reporting period the increase and decrease in seasonal flow can be observed as dilution during the wet season lowered variable concentrations, where variable concentrations increased during lower flow during the dry season. From May to November the difference in / impact on water quality up (VL-S01) and downstream (VL-S02) of the Witpuntspruit confluence is evident as less freshwater entered the Vaal River. From VL-S02 to VL-S03 variable concentrations improved slightly indicating no additional pollution entering the Vaal River.

  Vaal River – A continuous deterioration was recorded after the confluence of the Witpuntspruit with the Vaal River (between VL-S01 and VL-S02). The increase / variation in variable concentrations during the reporting period can be ascribed to seasonal factors and the addition of variables from the Witpuntspruit.

  Metal concentrations in the Vaal River exceeded the IWUL Limits from upstream to downstream, with concentrations remining relatively constant as water moves downstream. Although Fe and Al exceeded the IWUL limits, concentrations remained low and relative consistent from upstream to downstream indicating the presence might possibly be geological / natural. The Fe and Al concentrations can possibly be ascribed to regional and geological factors.

Evidently, the Witpuntspruit has a negative impact on the Vaal River.

4.4.4 MEAN ANNUAL RUNOFF (MAR)

The larger catchment, in which the project area is situated, consists of quaternary catchment C11A and part of C11B. The Mean Annual Runoff (MAR) is calculated as 79 million cubic meters per annum. The seasonal distribution is very similar to the rainfall distribution. The Water Research Commission (WRC) Report indicates that the C11B quaternary has a typical runoff response represented by the rainfall/runoff curve. This is particularly helpful for distributing runoff in areas smaller than quaternary level.

The aquifer boundaries for the shallow weathered aquifer in the study area can be seen in **Figure 16** and are defined or described as follows:

- The Sterkspruit on the north-eastern and eastern side for about 5.5km;
- The Wolwespruit on the south-eastern side for about 3.7km;
- The Witpuntspruit located approximately 2.2km north-east of the study area boundary for about 8km and
- The Vaal River and its tributaries on the southern, south-western and northern side for about 19km.

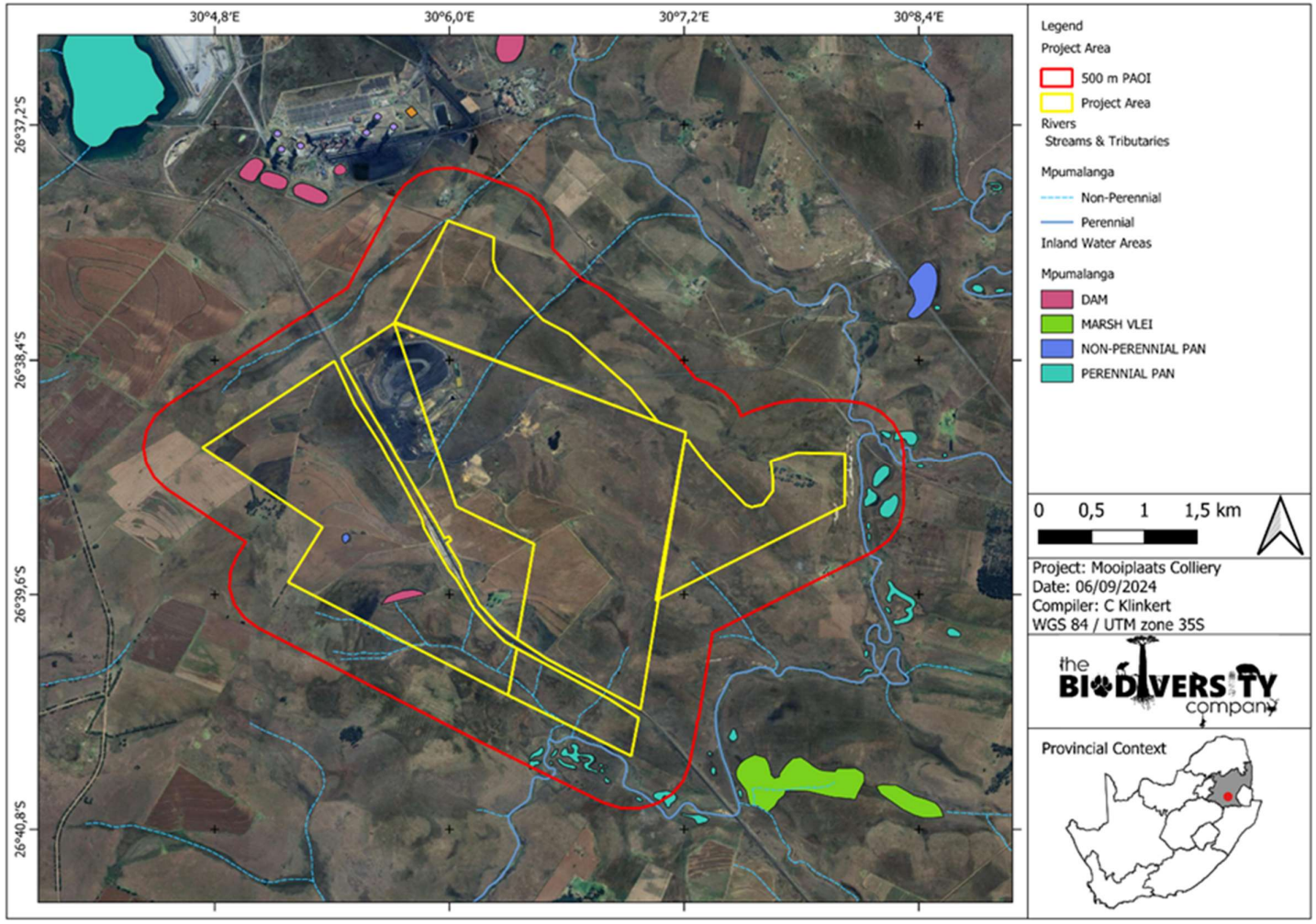


Figure 16: Mooiplaats Colliery surface water features (excluding wetland delineations)

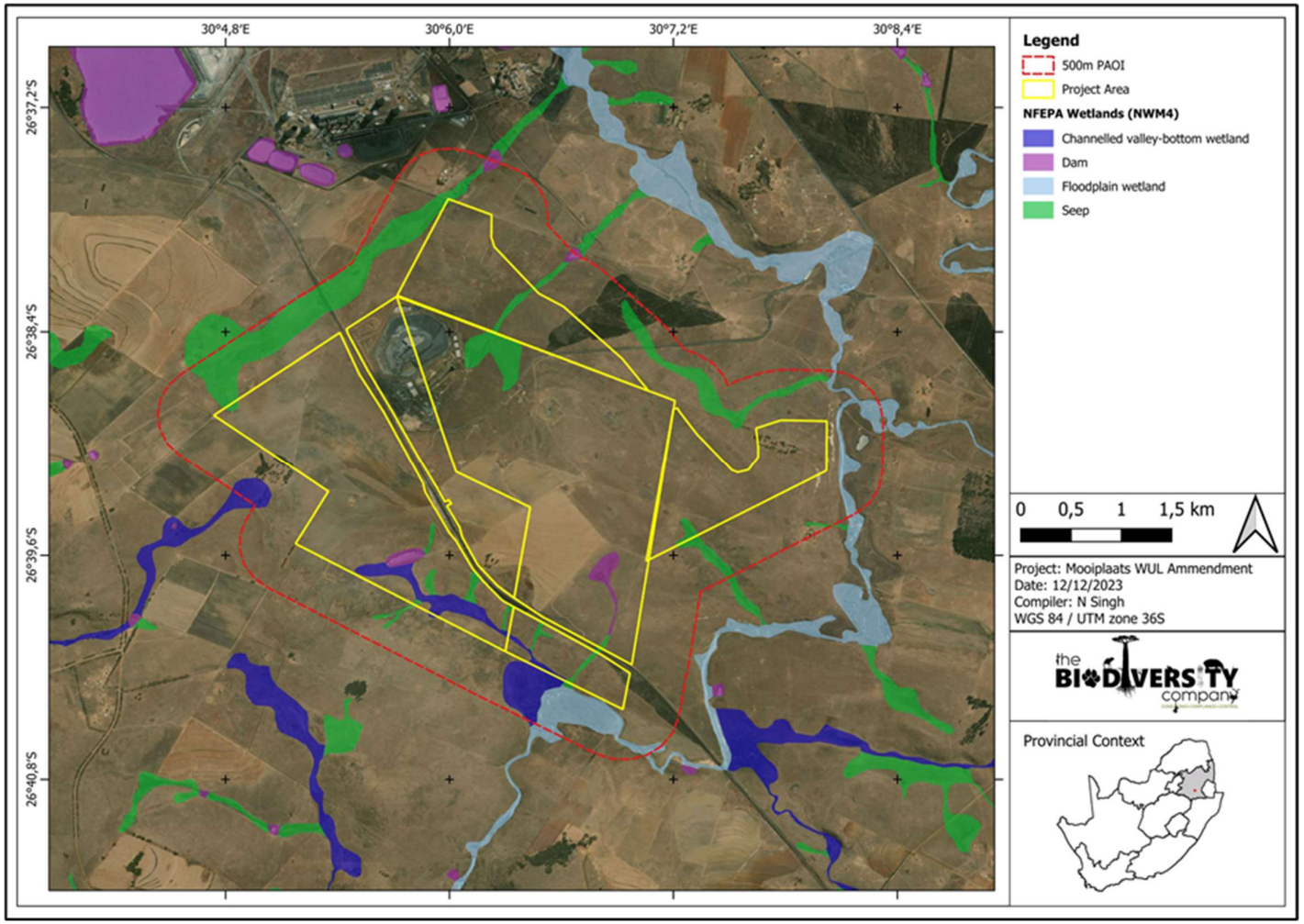


Figure 17: NFEPA Wetlands around the affected Mooiplaats Colliery properties

4.4.5 RESOURCE CLASS AND RIVER HEALTH RECEIVING WATER QUALITY OBJECTIVES AND RESERVE

Surface water and wetland resources were identified and assessed and are presented in **Figure 16** and **Figure 17** which provides context to the resource class and river health receiving water quality objectives and reserve presented in this section.

The wetlands have exhibited some degree of modification resulting from natural physical changes as well as anthropogenically induced impacts at both the local and catchment level. Resultingly, the wetlands scored average Present Ecological State (PES) scores within the "B – Largely Natural", C – Moderately Modified" and "D – Largely Modified" PES classes. Wetland systems which showed the highest disturbance and impact were the seeps (HGM 1) surrounding the existing colliery. These impacts are discussed below. The results of the wetland health and integrity assessment is provided in Table 15.

The highest disturbance to the wetland systems is related to agriculture. This includes direct disturbance from grazing livestock, and agricultural fields extending into the wetlands and fragmenting the wetlands. The indirect impacts include soil deposition during high rainfall periods and potential pollutants such as increased nutrients, herbicides and toxins entering the wetland systems from runoff. The wetland systems have also experienced altered hydrology due to damming within the wetlands, and minor water flow changes from infrastructure within and surrounding the wetlands altering topography and runoff characteristics, such as from the railway.

Table 15: Summary of the scores for the wetland PES.

B - Largely Natural	C - Moderately Modified	D - Largely Modified
HGM 2	HGM 3	HGM 1
HGM 5	HGM 4	
	HGM 6	

Six HGM units were identified within the assessed area relating to the Mooiplaats Colliery and the surrounding farm portions. The HGM units have been classified as: three seepage wetland systems (HGM 1, 3 and 6), unchannelled valley bottom systems (HGM 2), a channelled valley bottom wetland (HGM 4), and lastly floodplain wetland systems with an active channel (HGM 5).

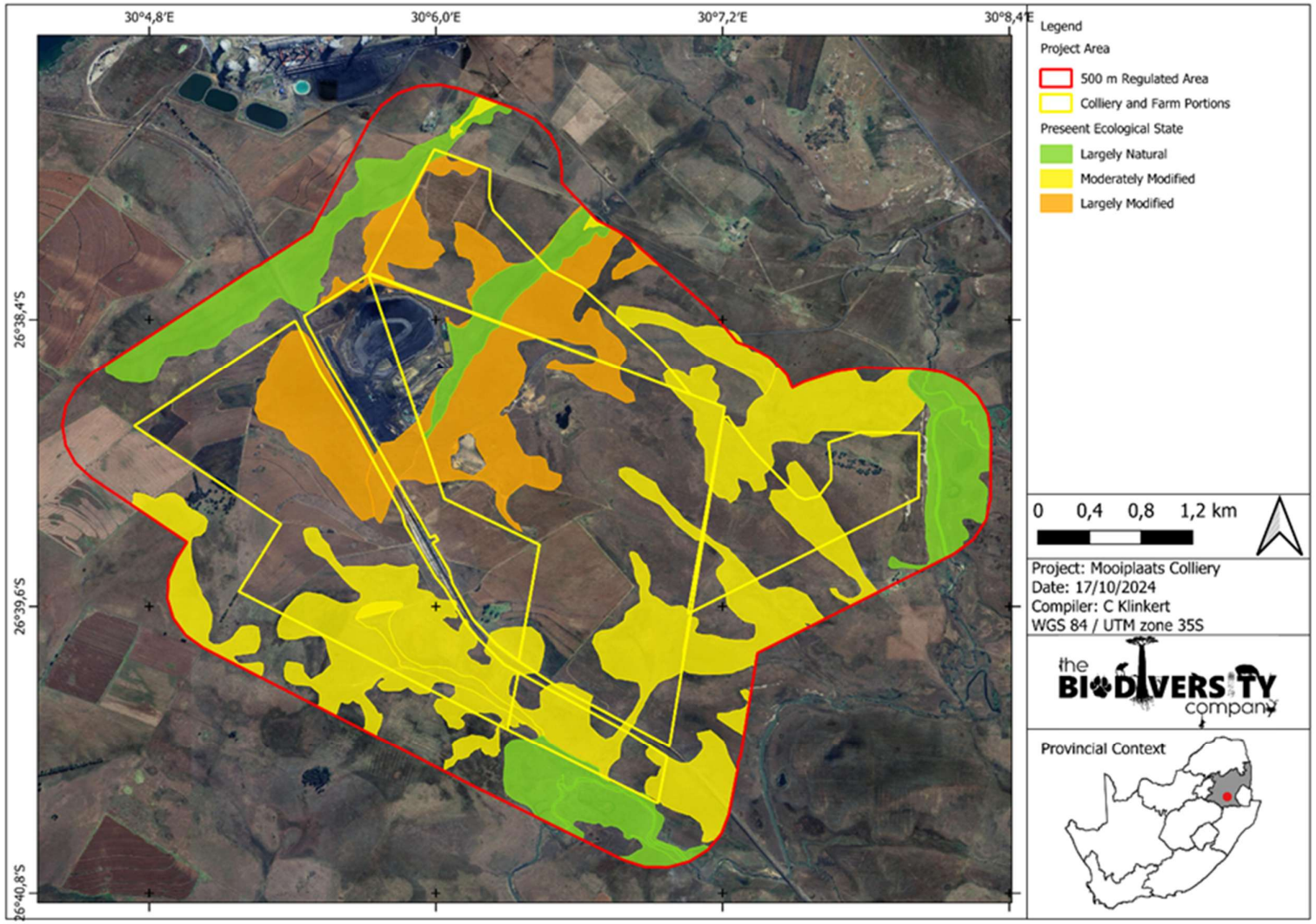


Figure 18: The PES classification for the delineated wetland systems.

The Ecological Importance and Sensitivity (EIS) assessment was applied to the wetland types in conjunction with the present ecological state and ecosystem service scores in the preceding sections, to assess the levels of sensitivity and ecological importance of the wetland. Various components pertaining to the protection status of a wetland is considered for the EIS, including Strategic Water Source Areas (SWSA), the NFEPA wet veg protection status and the protection status of the wetland itself considering the NBA wetland dataset as displayed in Table 16. The wetland average EIS score was "Very High" for the floodplain wetlands, and "High" for the seep and valley bottom wetlands.

Longstanding and widespread coal production within the Mpumalanga grasslands has placed large pressures on its remaining wetland resources. As such all wetlands within this region are considered important, especially considering the upper catchment nature of most of these highveld systems. Indeed, with the exception of seeps (Endangered), all Mesic Highveld Group 4 wetland HGM types are classified as Critically Endangered and Not Protected according to the NFEPA Wetveg Database. On a regional scale the Vaal and its Southern Tributary Floodplains are classified as Phase 1 FEPAs while the Witpuntspruit in the north is classified as a Phase 4 FEPA. A portion of the Vaal River Floodplain within the expansion area is classified as a Wetland FEPA.

At a more local scale the ecological importance and sensitivity of HGM unit 1, 2, 3, 4, and 6 scored High while HGM units 5 scored Very High. The floodplains, valley-bottom and depression systems within the project area all provide suitable habitat to support a large proportion of the region's wetland dependant species of conservation concern (SCC).

Table 16: The EIS results for the delineated HGM types.

HGM Type	NFEPA Wet Veg			NBA Wetlands			SWSA (Y/N)	CBA/ESA (Y/N)	Overall EIS
	Type	Ecosystem Threat Status	Ecosystem Protection Level	Wetland Condition	Ecosystem Threat Status 2018	Ecosystem Protection Level			
Seep	Mesic Highveld Grassland Group 4	Endangered	Not Protected	C/D/E/F	Critically Endangered	Poorly Protected	Y – Upper Vaal	ESA	**High**
Unchannelled Valley-Bottom		Critically Endangered	Not Protected	B (Field Visit)	Critically Endangered	Not Protected	Y – Upper Vaal	ESA	**High**
Channelled Valley-Bottom		Critically Endangered	Not Protected	A/B	Critically Endangered	Not Protected	Y – Upper Vaal	ESA	**High**
Floodplain		Critically Endangered	Not Protected	C	Critically Endangered	Not Protected	Y – Upper Vaal	CBA	**Very High**

4.4.6 WATER USER SURVEY

A hydrocensus user survey within the greater study area was conducted where relevant hydrogeological baseline information was gathered. The aim of the hydrocensus survey is to determine the ambient and background groundwater conditions and applications prior to the proposed expansion activities and to identify potential sensitive environmental receptors i.e. groundwater users in the direct vicinity of the operations. Geosites visited include nine (9) boreholes, thirteen (13) spring localities, five (5) streams/rivers as well as a neighboring farm dam. Refer to Figure 19 for a map depicting the spatial distribution of geosites with relevant information summarised in Table 17.

Of the boreholes and spring localities visited, the majority are in use (>90.0%) with only the two core and exploration boreholes not in use.

According to the Upper Vaal Internal Strategic Perspective (ISP) the fractured rock aquifers within this WMA are well utilised for rural domestic water supplies and stock watering (DWAF 2004). The groundwater application for domestic purposes is >45.0% while stock watering accounts for ~45.0%. Most boreholes visited are equipped with submersible pumps (~67.0%) while only one borehole is fitted with a handpump. The two exploration boreholes (HBH04 and HBH09) are not equipped.

Table 17: Hydrocensus user survey: relevant geosite information.

Site ID	Latitude	Longitude	Water level (mbgl)	Water level status	Site type	Site status	Equipment	Water application	Owner	Contact details
F 01	-26.66728	30.15877	0.00	Static	Spring	In use		Domestic	J, Roberts	0731989099
SW 01	-26.66286	30.13757			River				J, Roberts	0731989099
HBH 01	-26.64752	30.11161	94.58	Dynamic	Borehole	In use	Submersible pump	Domestic and livestock	J, Roberts	0731989099
F 02	-26.64674	30.10903	0.00		Spring	In use		Livestock	J, Roberts	0731989099
HBH 02	-26.64503	30.14264	7.38	Static	Borehole	In use	Submersible pump	Domestic and livestock	J, Roberts	0731989099
HBH 03	-26.69440	30.08751	3.75		Borehole	In use	Submersible pump	Domestic	J, Roberts	0731989099
F 03	-26.69637	30.08089	0.00		Spring	In use		Domestic	J, Roberts	0731989099
HBH 04	-26.67525	30.09233	0.00	Static	Borehole	Not in use	Not equipped	Exploration	J, Roberts	0731989099
F 05	-26.67289	30.09085	0.00		Spring	In use		Livestock	J, Roberts	0731989099
HBH 06	-26.67018	30.08004	nawl		Borehole	In use	Handpump	Domestic	J, Roberts	0731989099
F 06	-26.67058	30.07984	0.00		Spring	In use		Domestic	J, Roberts	0731989099
SW 02	-26.70205	30.08271			River				J, Roberts	0731989099
F 07	-26.67981	30.07348	0.00		Spring	In use		Livestock	L. Reyneke	0828851816
HBH 07	-26.67817	30.05782	2.03	Static	Borehole	In use	Submersible pump	Domestic	L. Reyneke	0828851816
F 08	-26.67961	30.05802	0.00		Spring	In use		Domestic	L. Reyneke	0828851816
SW 03	-26.64658	30.09697			Stockpile runoff				Mooiplaats Colliery	
SW 04	-26.64086	30.09761			Dam				Mooiplaats Colliery	
HBH 08	-26.68478	30.11271	9.76	Static	Borehole	In use	Submersible pump	Domestic and livestock	R. Saaiman	0734121967
HBH 09	-26.68044	30.72183	0.00	Static	Borehole	Not in use	Not equipped	Exploration	R. Saaiman	0734121967
F 09	-26.68115	30.12129	0.00		Spring	In use		Livestock	R. Saaiman	0734121967
F 10	-26.68630	30.11962	0.00		Spring	In use		Livestock	R. Saaiman	0734121967
F 11	-26.69017	30.11881	0.00		Spring	In use		Livestock	R. Saaiman	0734121967
F 12	-26.69087	30.11912	0.00		Spring	In use		Livestock	R. Saaiman	0734121967
F 13	-26.70819	30.10675	0.00		Spring	In use		Domestic	J.J. Greetch	0725851650
HBH 10	-26.69237	30.12935			Borehole	In use	Submersible pump	Domestic	Ignis van Rooyen	0826032810
SW 06	-26.64820	30.13124			River				Ignis van Rooyen	0826032810
F 14	-26.62659	30.12177	0.00		Spring	In use		Domestic	W. Meyer	0828004913
SW 07	-26.62673	30.12038			River				W. Meyer	0828004913
SW 08	-26.63563	30.13084			River				W. Meyer	0828004913

Note: NAWL (No Acess to the Water Level) is noted when the water level probe could not reach the static water level due to obstruction, equipment or no access

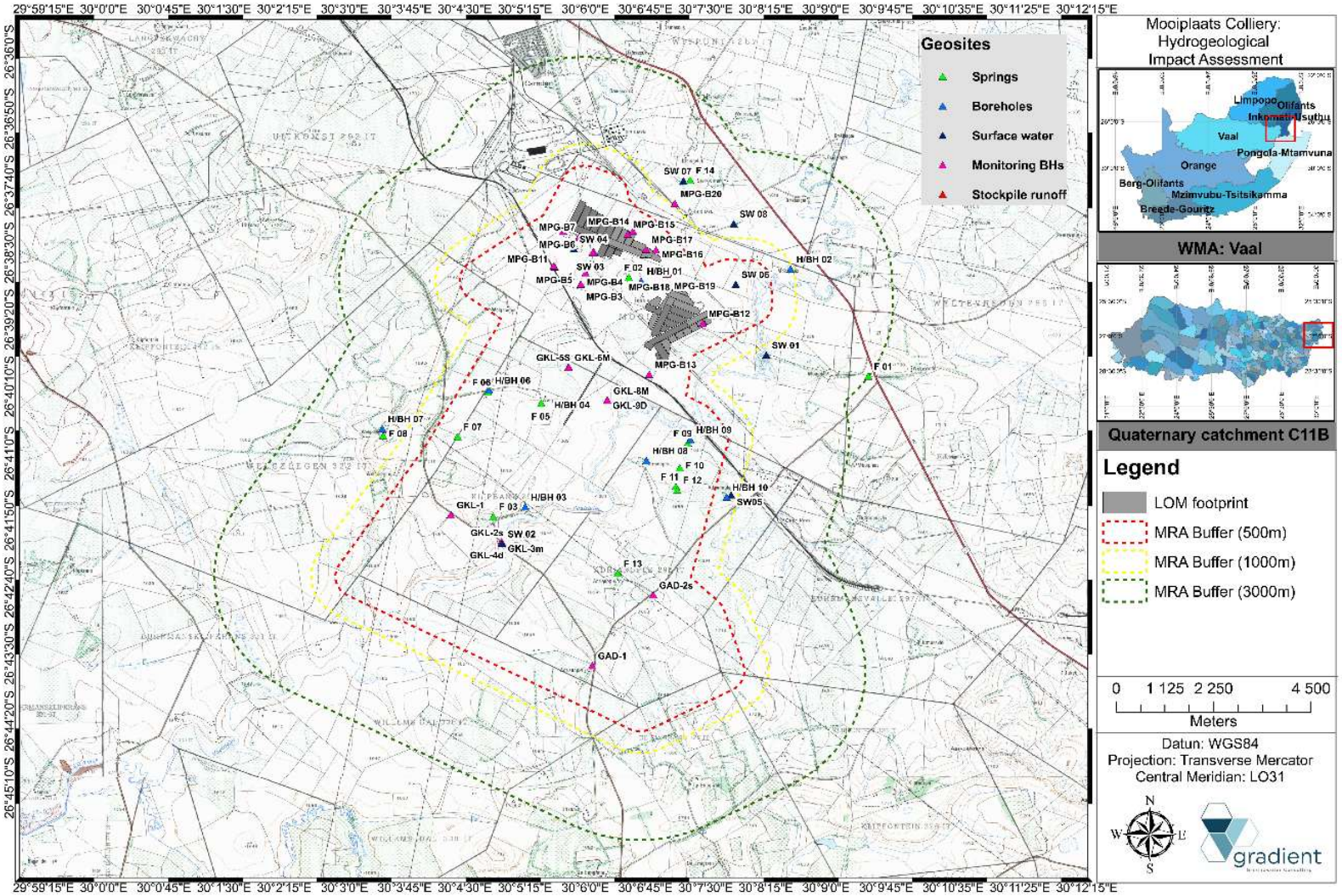


Figure 19: Spatial distribution of hydrocensus user survey geosites.

4.4.7 SENSITIVE AREAS SURVEY

The Vaal River and associated wetlands are situated in the upper reaches of the Vaal River catchment. These systems form part of the Upper Vaal Water Management Area and are zoned under Quaternary catchment C11B. In the north (existing colliery) water drains in a north-easterly direction towards the Witpuntspruit. This river runs to the north of the project area before merging with the Vaal River. In the south, a network of seeps and valley-bottom wetlands direct water towards the Vaal River Floodplain. This large, well-developed floodplain flows in a south-westerly direction. A further 6.5 km downstream it is joined by the Klein Vaal. The deeply incised topography of the farm portions surrounding the Mooiplaats Colliery has likely aided in the protection of its wetland systems which remain, for the most part, in a relatively intact, healthy and functional state.

Wetland units have been grouped based on the HGM type, size and ecological condition. It is assumed that systems of the same type and that are positioned in a similar landscape setting are likely to provide similar ecological services.

Four wetland types were identified within the colliery and the surrounding farms, namely, valley bottom wetlands – channelled and unchannelled, floodplain wetlands, and numerous seep wetlands which make up the majority of the wetlands identified. These wetlands consist of six Hydrogeomorphic (HGM) units – namely three seepage wetland systems (HGM 1, 3 and 6), unchannelled valley bottom systems (HGM 2), a channelled valley bottom wetland (HGM 4), and lastly floodplain wetland systems with an active channel (HGM 5). Additionally, three instream dams were also identified within the valley bottom wetland systems (HGM 2 and 4), and lastly several artificial wet areas, either artificial seeps or water storage dams were identified, located near the existing colliery.

The highest disturbance to the wetland systems is related to agriculture. This includes direct disturbance from grazing livestock, and agricultural fields extending into the wetlands and fragmenting the wetlands. The indirect impacts include soil deposition during high rainfall periods and potential pollutants such as increased nutrients, herbicides and toxins entering the wetland systems from runoff. The wetland systems have also experienced altered hydrology due to damming within the wetlands, and minor water flow changes from infrastructure within and surrounding the wetlands altering topography and runoff characteristics, such as from the railway.

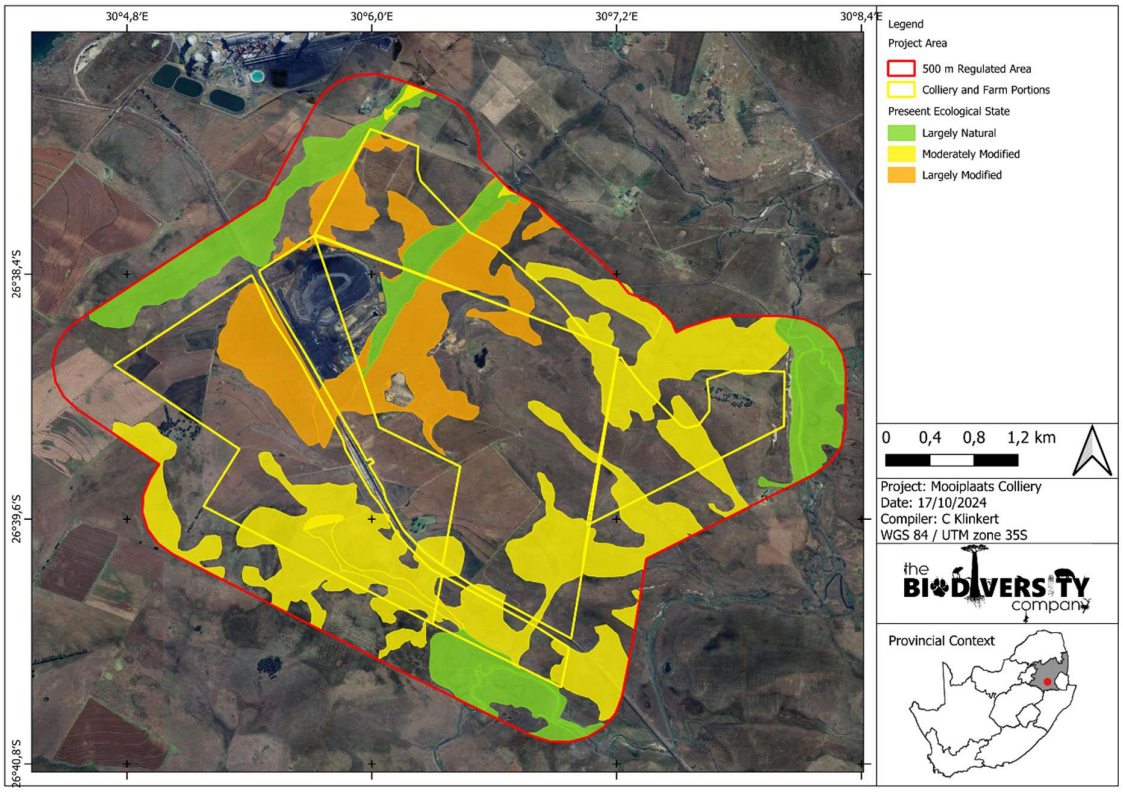


Figure 20: Present Ecological State of the wetland systems identified within the assessment area

4.5 GROUNDWATER

A distribution of borehole water levels recorded forming part of the existing groundwater monitoring network were considered and used to interpolate local groundwater elevation and hydraulic head contours. The groundwater levels available from the monitoring boreholes in and around the mining areas are summarized in Table 18 and Figure 21. The minimum water level recorded is at monitoring borehole GKL-1, 0.82mbgl, with the deepest water level measured IS at the potable water borehole, 58.77 mbgl. The average water level recorded, with inclusion of potential dynamic water levels is 13.32mbgl, while the average water level, only considering the static water levels is calculated at 4.79mbgl. Table 18 provides a summary of time-series water level measurements for the existing monitoring boreholes while Figure 22 depicts a bar chart of the time-series water levels. The relatively low standard deviation compared to the mean depth to groundwater i.e., Coefficient of Variation (CV) < 100%, suggests a relatively steady state groundwater environment.

Table 18: Regional water level summary

Site ID	Topographical Elevation (mamsl)	Water level (mbgl)	Groundwater Elevation (mamsl)
GAD-1	1666.00	3.48	1662.52
GAD-2S	1660.00	8.08	1651.92

Site ID	Topographical Elevation (mamsl)	Water level (mbgl)	Groundwater Elevation (mamsl)
GKL-5s	1647.00	4.17	1642.83
GKL-6m	1647.00	2.62	1644.38
GKL-8m	1622.00	1.53	1620.47
GKL-1	1678.00	0.82	1677.18
GKL-4D	1583.00	4.58	1578.42
GKL-9d	1622.00	13.03	1608.97
Potable water BH**	1692.13	58.77	1633.36
Usuthu BH**	1666.77	36.11	1630.66
Average	1647.82	13.32	1634.63
Minimum	1583.00	0.82	1578.42
Maximum	1692.13	58.77	1677.18
Standard deviation	30.41	18.11	26.61
Correlation		**0.81**	
****Notes: Representative of a dynamic water level.**			

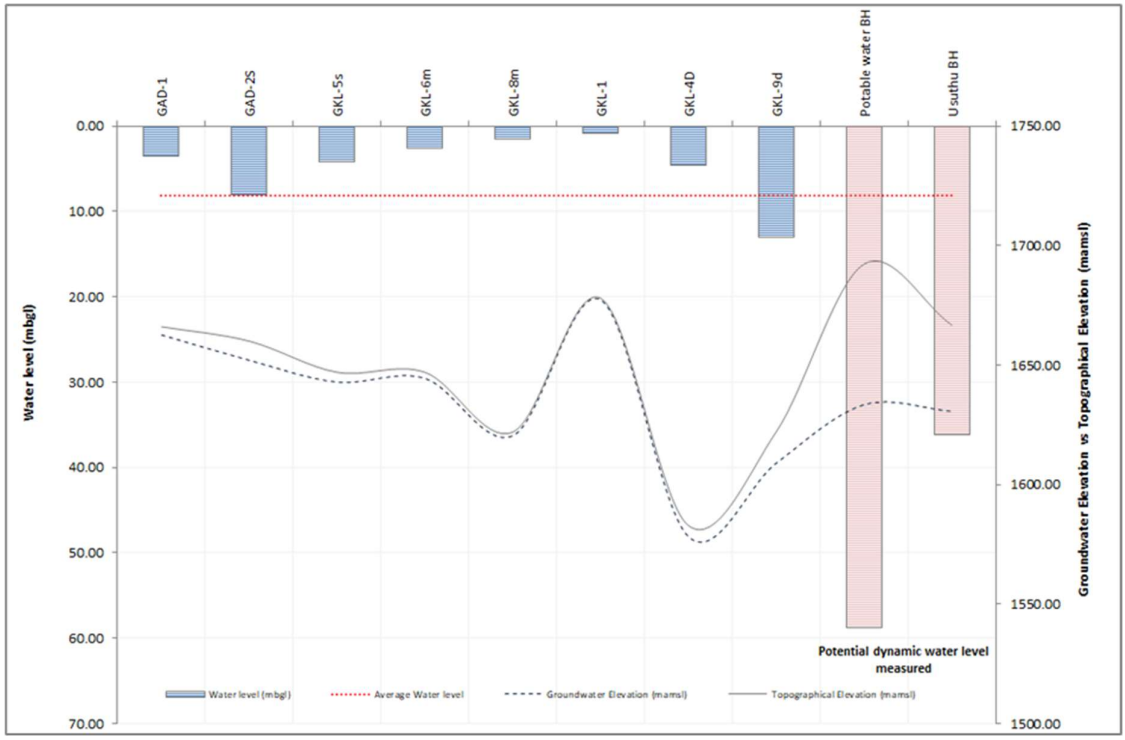


Figure 21: Topographical elevation vs. groundwater elevation correlation graph.

Table 19: Statistical summary of time-series water levels for the existing monitoring boreholes.

Monitoring period	GAD-1	GAD-2S	GKL-1	GKL-2S	GKL-4D	GKL-5s	GKL-6m	GKL-8m	GKL-9d
April 2022	2.55	6.55	25.64	2.41	1.46	0.86	0.00	2.79	12.14
July 2022	2.48	6.69	25.44	3.60	2.51	0.90	0.00	NAWL	12.16
October 2022	3.09	8.56	25.40	3.89	1.51	1.45	0.21	3.81	12.59
January 2023	2.07	4.40	25.21	2.07	2.41	0.88	0.00	2.09	11.43
April 2023	2.31	5.59	24.91	3.32	2.39	NAWL	NAWL	NAWL	NAWL
July 2023	3.16	8.61	24.79	3.89	2.52	1.56	0.70	3.94	12.58
October 2023	3.75	9.55	24.74	4.04	2.51	1.65	1.01	4.42	12.71
January 2024	3.72	9.39	24.78	3.98	2.51	1.48	0.85	4.50	12.68
Min	**2.07**	**4.40**	**24.74**	**2.07**	**1.46**	**0.86**	**0.00**	**2.09**	**11.43**
Max	**3.75**	**9.55**	**25.64**	**4.04**	**2.52**	**1.65**	**1.01**	**4.50**	**12.71**
Mean	**2.89**	**7.42**	**25.11**	**3.40**	**2.23**	**1.25**	**0.40**	**3.59**	**12.33**
Standard deviation	**0.64**	**1.89**	**0.35**	**0.76**	**0.46**	**0.36**	**0.44**	**0.96**	**0.46**
Coefficient of variation (CV)	**22.01**	**25.42**	**1.41**	**22.29**	**20.70**	**28.38**	**112.10**	**26.64**	**3.74**

Notes: NAWL – No Access to the Water Level

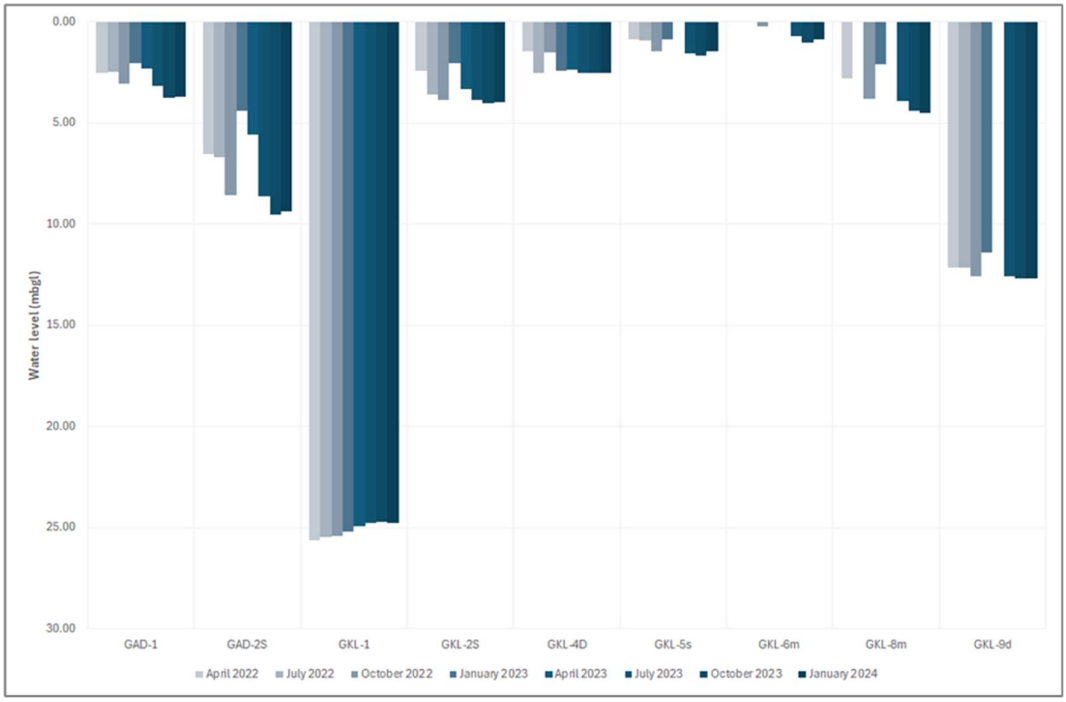


Figure 22: Bar chart of time-series water levels for existing monitoring boreholes

Analysed data indicate that the surveyed static water levels correlate very well to the topographical elevation with the correlation calculated at R2 >0.99 as depicted in Figure 21. It should be noted that when static water levels as well as dynamic water levels are considered, the correlation is not good and the R2 ~0.81 as depicted in Figure 23. Accordingly, it can be assumed that, under natural conditions, the regional groundwater flow direction will be dictated by topography, however localised deviation in groundwater flow direction can be observed and is attributed to abstraction causing negative hydraulic gradients towards respective boreholes, altering flow directions. The inferred regional groundwater flow direction of the shallow aquifer will thus be towards the lower laying drainage system of the Vaal River traversing the study area. The groundwater flow in the northern segment of the mining right area will be in a general south to southeastern direction whereas the groundwater flow in the southern section of the mining right area will be in a general north to northwestern direction depicted in Figure 24.

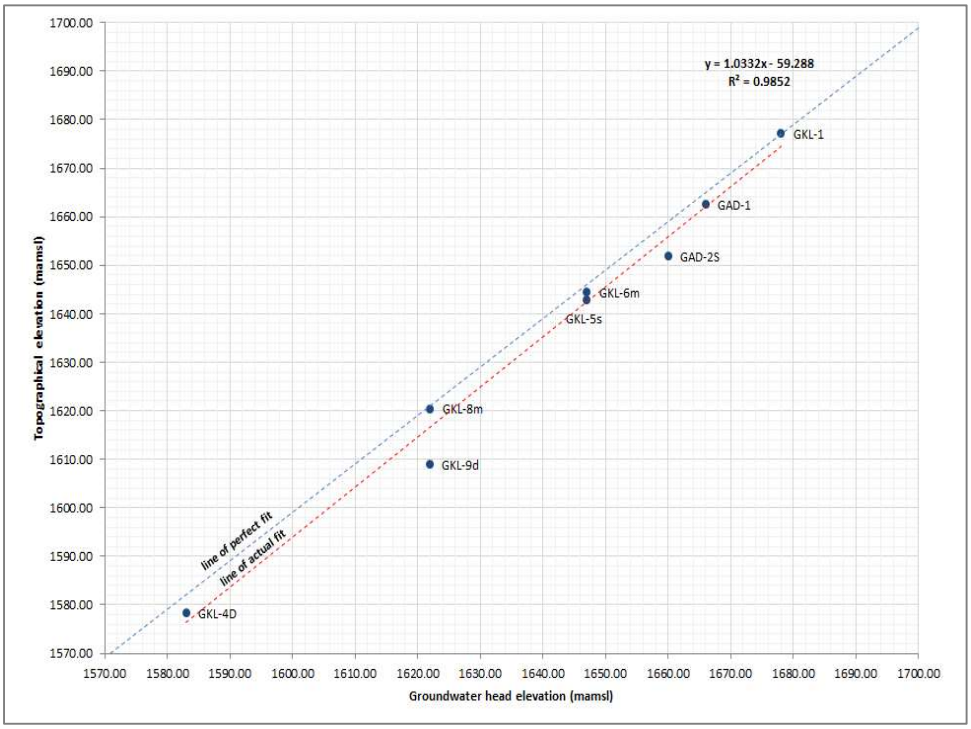


Figure 23: Topographical elevation vs. groundwater elevation correlation graph for static water level BHs only.

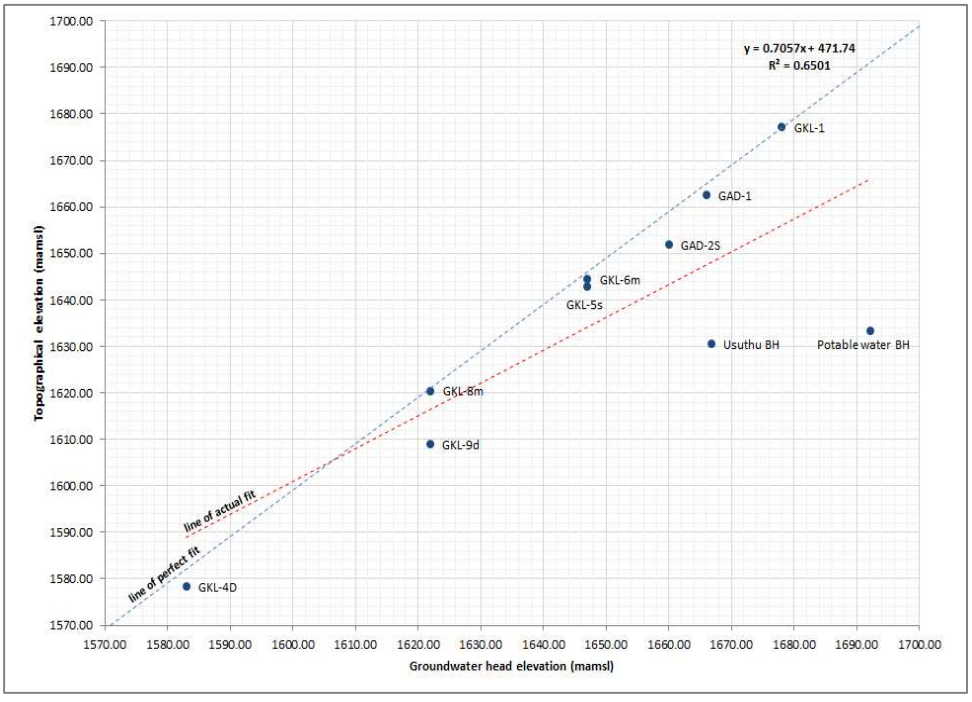


Figure 24: Topographical elevation vs. groundwater elevation correlation graph for all surveyed boreholes.

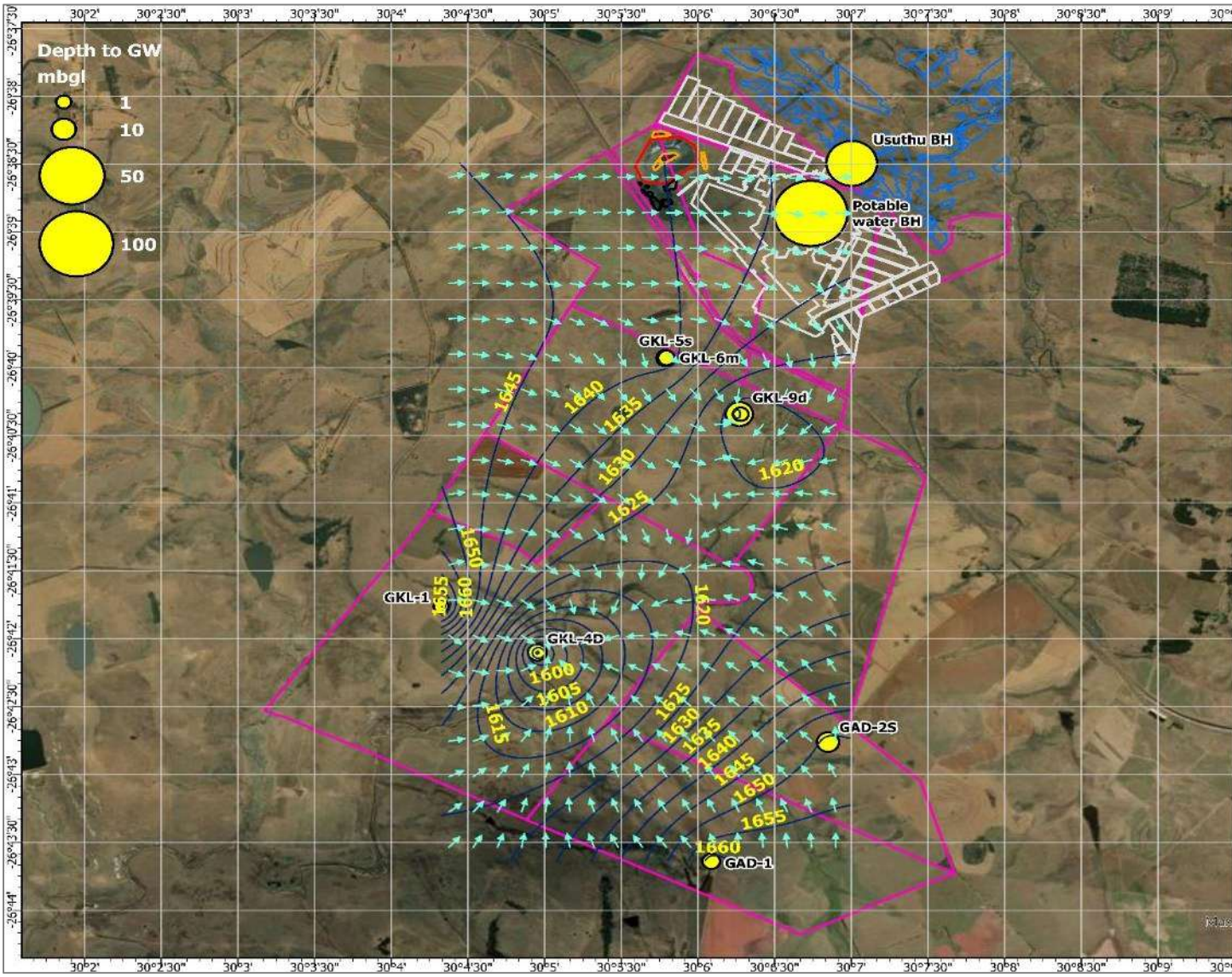


Figure 25: Regional groundwater flow direction and depth to groundwater.

4.5.1 AQUIFER CHARACTERISATION

4.5.1.1 AQUIFER TYPE

The Karoo sedimentary aquifer in the study area can be separated into different zones, classified as aquifers in their own right:

- Perched conditions in the soil horizon:
  - The shallow perched conditions are essentially restricted to finite extending clay lenses present in the soil (soft overburden) horizon. The perched aquifer has unconfined conditions; and
  - No major lateral extension of these zones were found.
- The shallow weathered zone Karoo aquifer and the deep fractured Karoo aquifer:
  - The host rock for these two aquifers is the Karoo sedimentary rocks. A large range of grain size distribution is present, which will not necessarily influence the hydraulic characteristics of the host rock; and
  - The shallow weathered zone aquifer displays unconfined to semi-confined conditions, while the deep aquifer predominantly displays semi-confined to confined conditions.

4.5.1.2 LATERAL AQUIFER DELINEATION

The lateral extent of the aquifer is important in order to set definable limits of any potential contaminant transport and lowering of water levels within the Karoo aquifers. This is due to the aquifer boundaries often being beyond the property boundaries of the mine. The shallow weathered aquifer zone is identified as the aquifer into which contaminants from surface activities will migrate. Any contaminant transport is identified by continuous monitoring of the shallow and deep Karoo aquifer. The groundwater elevation correlates roughly with the topography; therefore, groundwater will generally flow from higher towards lower topographical areas. The flow will not continue infinitely in a certain direction and is confined to boundaries. Two types of aquifer boundaries exist within the study area zone of influence:

- Physical aquifer boundary:
  - I.e. impermeable dolerite dykes and sills, or other geological discontinuities such as groundwater divides; and
- Hydraulic aquifer boundary:
  - I.e., surface water features which act as groundwater discharge boundaries.

The aquifer boundaries for the shallow weathered aquifer in the study area are as follows:

- The Sterkspruit on the north-eastern and eastern side, for approximately 8.5km;
- The Wolwespruit on the south-eastern side, for approximately 3.7km;
- The Vaal River and its tributaries on the southern, south-western and northern side, for approximately 19 km; and

- Two groundwater divides with a total length of about 6.1km in the west and another two of approximately 1km each in the south-east.

The Vaal River forms a local discharge boundary for the aquifer (groundwater discharge to river) and no flow from the river alluvial system towards the aquifer is supposed. Dolerite dykes and sills present within the aquifer boundaries may act as localised no-flow boundaries, or as preferential pathways, depending on the degree of weathering of the dolerite and the fracturing associated with the intrusions.

4.5.1.3 AQUIFER THICKNESS

The aquifer thickness logged during the drilling of the monitoring boreholes is as follows:

- Perched aquifer:
  - The average depth of the soil horizon is 5 metres below ground level (mbgl). Perched conditions is present in clay lenses within the soil horizon.
- Shallow weathered aquifer:
  - The average depth of this aquifer is between 5mbgl - 22 mbgl and it will most often be totally saturated as the average depth to the groundwater level is about 4 mbgl; and
- Deep fractured aquifer:
  - This aquifer is present below 22 mbgl and the depth is taken as the bottom of the Karoo sedimentary rocks that may be present at a further 100m – 150m below the average depth of the exploration boreholes (140m) drilled in the area.

4.5.1.4 AQUIFER CLASSIFICATION

The Karoo aquifer at Mooiplaats has been classified in accordance with the following definitions for aquifer management classes:

- Sole Aquifer System:
  - 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;
- Major Aquifer System:
  - These are highly 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 (less than 150 mS/m Electrical Conductivity);
- Minor Aquifer System:
  - 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 for local supplies and in supplying base flow for rivers; and

- Non-Aquifer System:
    - These are formations with negligible permeability that are regarded as not containing groundwater in exploitable quantities. Water quality may also be such that it renders the aquifer unusable. However, groundwater flow through such rocks, although imperceptible, does take place, and needs to be considered when assessing the risk associated with persistent pollutants.
    - Subject to the baseline information, the following overall classification of the Karoo aquifer in the area could be made:

The Karoo aquifer of the Mooiplaats area can, in general, be classified as a low yielding aquifer. It does have a viable exploitation potential for domestic and stock-watering application and as such is the main water resource to the farming communities in the area. The aquifers will however not support formal irrigation application over any extensive area (>10ha). The shallow weathered aquifer can therefore be classified as a minor aquifer system in terms of aquifer management as discussed above.

4.5.1.5 GROUNDWATER QUALITY

The overall water quality of groundwater samples analysed is good with the majority of macro and micro determinants below the SANS 241:2015 limits. Water quality can be described as neutral, non-saline and slightly to moderately hard. Isolated sampling localities indicate a high salt load i.e., GKL-4D and the Usuthu borehole. It should be noted that monitoring locality GKL-4D suggests elevated fluoride, sodium as well as aluminum and iron concentration while monitoring locality Usuthu BH suggest a very high TDS (very saline) with elevated sulphate and sodium concentrations. The latter can be attributed to the defunct underground workings targeted. Table 20 summarises water quality analysis per sampling locality.

Groundwater samples are analysed for:

- pH
- EC mS/m
- TDS mg/L
- Total Hardness mg/L
- Alkalinity $CaCO_3$/L
- Ca mg/L
- Mg mg/L
- Na mg/L
- K mg/L
- F mg/L
- Cl mg/L

- SO_4 mg/L
- NO_3 mg/L
- Al mg/L
- Fe mg/L
- Mn mg/L
- NH_3 mg/L

Table 21 provides a summary of the location of the groundwater monitoring points.

Table 20: Water quality results of groundwater monitoring boreholes (SANS 241:2015)

Determinant	Unit	Risk	SANS 241:2015 limits	GAD-1	GAD-2S	GKL-1	GKL-2S	GKL-4D	GKL-5S	GKL-6M	GKL-8M	GKL-9D	Potable water BH	Usuthu BH
General parameters														
pH	-	Operational	≥5.0 ≤ 9.5	7.27	7.56	7.41	7.51	8.30	7.85	7.65	7.66	7.81	7.44	7.62
EC	mS/m	Aesthetic	≤170.0	28.20	15.28	36.35	41.05	**174.25**	31.80	25.27	24.50	21.27	28.00	**302.00**
TDS		Aesthetic	≤ 1 200.0	145.00	81.00	198.00	223.00	949.00	178.00	142.00	130.00	119.00	156.28	**1994.48**
Total Alkalinity	CaCO3/l	-	-	119.00	61.00	155.00	180.00	13.00	68.00	73.00	92.00	66.00	152.00	1228.00
Total Hardness	mg/l	-	-	140.00	47.53	189.50	206.25	475.51	167.79	132.33	118.67	110.33	133.24	159.99
Anions														
Cl	mg/l	Aesthetic	≤300.0	6.03	15.88	5.61	5.93	254.02	3.61	4.50	7.82	3.60	1.24	70.80
SO_4	mg/l	Acute health	≤250.0	1.06	1.06	6.20	14.67	12.65	0.14	0.45	0.98	1.39	2.92	**419.24**
F	mg/l	Acute health	≤1.50	0.04	0.04	0.03	0.02	**2.74**	0.26	0.51	0.00	0.08	0.09	0.09
NO_3< N	mg/l	Acute health	≤11.0	0.35	1.69	0.35	0.35	0.35	0.06	0.35	0.35	0.35	0.35	0.35
Cations and metals														
Ca	mg/l	-	-	30.60	13.90	39.13	41.24	3.42	18.37	22.08	25.70	17.95	38.70	39.50
Mg	mg/l	-	-	10.24	6.48	13.92	18.80	1.17	5.42	4.44	6.72	5.03	8.89	14.90
Na	mg/l	Aesthetic	≤200.0	10.27	5.71	17.40	16.40	**368.57**	45.33	28.30	14.17	21.63	11.10	**693.18**
K	mg/l	-	-	1.88	0.95	1.30	1.47	3.96	1.59	1.19	1.74	2.13	2.14	10.00
Al	mg/l	Operational	0.3	0.01	0.01	0.08	0.00	**1.99**	0.01	0.01	0.01	0.00	0.01	0.01
Fe	mg/l	Acute health	2.0	0.40	0.38	0.09	0.71	**7.25**	0.88	1.23	0.89	0.48	0.01	0.01
Mn	mg/l	Operational	0.4	0.18	0.08	0.15	0.11	0.02	0.07	0.15	0.09	0.09	0.01	0.01

Note: "- " indicate that no limits have been provided by the SANS 2015:241 guidelines.
"< " indicate that results analysed are below the detection limits.
Shaded cells exceed SANS 241:2015 drinking water guidelines.

Table 21: Summary of groundwater monitoring points

Mooiplaats Colliery Groundwater Monitoring Programme			
Groundwater Monitoring Points			
Locality	**Locality Description**	**Coordinates WGS 84 ddd.ddddd**	**Monitoring Frequency**
GKL-1*	IWUL Borehole – Outer perimeter borehole	S26.69603° E30.07208°	Quarterly
GKL-4d*	IWUL Borehole – Outer perimeter borehole	S26.70167° E30.08253°	Quarterly
GKL-3m	Borehole – Outer Perimeter borehole	S26.70178° E30.08269°	Ad Hoc
GKL-2s*	IWUL Borehole – Outer perimeter borehole	S26.70178° E30.08269°	Quarterly
GAD-2s*	IWUL Borehole – Outer perimeter borehole	S26.71269° E30.11414°	Quarterly
GAD-1*	IWUL Borehole – Outer perimeter borehole	S26.72733° E30.10144°	Quarterly
GKL-9D*	IWUL Borehole – Outer perimeter borehole	S26.67231° E30.10450°	Quarterly
GKL-8M*	IWUL Borehole – Outer perimeter borehole	S26.67233° E30.10464°	Quarterly
GKL-5S*	IWUL Borehole – Outer perimeter borehole	S26.66542° E30.09647°	Quarterly
GKL-6M*	IWUL Borehole – Outer perimeter borehole	S26.66542° E30.09658°	Quarterly
GKL-7D	Outer perimeter borehole	S26.66542° E30.09658°	Ad Hoc
GAD-3s	Borehole – Outer Perimeter borehole	S26.67772° E30.12374°	Ad Hoc
GAD-4m	Borehole – Outer Perimeter borehole	S26.67772° E30.12374°	Ad Hoc
GAD-5d	Borehole – Outer Perimeter borehole	S26.67772° E30.12374°	Ad Hoc
MPG-B1	Down gradient (north) of the co-disposal facility.	S26.63843° E30.09878°	Ad Hoc
MPG-B2	Down gradient (east) of the lined Settling Dams and co-disposal.	S26.64143° E30.10175°	Ad Hoc
MPG-B3	Near the security gate.	S26.64816° E30.09905°	Ad Hoc
MPG-B4	Near the security gate.	S26.64819° E30.09910°	Ad Hoc
MPG-B5	Up-gradient (south-west) of the plant area next to the railway line.	S26.64457° E30.09363°	Ad Hoc
MPG-B6	Adjacent to the return water dam.	S26.63719° E30.09540°	Ad Hoc
MPG-B7	Down gradient (north) of the co-disposal facility.	S26.63832° E30.09870°	Ad Hoc
MPG-B8	Down gradient (east) of the lined Settling Dams.	S26.64160° E30.10155°	Ad Hoc
MPG-B9	Down gradient (east) of the plant area.	S26.64403° E30.10107°	Ad Hoc
MPG-B10	Down gradient (east) of the plant area.	S26.64581° E30.10007°	Ad Hoc
MPG-B11	Up-gradient (south-west) of the plant area next to the railway line.	S26.64435° E30.09344°	Ad Hoc
MPG-B12	At MPN Vunene extension	S26.65633° E30.12443°	Ad Hoc

MPG-B13	South of the mine next to the railway line.	S26.66689° E30.11329°	Ad Hoc
MPG-B14	Between Usutu/MPN	S26.63716° E30.10992°	Ad Hoc
MPG-B15	Between Usutu/MPN	S26.63778° E30.10881°	Ad Hoc
MPG-B16	Between Usutu/MPN	S26.64106° E30.11469°	Ad Hoc
MPG-B17	Between Usutu/MPN	S26.64095° E30.11259°	Ad Hoc
MPG-B18	Between Usutu/MPN	S26.64608° E30.11685°	Ad Hoc
MPG-B19	Between Usutu/MPN	S26.64600° E30.11725°	Ad Hoc
MPG-B20	Usutu UG. Borehole intersecting mine at 90 m	S26.63144° E30.11860°	Ad Hoc
	***IWUL Monitoring Points**		

The overall water quality of groundwater samples analysed is good with the majority of macro and micro determinants below the SANS 241:2015 limits. Groundwater quality outside the mining right area remained of good quality, with seasonal fluctuations, despite several IWUL Limits and Grootdraai Dam Guidelines being exceeded. The slight movement of pH values, EC concentrations (seasonal at GKL-4d) and variables associated with geology indicate the consistent recharge of natural groundwater without mining impacts. Furthermore, the higher SO_4 concentrations recorded during the start of the reporting period remained low which indicate that concentrations follow seasonal trends which is unlikely to be linked to Mooiplaats mining.

Naturally high CaCO3 and Cl concentrations (geological) at especially GKL-4D resulted in elevated EC concentrations that exceeded the IWUL limits and Grootdraai Dam Guidelines -Vaal Origin for EC and CaCO3. Due to very low IWUL parameters (SO_4 of 0.25mg/L, Ca of 15.18mg/L and Mg of 6.96 mg/L) variable concentrations in its natural state exceeded the limits. GKL-4D is drilled to a depth of 80 meters. Naturally high CaCO3, Na and Cl concentrations (geological) elevated the EC concentrations, to exceed the IWUL Limit. Elevated CaCO3, SO_4, Na, Ca, Mg, Cl and Fe concentrations can be ascribed to the deeper geology of the area.

Groundwater - Outside the mining right area, water quality remains stable and of good quality, with slight seasonal fluctuations. Neutral to high pH values and Alkalinity (CaCO3) concentrations indicate geological conditions. The movement of pH values, EC concentrations and variable associated with geology indicate the consistent recharge of natural groundwater without mining impacts.

Groundwater levels continued to fluctuate according to seasonal factors and not due to mining impacts. No impact from Mooiplaats colliery was observed in the groundwater monitored.

Table 22 provides an overview of the groundwater levels including most recent measurements (April 2025) with Figure 26 depicting a bar-chart of major anion and cation composition. Figure 27 indicate a spatial distribution map of hydrochemical composition per sampling locality.

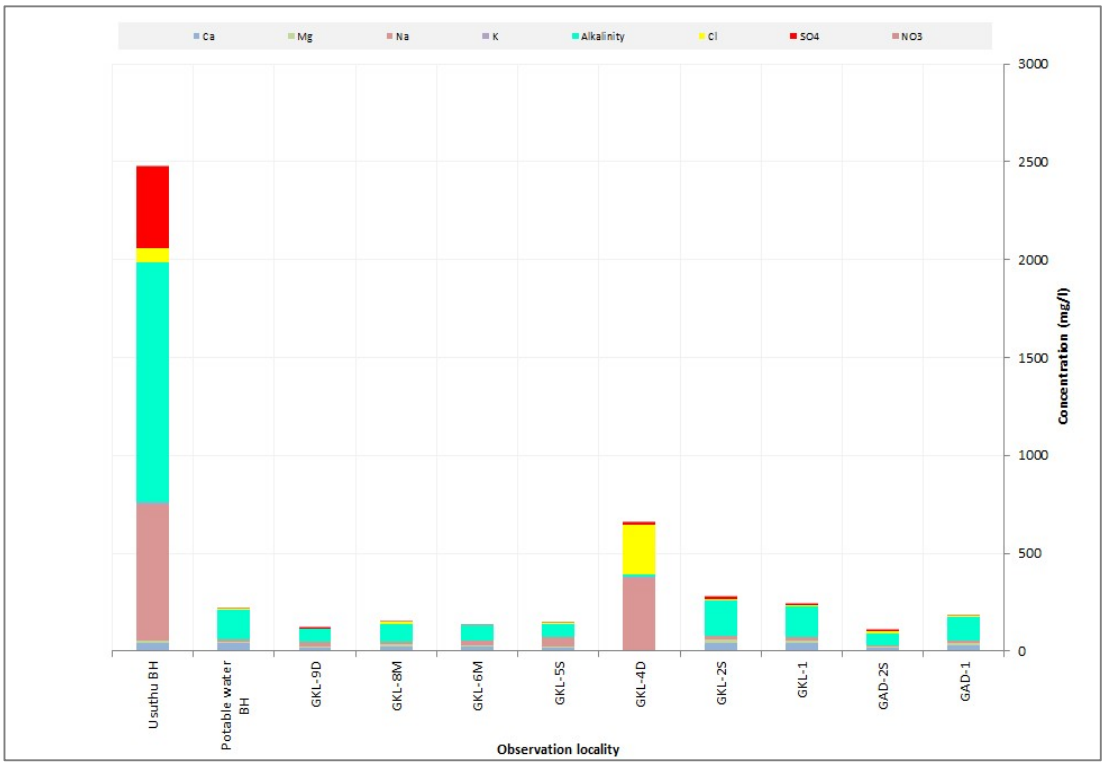


Figure 26: Hydrochemistry: Composite bar-chart indicating major anion cation composition of groundwater samples analysed (mg/l).

Table 22: Mooiplaats groundwater levels for IWUL monitoring boreholes.

Mooiplaats IWUL Groundwater Levels									
Date	**GAD-1**	**GAD-2S**	**GKL-1**	**GKL-2S**	**GKL-4D**	**GKL-5s**	**GKL-6m**	**GKL-8m**	**GKL-9d**
Apr-24	-3.48	-8.08	-24.82	-4.17	-2.62	-1.53	-0.82	-4.58	-13.03
Jul-24	-4.28	-9.44	-24.98	-4.17	-2.61	-2.07	-1.63	-4.98	-13.19
Oct-24	-4.79	-10.02	-25.17	-2.68	-3.29	-2.3	-2.08	-5.21	-13.27
Apr-25	-1.93	-4.26	-25.13	-2.73	-2.55	NA	NA	NA	NA

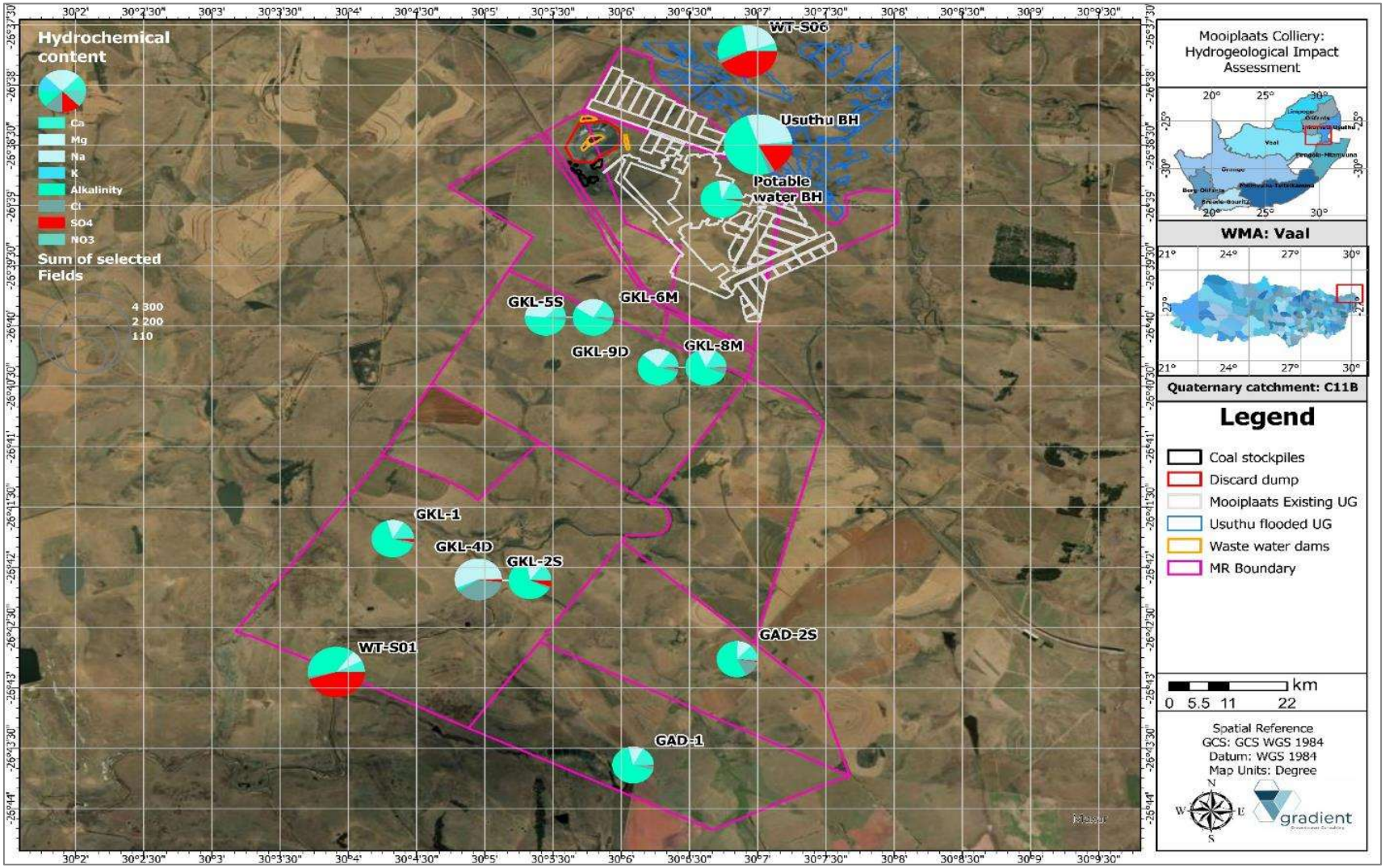


Figure 27: Hydrochemical analysis spatial distribution (mg/l).

4.5.2 HYDROCENSUS

A hydrocensus user survey within the greater study area was conducted where relevant hydrogeological baseline information was gathered. In order not to repeat information in this document, the hydro-census discussion is presented in Section 4.4.6.

4.5.3 POTENTIAL POLLUTION SOURCE IDENTIFICATION

The main indicator for groundwater contamination is sulphate. During the various stages of geochemical transformation, sulphate will be associated with sodium, calcium and magnesium. TDS or EC indicates the total salt load. Other contaminant indicators associated with sulphate, are pH levels. When low-pH conditions prevail, increased metals concentrations may manifest, such as iron.

4.5.4 GROUNDWATER MODEL

The purpose of a groundwater model is to serve as a tool to evaluate various water management options and scenarios. The model design and parameters are presented in the attached updated Geohydrological Specialist Report (refer to Appendix D). Various management scenarios were modelled for the purposes of planning and decision making with stress periods listed in Table 23:

1. Scenario 01: Pre-mining water balance (Quasi steady state).
2. Scenario 02: Groundwater abstraction from proposed production boreholes for the operational phase(s).
3. Scenario 03: Sulphate pollution plume migration within the shallow, intergranular aquifer for the operational phase(s).
4. Scenario 04: Sulphate pollution plume migration within the shallow, intergranular aquifer for the post-closure phase(s).
5. Scenario 05a (mitigation and management): Sulphate pollution plume migration within the shallow, intergranular aquifer with establishment of scavenger or seepage capturing boreholes down-gradient of proposed waste infrastructure.
6. Scenario 05b (mitigation and management): Sulphate pollution plume migration within the shallow, intergranular aquifer with implementation of a cut-off or fracturing trench constructed down-gradient of proposed waste infrastructure.
7. Scenario 05c (mitigation and management): Sulphate pollution plume migration within the shallow, intergranular aquifer with implementation of a cut-off or fracturing trench constructed down-gradient of proposed waste infrastructure.

Table 23: Summary of model stress-periods.

Stress Period	Description
Year 01 - Year 20	Operational period
Year 20 - Year 70	Post-closure (50-years)
Year 70 - Year 120	Post-closure (100-years)

4.5.4.1 SCENARIO 01: BASELINE CATCHMENT WATER BALANCE

Scenario 01 simulated the baseline conditions. Table 24 summarises the groundwater catchment water balance representing steady state conditions. Recharge is assumed the only source of inflow to the system and has been simulated at $1.45E^{+04}m^3/d$, while the largest loss to the groundwater system is via baseflow, $1.41E^{+04}m^3/d$. An assumption has been made for the total volume of groundwater abstraction from privately owned water supply boreholes account to $4.96E^{+02}m^3/d$. An imbalance, ignoring internal transfer, for the modelled catchment is calculated at a volume of $3.50E^{+01}m^3/d$.

Table 24: Scenario 01: Catchment water balance – Baseline conditions.

Scenario 01 – Steady state pre-mining (Quasi steady-state)			
Parameter	**Inflow (m^3/d)**	**Outflow (m^3/d)**	**Balance (m^3/d)**
Recharge (m^3/d)	1.45E+04	0.00E+00	1.45E+04
Catchment abstraction (m^3/d)**	0.00E+00	4.96E+02	-4.96E+02
Dirichlet/ Groundwater discharge to baseflow contribution (m3/d)	0.00E+00	1.41E+04	-1.41E+04
Imbalance ignoring internal transfer (m^3/d)	0.00E+00	3.50E-01	-3.50E-01
Total (m^3/d)	**1.45E+04**	**1.45E+04**	**0.00E+00**

4.5.4.2 SCENARIO 02: GROUNDWATER ABSTRACTION FROM PROPOSED PRODUCTION BOREHOLES FOR THE OPERATIONAL PHASE(S)

Scenario 02 simulated the water level drawdown caused by abstraction from proposed production boreholes for the operational phase(s). Figure 28 shows a cross section the simulated hydraulic head drawdown in conjunction with the zero-pressure isoline i.e. piezometric surface. It is evident that the abstraction activities change the hydraulic gradient as groundwater is removed from storage. Table 25 summarises the groundwater catchment water balance for stress periods representing the operational phase. Recharge is assumed the only source of inflow to the system and has been simulated at $1.45E^{+04}m^3/d$, while the largest loss to the groundwater system is via baseflow, $1.37E^{+04}m^3/d$. The average combined groundwater abstraction has been simulated at approximately $3.33E^{+02}m^3/d$ (as sourced from the sustainable yield calculations in Section 7 of the Geohydrology report) while the volume of groundwater released from storage account to approximately $5.51E^{+01}m^3/d$.

Table 25: Scenario 02: Catchment water balance –Groundwater abstraction from scavenger boreholes for the operational phase(s).

Scenario 02: Groundwater abstraction from proposed production boreholes for the operational phase(s).			
Parameter	**Inflow (m^3/d)**	**Outflow (m^3/d)**	**Balance (m^3/d)**
Recharge (m^3/d)	1.45E+04	0.00E+00	1.45E+04
Catchment abstraction (m3/d)**	0.00E+00	4.96E+02	-4.96E+02
Dirichlet/ Groundwater discharge to baseflow contribution (m^3/d)	0.00E+00	1.37E+04	-1.37E+04
Groundwater abstraction from production boreholes (m^3/d)	0.00E+00	3.33E+02	-3.33E+02
Storage Capture(-)/Release(+)(m^3/d)	-5.51E+01	0.00E+00	-5.51E+01
Total (m^3/d)	**1.45E+04**	**1.45E+04**	**-5.68E-14**

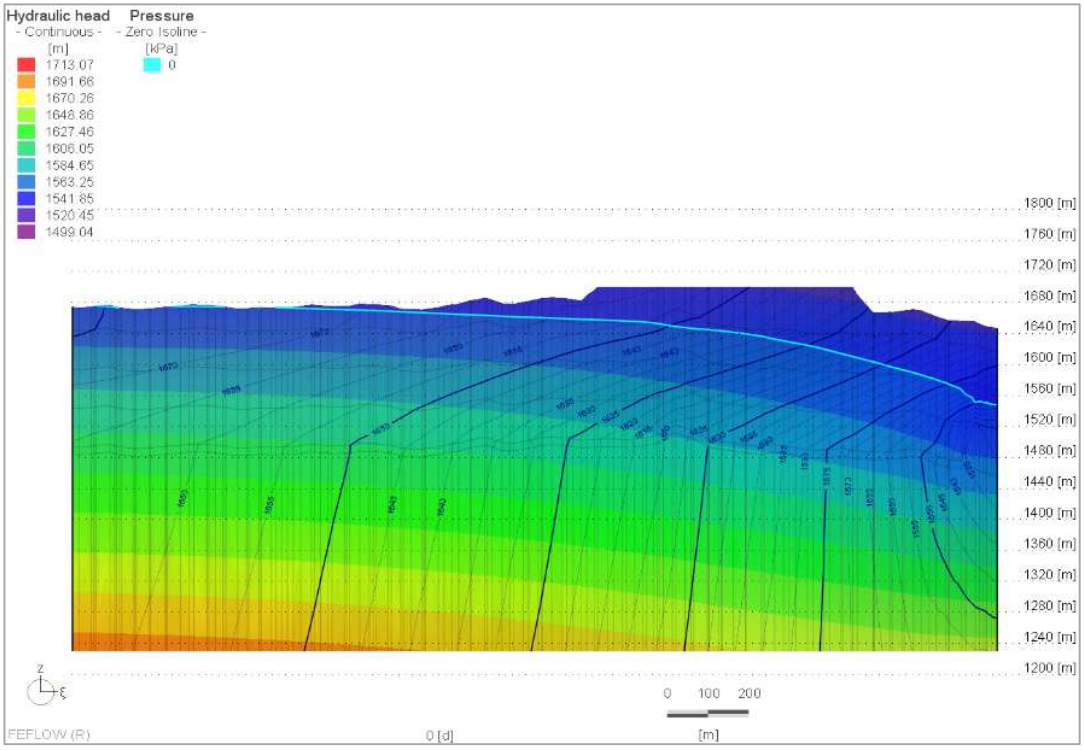


Figure 28: Scenario 02: Cross sectional view of the simulated hydraulic head in a northwest-southeast orientation (Slice A-A').

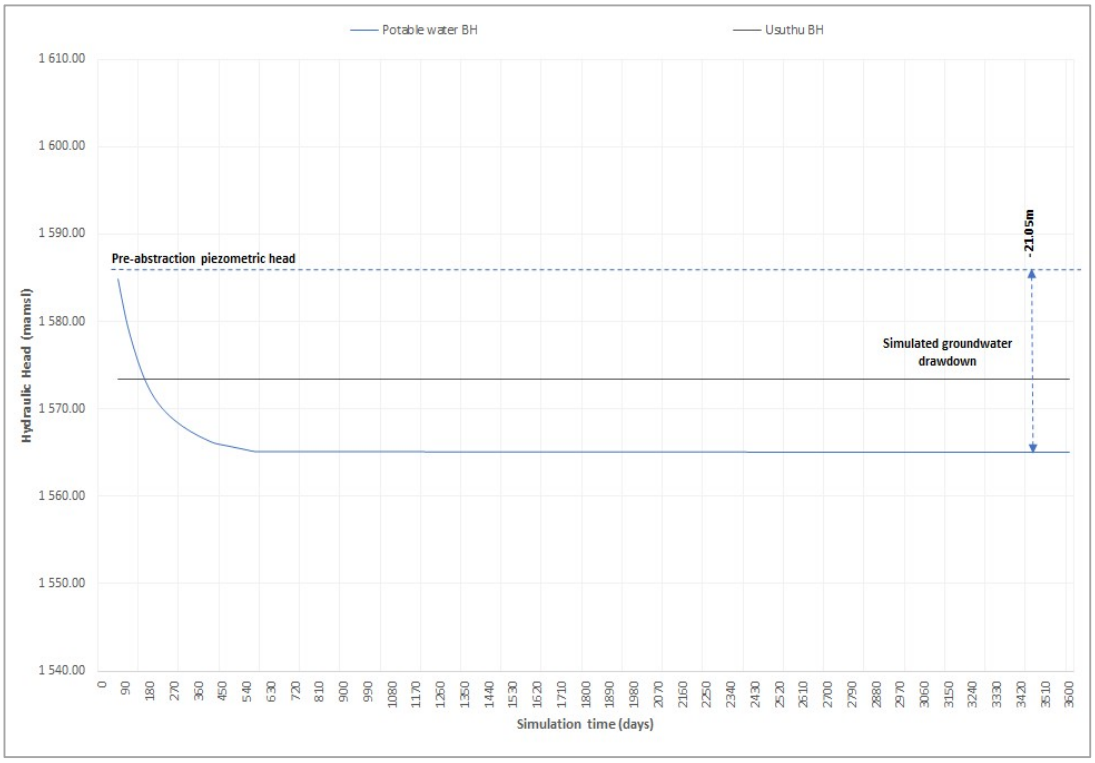


Figure 29: Scenario 02: Time-series water level drawdown within existing scavenger boreholes.

Figure 29 shows the simulated groundwater drawdown within the existing production boreholes. It should be noted that the simulated groundwater drawdown zone intercepts various monitoring boreholes and stretches to the drainage systems or associated wetlands in the proximity of the site. The groundwater drawdown during the simulated abstraction period will range from <1.0mbsl (meter below static level), i.e., relatively little drawdown expected within the Usuthu boreholes to >21.0mbsl simulated within the Potable water borehole. The groundwater capture zone i.e. drawdown zone of influence extent will cover an estimated footprint of approximately 3.36km^2 propagating radially reaching a maximum distance of approximately 1.40km in a general south to southeastern direction.

As mentioned there exist a pronounced interaction between surface and groundwater as the two regimes are well-linked. Groundwater contribution to baseflow discharge[5] accounts to approximately 1.33E^{+04}m^3/d during baseline conditions, whereas groundwater contribution to baseflow discharge during the operational period decreases to ~1.29E^{+04}m^3/d (Refer to Figure 30). The latter accounts for an average loss of 3.68E^{+02}m^3/d, ~2.84% with a maximum reduction of 4.21% for the operational phase(s). Figure 31 depicts the Darcy flux vectors in the direct vicinity of the proposed production borehole alternating the local hydraulic gradient a. Figure 32 indicates the simulated groundwater drawdown and depression zone created from abstraction activities

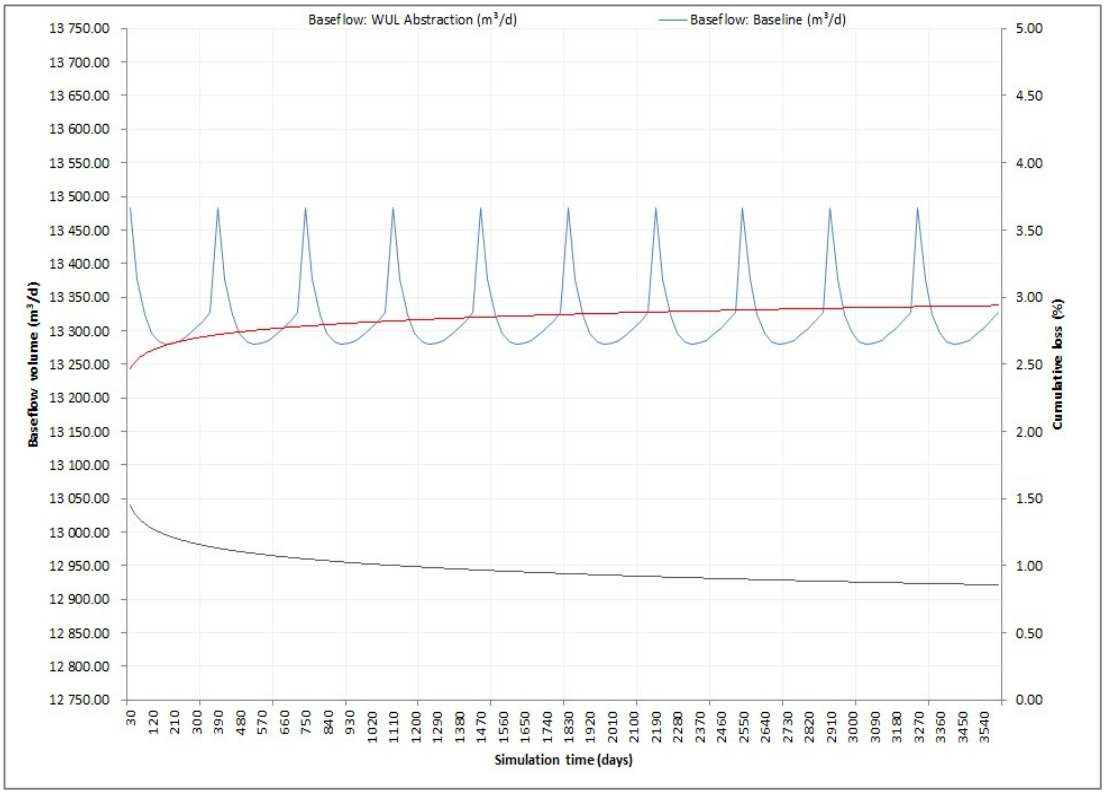


Figure 30: Scenario 02a: Baseflow comparison curve: Pre-abstraction vs abstraction from scavenger boreholes.

[5] Baseflow calculations is expressed as the observed loss based on the drainage system traversing the project area.

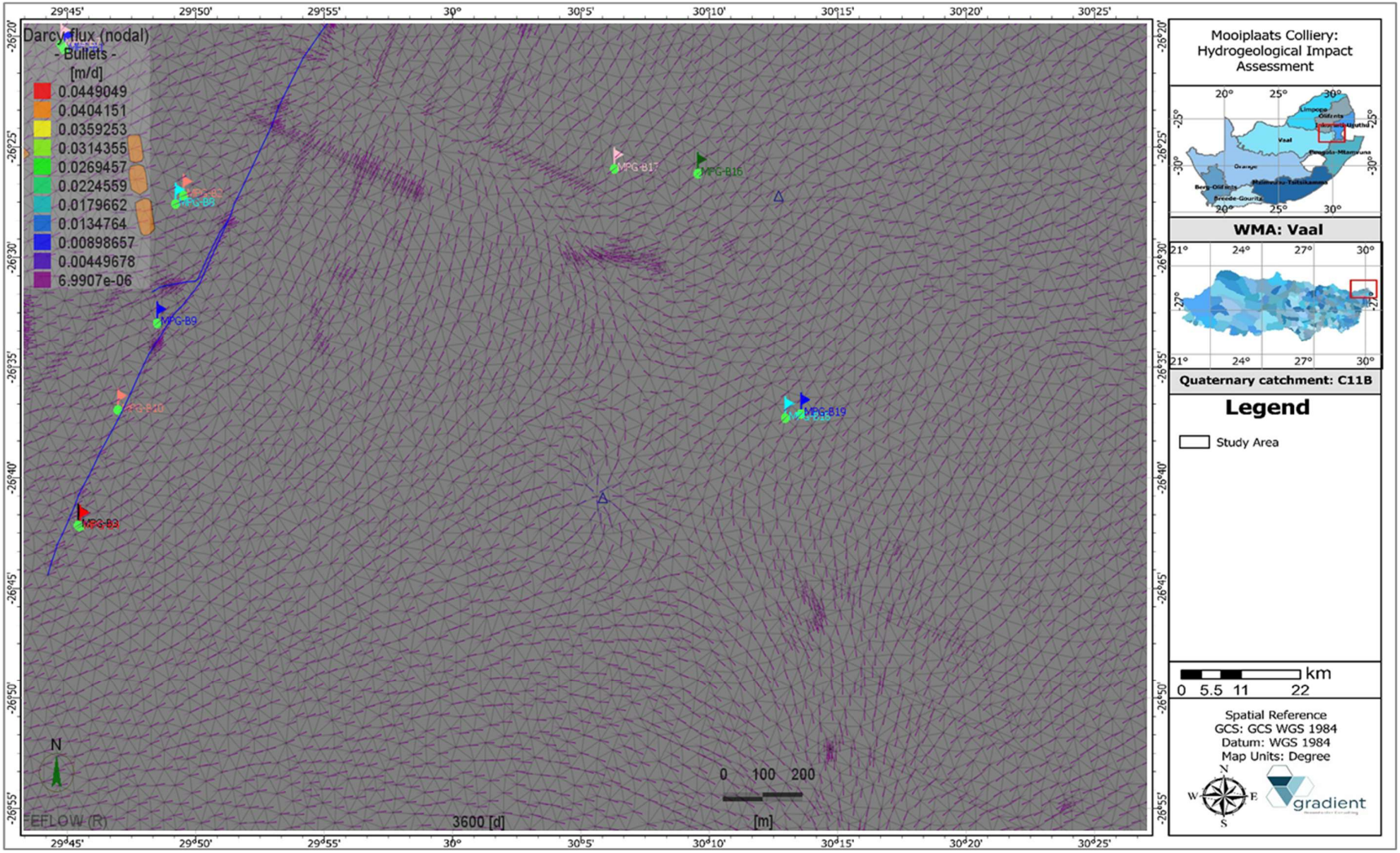


Figure 31: Scenario 02a: Darcy flux vectros in the vicinity of the Southern Pit during the operational period.

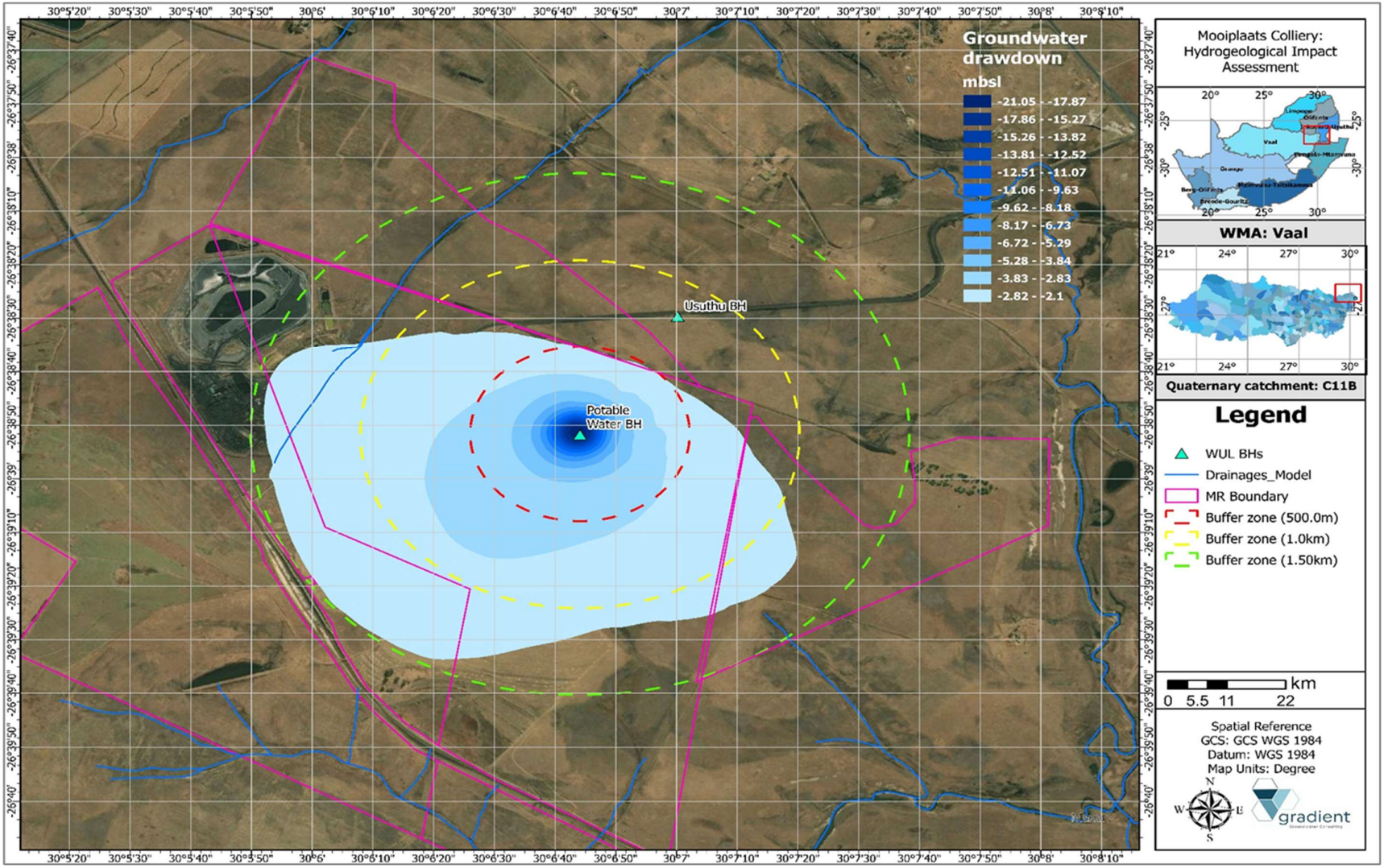


Figure 32: Scenario 02: Time-series water level drawdown and groundwater capture zones of the shallow, intergranular aquifer formed by abstraction activities.

4.5.4.3 SCENARIO 03: SULPHATE POLLUTION PLUME MIGRATION WITHIN THE SHALLOW, INTERGRANULAR AQUIFER FOR THE OPERATIONAL PHASE(S)

Scenario 03 simulated the pollution plume migration within the intergranular aquifer originating from the waste infrastructure footprints for the duration of the operational period without any mitigation or management measures applied i.e., worst-case scenario. Figure 34 indicates the simulated flow pathways of contaminant particles within the receiving aquifer. It can be observed that the pollution plume migration is generally in a northeastern to eastern direction towards the lower lying drainage system. The pollution plume extent covers a total area of approximately 0.95km^2, reaching a maximum distance of ~330.0m in a general northeastern to eastern direction. Figure 35 indicates the simulated sulphate pollution plume migration for various phases during the operational phase whereas Figure 36 depicts the simulated pollution plume extend at the end of the operational phase. The simulation indicates that the pollution plume generated is mostly confined to the mining right area, however, does intercept various monitoring boreholes and reach to the local drainage system and associated wetlands. Figure 33 indicates a time-series graph of the simulated mass load contribution originating from the waste infrastructure to down-gradient receptors. It can be observed that the sulphate mass load contribution to local observation boreholes increases to a maximum of between 950.0mg/l to 1500.0mg/l and is a function of the distance towards the waste body footprints. The sulphate concentration for all the monitoring boreholes situated in relatively close proximity to the waste infrastructure is above the SANS 241:2015 acute health threshold concentration[6] after a simulation period of approximately 20 years. It can be observed that the mass load contribution to the local drainage system increases to a maximum of 130.0mg/l however remain below the SANS 241:2015 acute health threshold concentration for the duration of the simulation period.

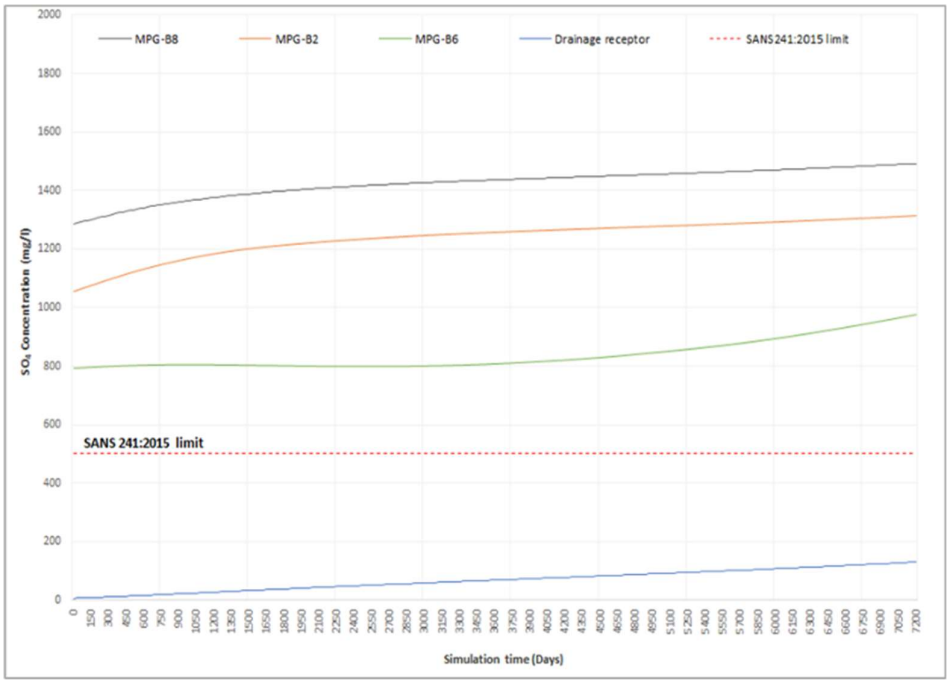


Figure 33: Scenario 03: Time-series graph indicating the sulphate mass load contribution of waste footprints to down-gradient receptors within the intergranular aquifer host during the operatinal phase.

[6] The SANS241:2015 acute health limit for sulphate is 500.0mg/l.

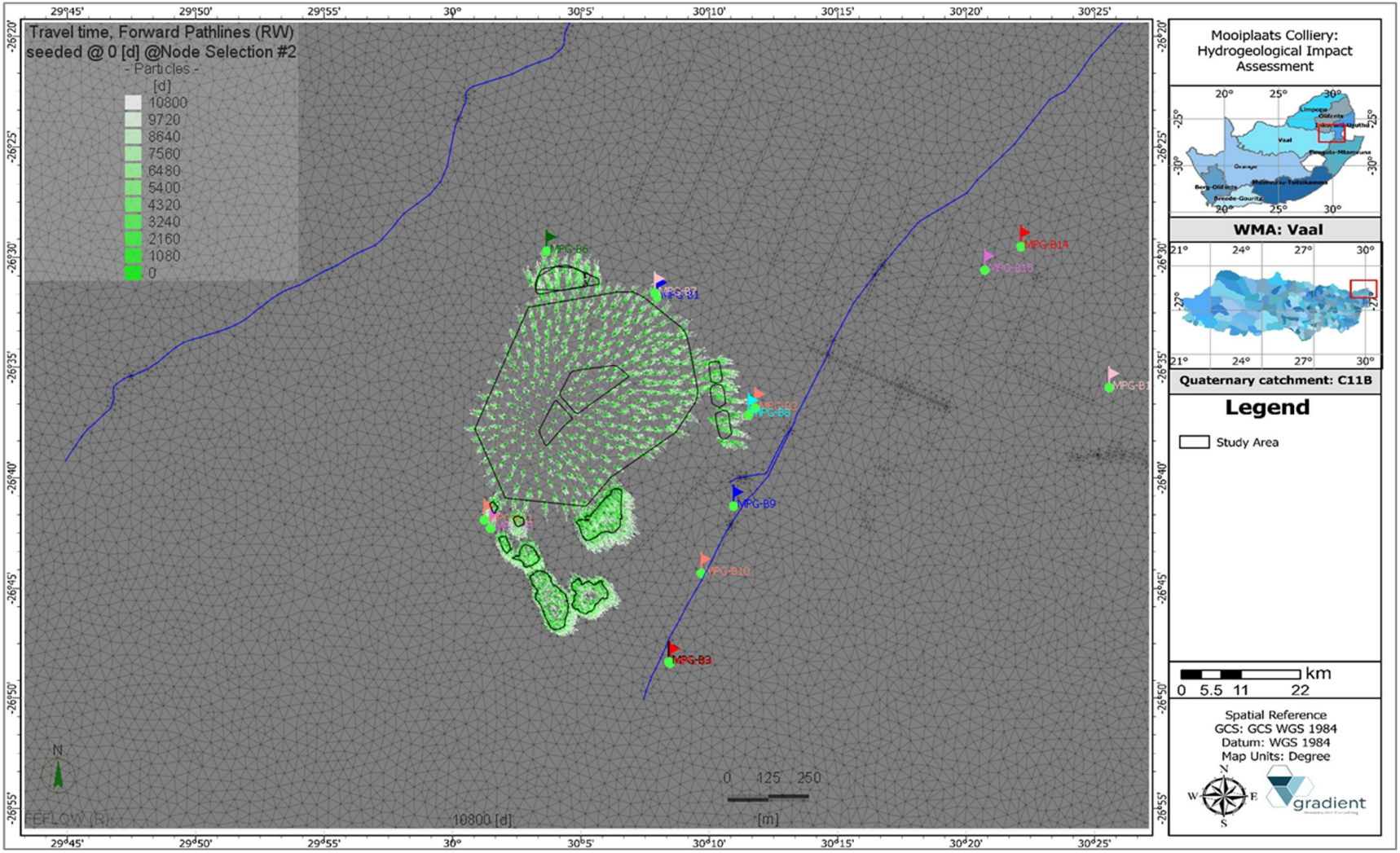


Figure 34: Scenario 03: Simulated particle tracking of contaminants within the host aquifer unit(s).

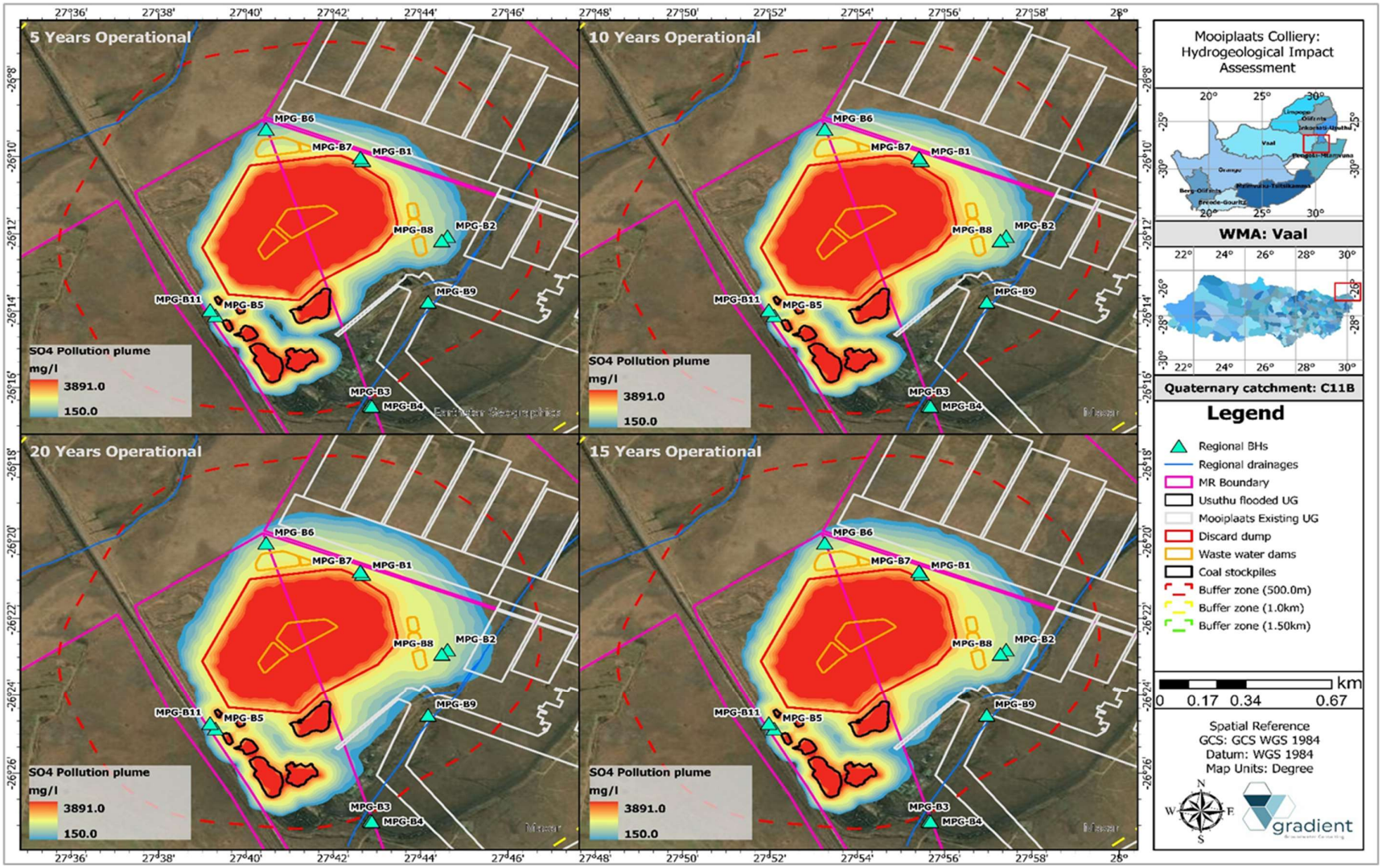


Figure 35: Scenario 03: Sulphate (SO_4) pollution plume migration within the intergranular aquifer host fro various periods during the operational phase.

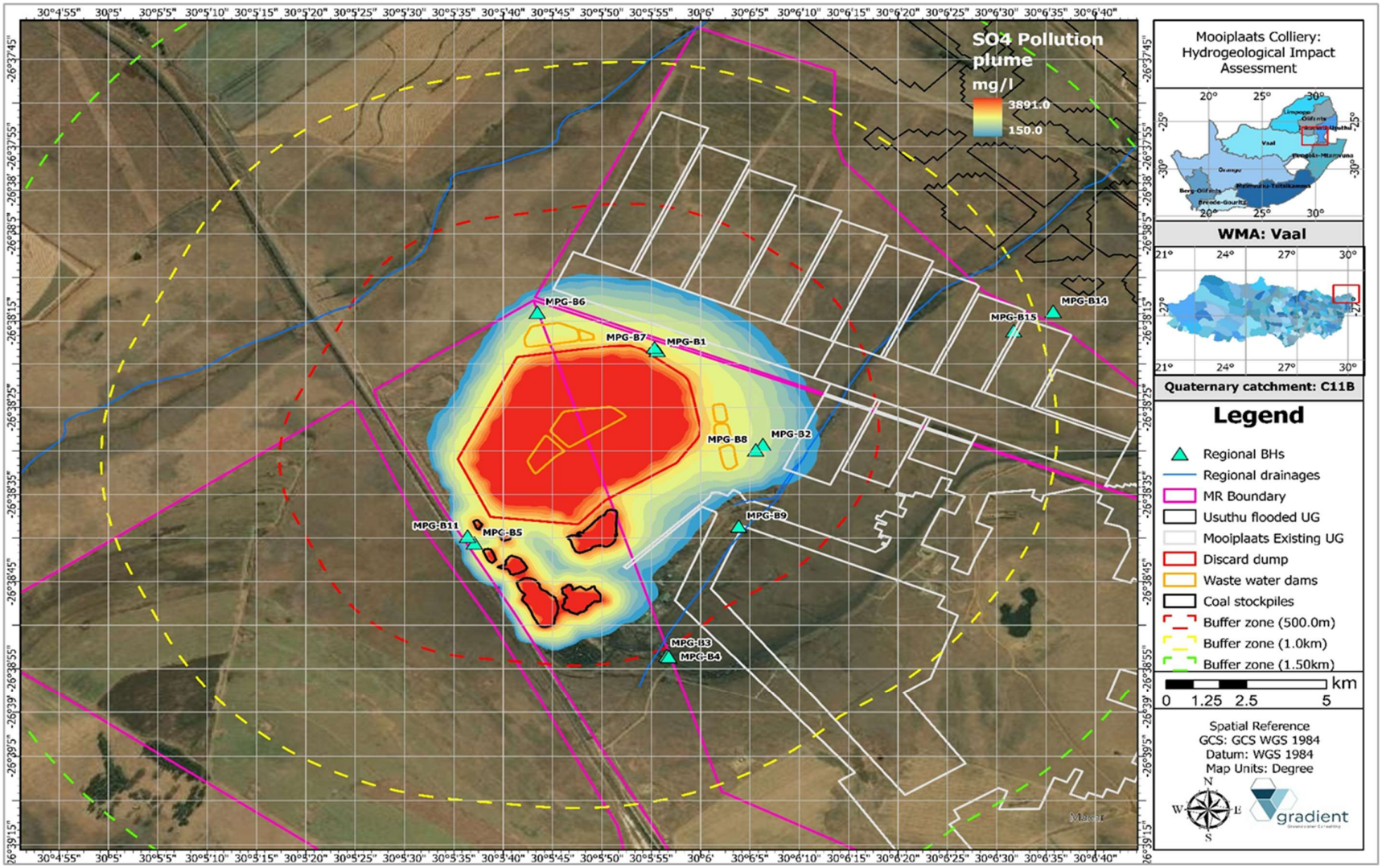


Figure 36: Scenario 03: Sulphate (SO_4) pollution plume migration within the intergranular aquifer host at the end of the operational phase.

4.5.4.4 SCENARIO 04: SULPHATE POLLUTION PLUME MIGRATION WITHIN THE SHALLOW, INTERGRANULAR AQUIFER FOR THE POST-CLOSURE PHASE(S)

A post-closure scenario was simulated to evaluate the pollution plume migration within the intergranular aquifer host after discontinuing of current activities. Figure 38 indicates the simulated flow pathways of contaminant particles within the receiving aquifer. It can be observed that the post-closure pollution plume migration remains in a general northeastern to eastern direction towards the lower lying drainage system.

The 50-year simulation period suggest that the pollution plume extent covers a total area of approximately 1.25km^2, reaching a maximum distance of ~500.0m in a general northeastern to eastern direction towards the lower laying drainage systems. The 100-year simulation period suggest that the pollution plume extent covers a total area of approximately 1.47km^2, reaching a maximum distance of ~570.0m in a general northeastern to eastern direction towards the lower laying drainage systems. The simulation indicates that the pollution plume generated slightly extends beyond the mining right area and intercepts various monitoring boreholes situated towards the north and northeast. Furthermore, it is noted that the simulated pollution plume reaches the local drainage system and associated wetlands.

Figure 37 indicates a time-series graph of the simulated mass load contribution originating from the waste infrastructure to down-gradient receptors. It can be observed that the sulphate mass load contribution to local observation boreholes continues to increase during the post-closure phase, reaching a maximum concentration of between 1950.0mg/l to 2150.0mg/l and is a function of the distance towards the waste body footprints. The sulphate concentration for all the monitoring boreholes situated in relatively close proximity to the waste infrastructure remains above the SANS 241:2015 acute health threshold concentration for the duration of the post-closure period. It can be observed that the mass load contribution to the local drainage system increases to a maximum of >1400.0mg/l, breaking through the SANS 241:2015 acute health threshold concentration after a simulation period of approximately 15 years post-closure. It can be noted that the mass load contribution during the post-closure phase for all borehole receptors have not reached a quasi-state conditions and remains in an upward trend.

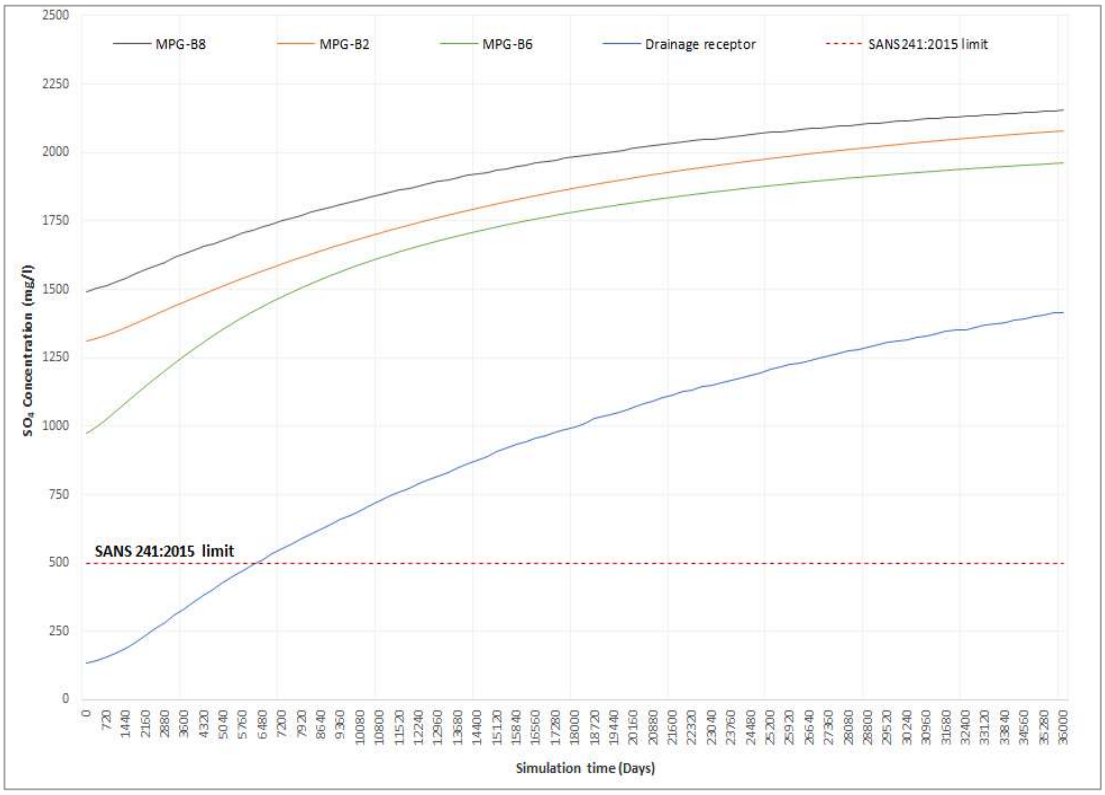


Figure 37: Scenario 04: Time-series graph indicating the sulphate mass load contribution of waste footprints to down-gradient receptors within the intergranular aquifer host during the post-closure phase.

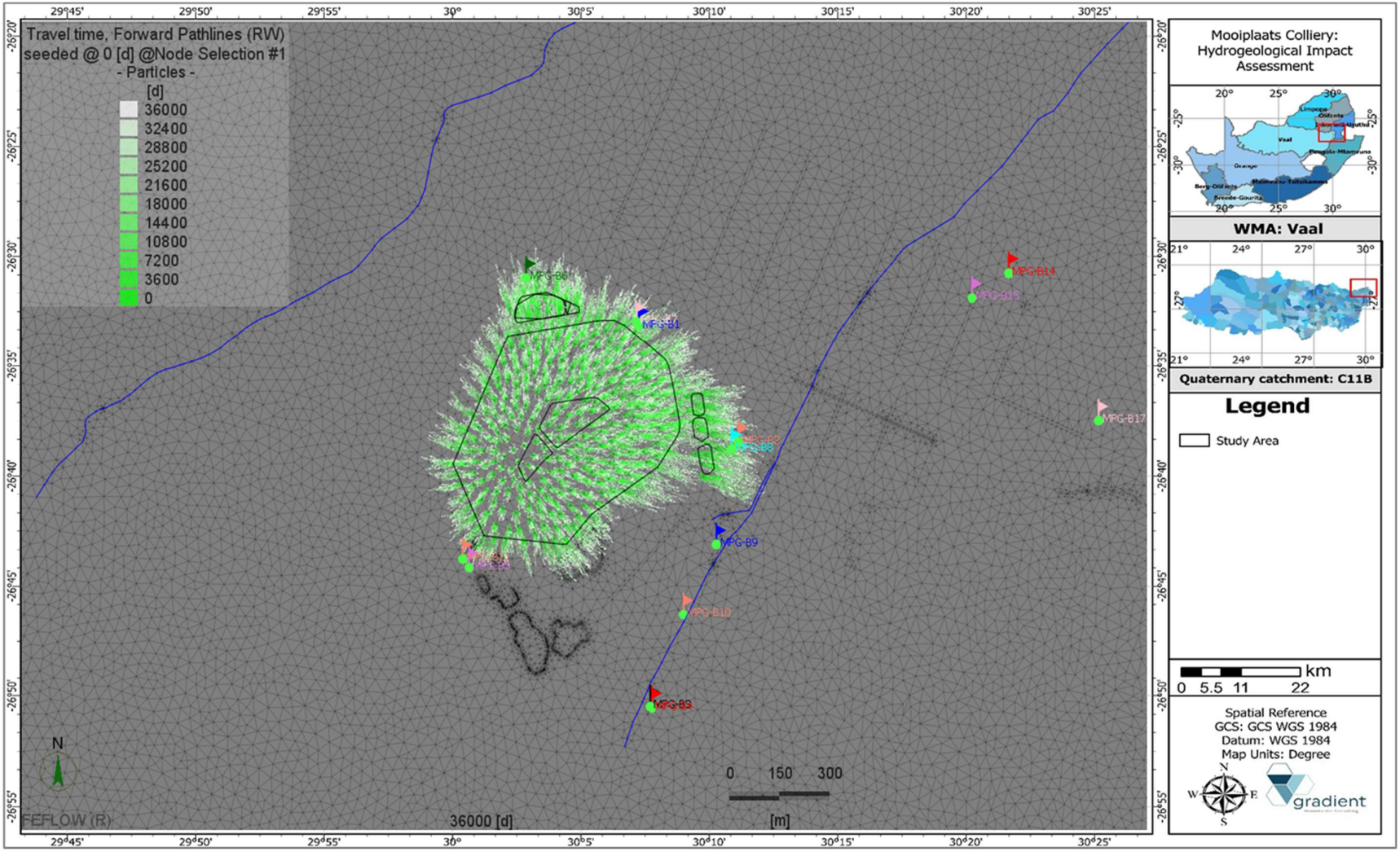


Figure 38: Scenario 04: Simulated particle tracking of contaminants within the host aquifer unit(s).

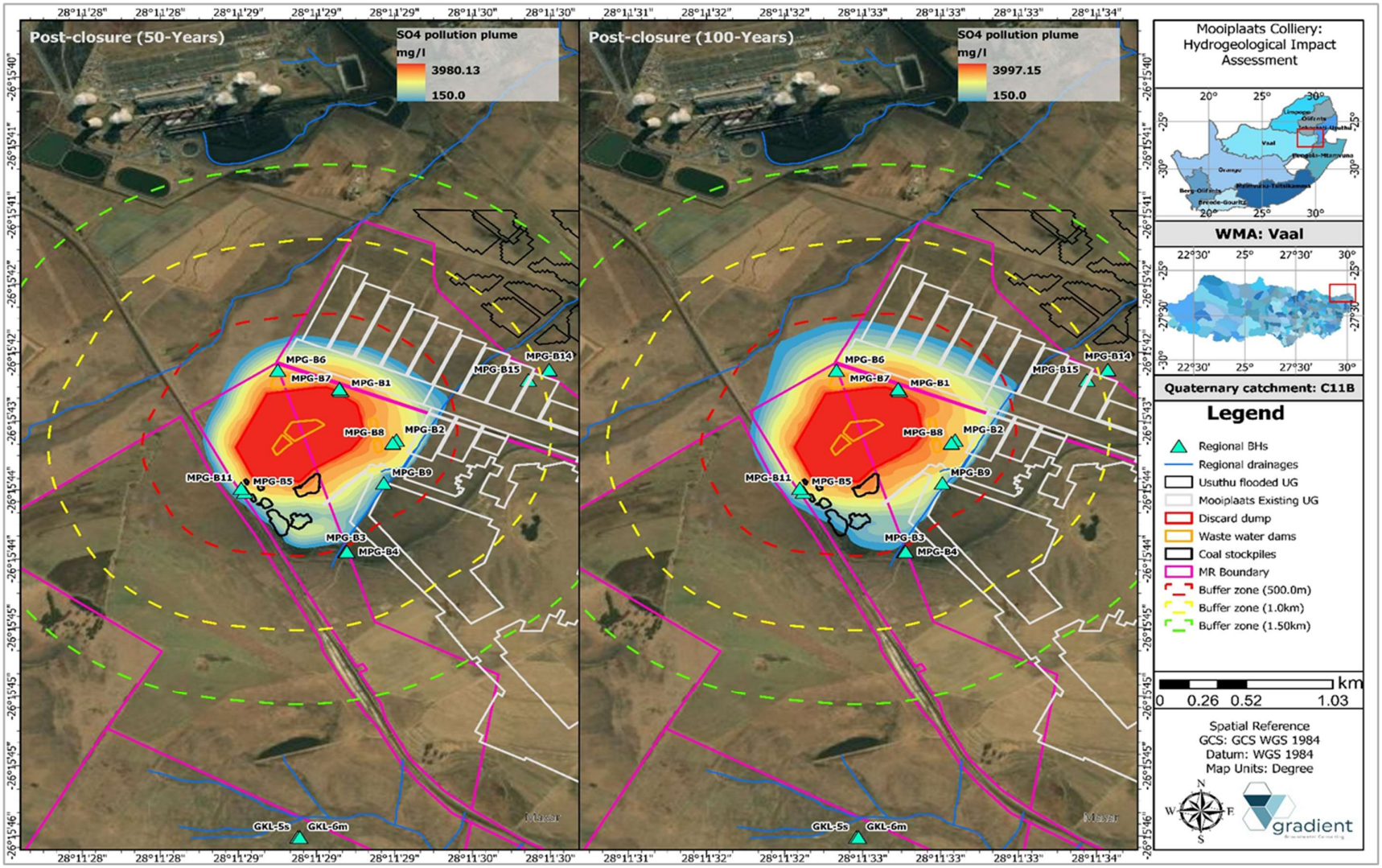


Figure 39: Scenario 04: Post-closure pollution plume migration.

4.5.4.5 SCENARIO 05: MITIGATION AND MANAGEMENT

Various alternative management and mitigation scenarios which include active water management strategies were simulated to evaluate the remedial options available. Table 26 provides a summary of the mitigatory effect and effectiveness of proposed management alternatives on the pollution plume migration while Figure 40 shows a time-series graph indicating mass load contribution on down-gradient receptors (Pre-mitigation vs Post-mitigation). It is noted that if implemented successfully, the proposed mitigation and management measures can constrain the pollution plume propagation and reduce the sulphate mass load to below the SANS241 threshold. Below a brief description of each mitigation and management scenario simulated.

Table 26: Scenario 05: Effectiveness of mitigation and management alternatives on pollution plume areas.

Mitigation and management scenarios	Combined plume area (pre-mitigation)(km²)	Combined plume area (post-mitigation)(km²)	Improvement (%)	Intercepted contact water volume (m³/d)
Scenario 05a: Establishment of seepage capturing/scavenger boreholes	1.47	0.65	55.78	302.40
Scenario 05b: Implementation of a cut-off trench/ fracturing curtain	1.47	1.05	28.57	50.83
Scenario 05c: Implementation of a barrier/ liner system underneath waste infrastructure	1.47	0.75	48.98	0.00

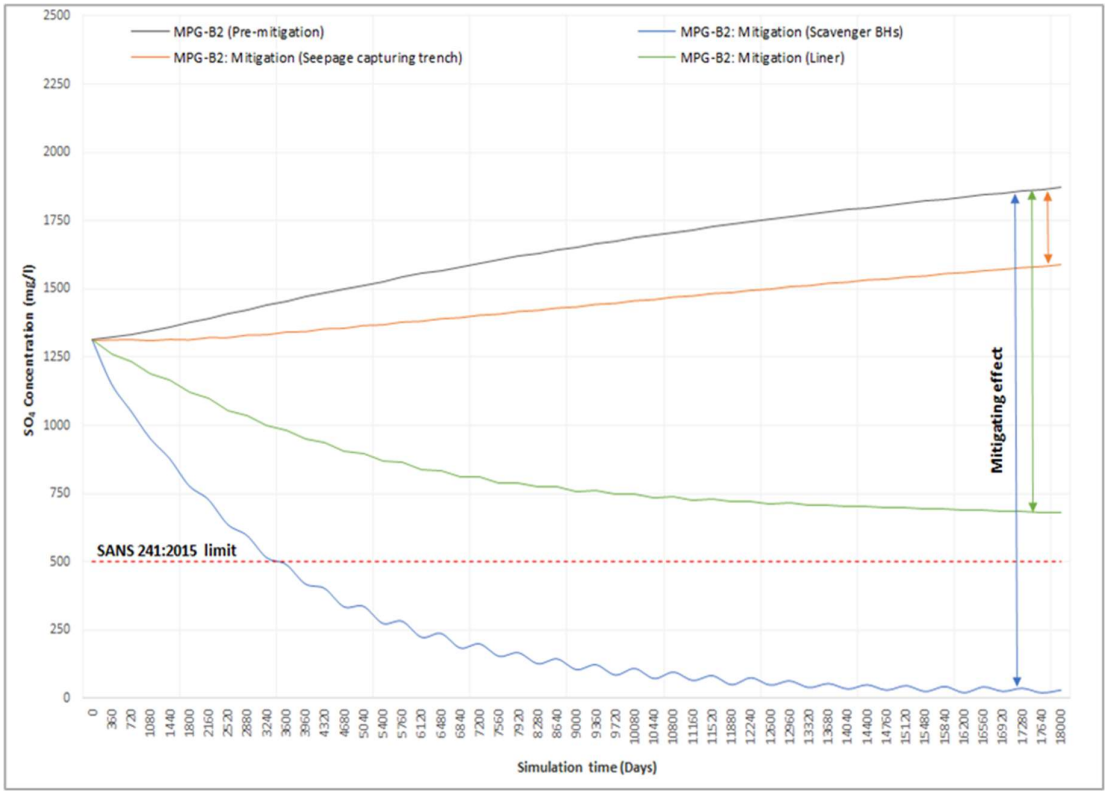


Figure 40: Scenario 05: Time-series graph indicating mass load contribution on down-gradient receptors (Pre-mitigation vs Post-mitigation).

4.5.4.6 SCENARIO 05A: SULPHATE POLLUTION PLUME MIGRATION WITHIN THE SHALLOW, INTERGRANULAR AQUIFER WITH ESTABLISHMENT OF SCAVENGER OR SEEPAGE CAPTURING BOREHOLES DOWN-GRADIENT OF PROPOSED WASTE INFRASTRUCTURE

An active management scenario evaluating the mitigating effect of seepage capturing boreholes i.e. scavenger boreholes on the plume migration via active pumping were simulated. A series of seepage capturing boreholes were established down-gradient of existing waste infrastructure as indicated in Figure 41. Due to the negative groundwater gradient created, the pollution plume footprint is reduced by approximately >55.0% to ~0.65km^2 with an abstraction volume of ~0.25l/s per borehole. Increased abstraction will further decrease and constraint the plume footprint, however this will be highly dependent on borehole specific hydraulic parameters as well as functionality. It is recommended that constant discharge aquifer tests be conducted on newly established seepage capturing boreholes in order to optimise borehole yields. Abstracted groundwater volumes expected accounts to approximately 302.40m^3/d, which should be treated before discharge and re-established into the local groundwater catchment balance. Based on the constraining effect of this mitigation scenario on both the pollution plume migration as well as reduced mass load contribution, this alternative can be viewed as the best remedial option for implementation.

4.5.4.7 SCENARIO 05B: SULPHATE POLLUTION PLUME MIGRATION WITHIN THE SHALLOW, INTERGRANULAR AQUIFER WITH IMPLEMENTATION OF A CUT-OFF OR FRACTURING TRENCH CONSTRUCTED DOWN-GRADIENT OF PROPOSED WASTE INFRASTRUCTURE

A passive management scenario evaluating the mitigating effect of a sub-surface cut-off trench/fracturing curtain[7] on the plume migration were simulated as depicted in Figure 42. Due to the deeper groundwater levels i.e. relatively thick vadose zone experienced, this mitigation alternative will not intercept adequate water to create a negative gradient within these zones and accordingly, the pollution plume footprint is reduced by only ~28.57% to ~1.05km^2. Intercepted groundwater volumes expected is approximately 50.83m^3/d, however this will be dependable on the depth of the proposed cut-off trench.

4.5.4.8 SCENARIO 05C: SULPHATE POLLUTION PLUME MIGRATION WITHIN THE SHALLOW, INTERGRANULAR AQUIFER WITH A BARRIER/ LINER SYSTEM UNDERNEATH WASTE INFRASTRUCTURE

A passive management scenario evaluating the mitigating effect of the implementation of a liner or barrier system underneath existing waste infrastructure on the plume migration were simulated as depicted in Figure 43. Due to the significant reduction in recharge and infiltration of leachate reporting to the receiving aquifer unit(s), the pollution plume footprint is reduced to ~49.0% to ~0.75km^2.

[7] It should be noted that a trench depth of >6.0-8.0mbgl becomes impractical to implement, and as such, simulations are based on these designs.

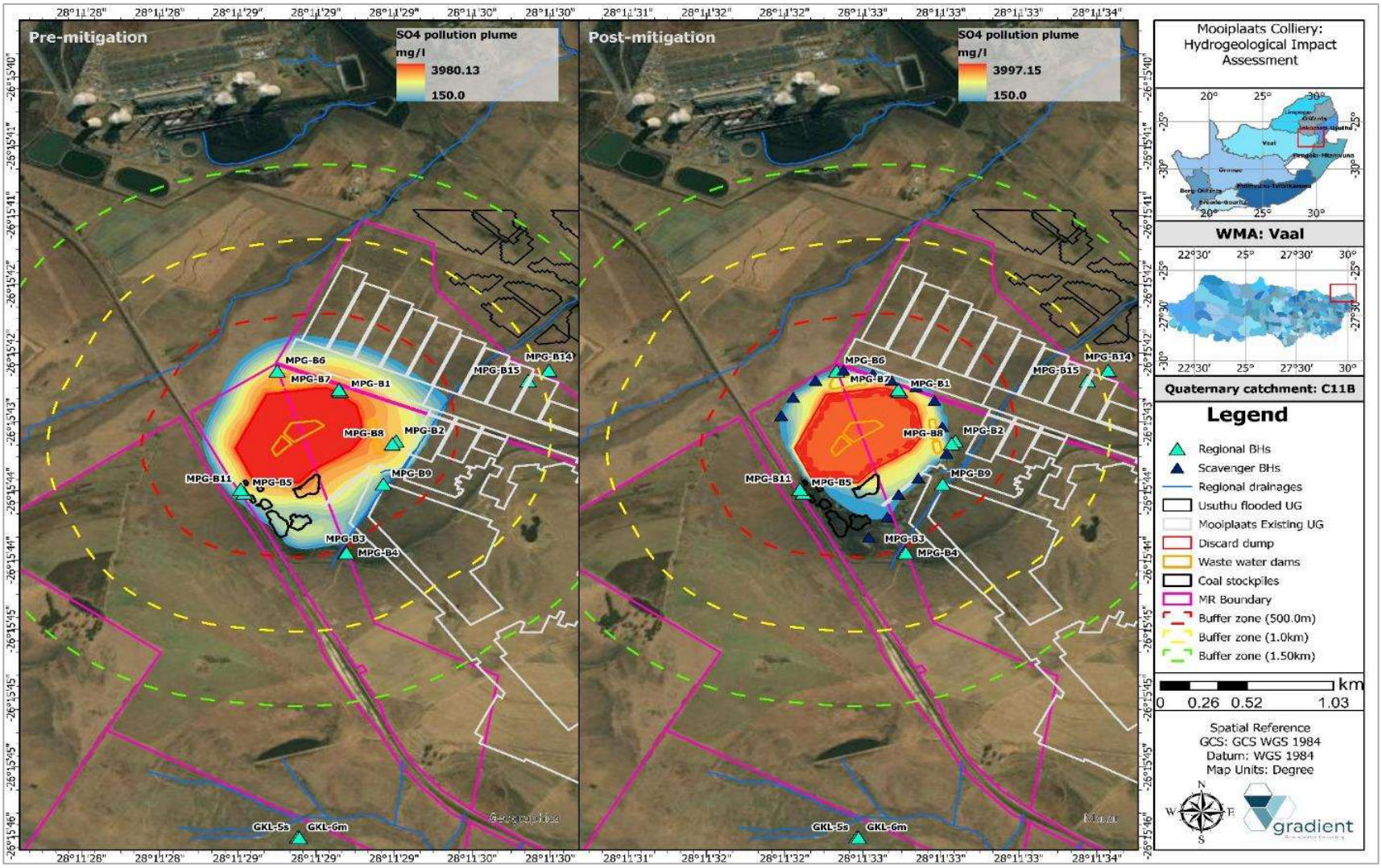


Figure 41: Scenario 05a: Mitigation and management- Establishment of existing seepage capturing/ scavenger boreholes down-gradient of waste infrastructure footprints.

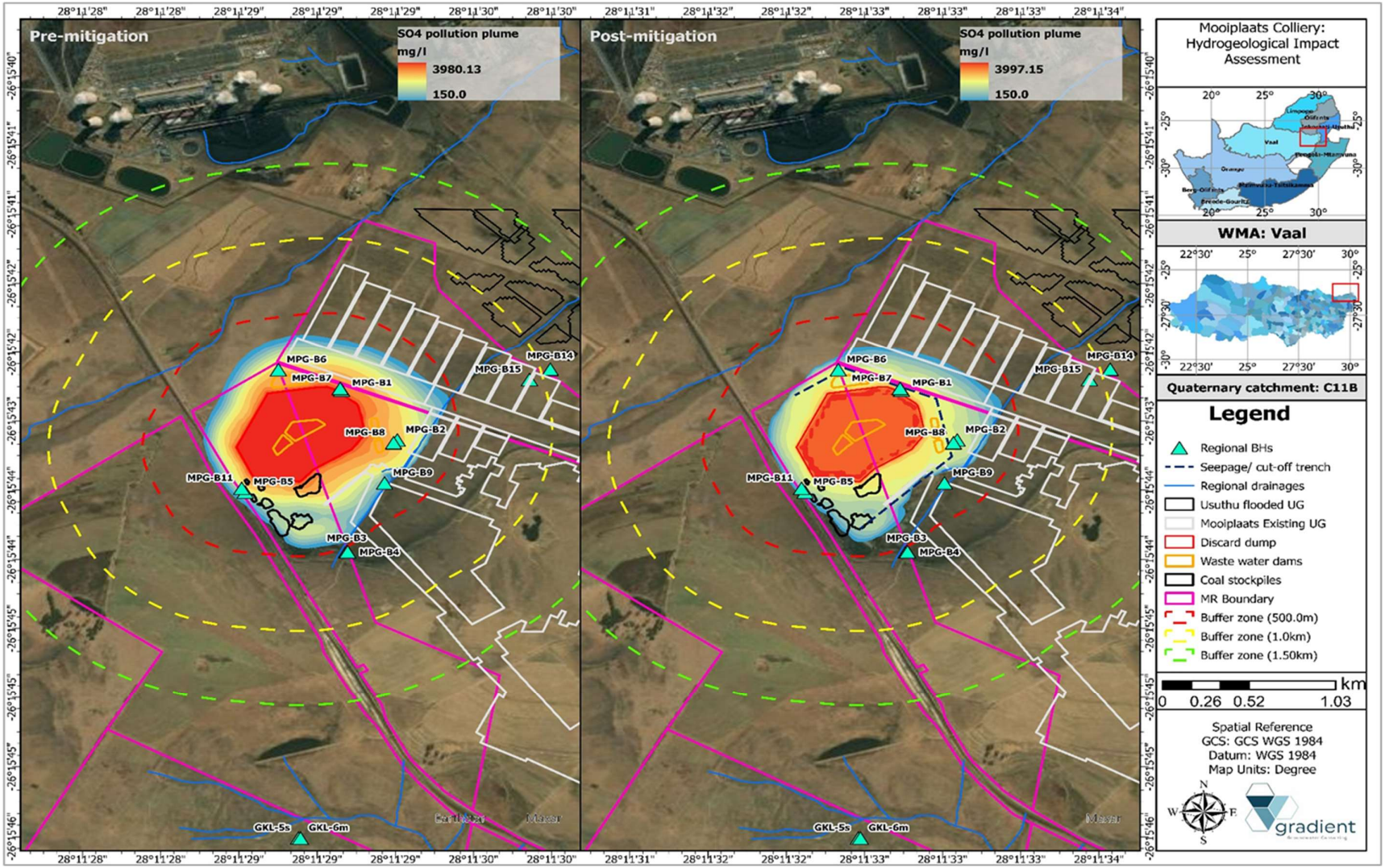


Figure 42: Scenario 05b: Mitigation and management- Implementation of a cut-off or fracturing trench constructed down-gradient of proposed waste infrastructure.

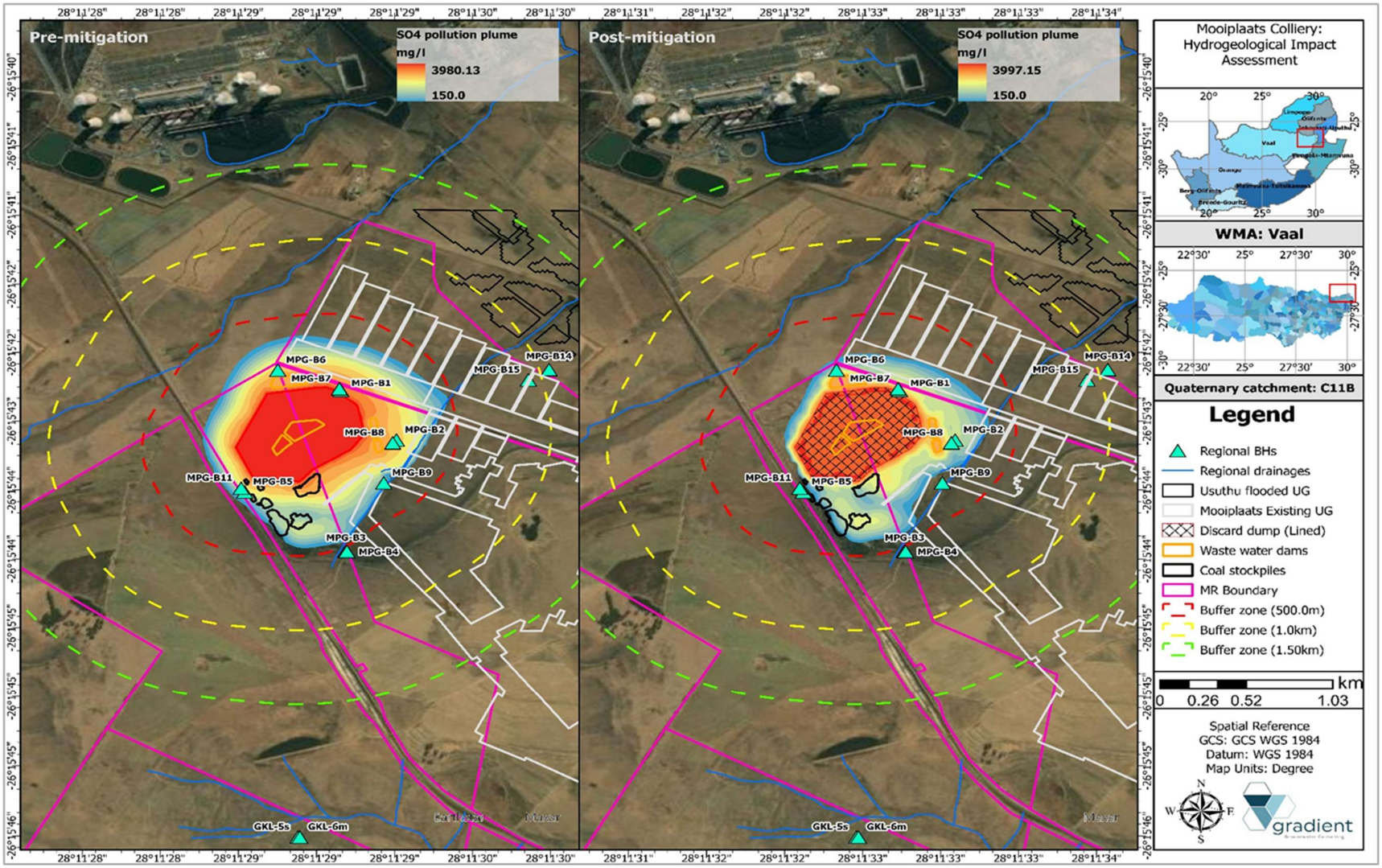


Figure 43: Scenario 05c: Mitigation and management- Implementation of a Class 3 liner system implemented on the proposed waste infrastructure footprints.

4.6 SOCIO-ECONOMIC ENVIRONMENT

The following section provides a summary of the social and economic environment that may be influenced by the proposed project. Information in this section was sourced from Stats SA and the Integrated Development Plans (IDP's) for the Msukaligwa Local Municipality as well as the Gert Sibande District Municipality. The information provided in the IDP's and the Stats SA website are based on a 2011 National census and well as the 2016 Community Survey[8].

According to the National Environmental Management Act (NEMA, 1998) environment refers to the surroundings in which humans exist. When viewing the environment from a socio-economic perspective the question can be asked what exactly the social environment is. Different definitions for social environment exist, but a clear and comprehensive definition that is widely accepted remains elusive. Barnett & Casper (2001) offers the following definition of human social environment:

"Human social environments encompass the immediate physical surroundings, social relationships, and cultural milieus within which defined groups of people function and interact. Components of the social environment include built infrastructure; industrial and occupational structure; labour markets; social and economic processes; wealth; social, human, and health services; power relations; government; race relations; social inequality; cultural practices; the arts; religious institutions and practices; and beliefs about place and community. The social environment subsumes many aspects of the physical environment, given that contemporary landscapes, water resources, and other natural resources have been at least partially configured by human social processes. Embedded within contemporary social environments are historical social and power relations that have become institutionalized over time. Social environments can be experienced at multiple scales, often simultaneously, including households, kin networks, neighbourhoods, towns and cities, and regions. Social environments are dynamic and change over time as the result of both internal and external forces. There are relationships of dependency among the social environments of different local areas, because these areas are connected through larger regional, national, and international social and economic processes and power relations."

The environment influences and constrains behaviour, but behaviour also leads to changes in the environment. The impacts of a project on people can only be truly understood if their environmental context is understood. The baseline description of the social environment will include a description of the area within a provincial, district and local context that will focus on the identity and history of the area as well as a description of the population of the area based on a number of demographic, social and economic variables. Table **27** presents a summary of the socio-economic aspects which may have a bearing on the proposed project.

[8] It is acknowledged that this data may be outdated as no more recent census has been undertaken (Stats SA) and in addition, the municipal IDP 2017-2022 is still in draft mode and may be updated after review.

Table 27: Summary of the socio-economic aspects (Msukaligwa Local Municipality, 2017)

<table>
<tr><th>Aspect</th><th>Local Municipality</th></tr>
<tr><td>District Municipality</td><td>Gert Sibande District Municipality</td></tr>
<tr><td>Province</td><td>Mpumalanga Province</td></tr>
<tr><td>Municipal Area Size</td><td>6016 km^2</td></tr>
<tr><td>Number of Wards</td><td>19 wards</td></tr>
<tr><td>Population Size</td><td>164 608</td></tr>
<tr><td>Number of households</td><td>51 809</td></tr>
<tr><td>Estimated growth/change in population size from 2001</td><td>~31.9%</td></tr>
<tr><td>Population composition</td><td>Black African (91.7%), White (6.7%), Coloured (0.6%), Indian or Asian (0.9%)</td></tr>
<tr><td>Languages</td><td>Main languages spoken are isiZulu, Afrikaans, SiSwati and English</td></tr>
<tr><td>Age</td><td>Age group 0 – 14 comprising 28% of the total population and 15 – 34 comprising of 41%, while 26% is between 35 and 64 years and 5% is 65 years and above</td></tr>
<tr><td>Gender</td><td>50.39% female, 49.61% male</td></tr>
<tr><td>Education</td><td>
<table>
<tr><td>Education Indicators</td><td>2001</td><td>2011</td></tr>
<tr><td>Number of people 15+ with no schooling</td><td>18 125</td><td>12 213</td></tr>
<tr><td>% Population 15+ with no schooling</td><td>21.7%</td><td>8.2%</td></tr>
<tr><td>% Population 15+ with matric and post matric qualification (%)</td><td>20.5%</td><td>23.6%</td></tr>
</table>
</td></tr>
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Aspect	Local Municipality
	% Functional Literacy rate (%) 58.1% 51.4%
Housing	The predominant settlement type is a house or brick structure on a separate stand, followed by traditional dwelling/hut structure, flats, townhouse, backyard room or hose then informal settlements. Overall, it is estimated that the housing is 75% formal and 26% informal dwelling type.
Urban development	According to the SDF as well as previous plans of the municipality, the area South to South-west of Ermelo town between and along the N11 and R36 roads is a land earmarked for future urban development. Also East of Ermelo town along the N2 Piet Retief Road the area is earmarked for urban housing development. Currently there are number of vacant stands for residential and business development besides the proposed land for future development. Wesselton as a dormitory township for Ermelo, there is also land earmarked for future urban development bounded by N11, Hendrina Road on the West. The said land is owned the municipality and a portion further to the East of this land is privately owned.
Energy	By February 2017, nearly seven million households had been connected to the grid and now have electricity. The successful execution of Eskom's Build and Maintenance programmes helped to ensure stability and an end to load-shedding. Work is continuing to ensure energy security. Renewable energy forms an important part of the energy mix, which also includes electricity generation from gas, nuclear, solar, wind, hydro and coal. Government is committed to the overall Independent Power Producer Programme and is expanding the programme to other sources of energy, including coal and gas, in addition to renewable energy. Eskom will sign the outstanding power purchase agreements for renewable energy in line with the procured rounds.
Access to water	The municipality had over the past years through the District and in partnership with relevant spheres of government strived

Aspect	Local Municipality
	to meet the millennium target in ensuring access to water for all by 2015. In striving to achieve this target, the municipality has managed to reduce the water backlog to 9%. Though the 9% reflect as a backlog, these affect communities at the farms/rural areas of the municipality where water has been provided through boreholes but below the RDP level. Provision of clean drinking water (potable water) is almost addressed with few challenges more especially at rural / farmlands within the municipality. In providing Water, the Municipality shall ensure that water is provided to schools, clinics and all other social amenities. It is therefore ensured that prior to approval of construction of clinics and schools there is water provided to such amenities more especially ensuring that farm schools have water where the farm owners cannot provide. The municipality is a water services authority and therefore responsible for supply of water within its area of jurisdiction.
Nearby towns	Breyton, Camden, Davel, Wesselton, Ermelo, Phumula, KwaZanele
Percentage employment	41,698 in 2011
Percentage unemployment	Unemployment rate stood at 26.8% in 2011 which has decreased by 4.4% to 22.4% in 2016
Largest Employing sector	Agriculture
Largest economic contribution	Transport
Tourism	Government has identified tourism as a key job driver. Tourist arrival numbers for January to November 2016 increased to nine million, an increase of just over a million arrivals from 2015. This represents a 13% growth in tourist arrivals

5 ANALYSIS AND CHARACTERISATION OF ACTIVITY

The following section describes the activity, its associated processes and infrastructure in more detail.

5.1 SITE DELINEATION FOR CHARACTERISATION

The Mooiplaats Colliery is an underground mining operation located close to the town of Ermelo in the Mpumalanga Province. The mine falls in a section of the C11B Vaal River quaternary catchment (

Figure **16: Mooiplaats Colliery surface water features (excluding wetland delineations)**) area and is situated on a slope that drains directly into the Vaal River.

5.2 WATER AND WASTE MANAGEMENT

The Mooiplaats Colliery will continue to require water in the form of both potable and bulk water (for the wash plant and dust suppression). This section details the various water and waste management activities.

5.2.1 POTABLE WATER SUPPLY

Potable water is obtained from 3 boreholes on site, each supplying an average of around 4000 m^3/annum.

5.2.2 WATER POLLUTION MANAGEMENT

Diversion berms are in place upslope of the shaft area to ensure that all clean run-off water is diverted around and away from the shaft area. All rainwater and other dirty water in the shaft area is captured and stored on site in the PCD. Dirty water is not permitted to enter the receiving environment and all dirty water is kept in the close loop dirty water system from where it is reused. The PCD is designed correctly according to Dam Safety Regulations to store a 1:50 year 24-hour storm event and maintain a 0.8m freeboard. Appendix J shows the designs for the PCDs situated at Mooiplaats Colliery.

5.2.3 LIQUID EFFLUENT MANAGEMENT

Upslope diversion berms direct clean run-off around and away from the site of Mooiplaats Colliery. All water falling on and around the shaft area is deemed dirty water and is collected in the Pollution Control Dam (PCD) (Appendix J). Water produced as part of the underground mining, either from dewatering or as part of the mining process is pumped to settling dams via the silt trap. Settled water is transferred into the Erikson dams from where it is reticulated back underground allowing majority of the water being used to be recycled.

5.2.4 SEWAGE

A biological sewage treatment facility has been constructed next to the office and administration buildings. The capacity of the sewage treatment plant is 30 750L / 3.075 m^3 per day. The system is gravity fed. The sewage is collected through a network of sewage pipes which is then routed to the wastewater treatment plant for treatment. The certificate issued for the sewage treatment plant classifies the plant as a Class C facility in terms of Section 26 of the NWA and it was registered on the 15th of May 2013.

5.2.5 HAZARDOUS WASTE MANAGEMENT

Hazardous waste is covered to protect it from the elements and is stored in a designated area. It is disposed of by an authorised contractor at a registered H:H waste disposal facility. Used oil is collected in either the oil separator at the workshop or collected in a specialised used oil container located at the waste collection area. Used oil is collected by a registered recycling contractor. Fluorescent tubes are crushed in a specialised 210L

crushing drum, which is disposed of along with the other hazardous waste. A waste inventory is kept of all waste types and volumes generated and disposed of or recycled.

5.3 PROCESS WATER

Process water is obtained from 4 boreholes drilled to access water from the old Usutu underground working, with an average abstraction rate of 16 425 m^3/annum per borehole. Make-up water is obtained from the various pollution control facilities of the Mooiplaats Colliery. Water for dust suppression is obtained from dirty runoff water collecting in various pollution control facilities on site.

5.4 STORM WATER AND WATER BALANCE

Appendix O of this report includes a Water and Salt Balance report which was drafted to accompany this technical report. Any mining activity has the potential to impact upon the baseline water quality of an area and, if not managed correctly, stormwater may pose a risk of flooding to project infrastructure. The aim of stormwater management measures is to mitigate these impacts by fulfilling the requirements of the National Water Act (Act 36 of 1998) and more particularly GN 704.

The following definitions from GN 704 are appropriate to the classification of catchments and design of stormwater management measures at the Mooiplats Colliery:

- Clean water system includes any dam, other forms of impoundment, canal, works, pipeline and any other structure or facility constructed for the retention or conveyance of unpolluted (clean) water.
- Dam: includes any settling dam, slurry dam, evaporation dam, catchment or barrier dam and any other form of impoundment used for the storage of unpolluted water or water containing waste (i.e., dirty water).
- Dirty area: means any area at a mine or activity which causes, has caused or is likely to cause pollution of a water resource.
- Dirty water system: This includes any dirty water diversion bunds, channels, pipelines, dirty water dams or other forms of impoundment, and any other structure or facility constructed for the retention or conveyance of water containing waste (i.e., dirty water); and
- Activity: means any mining related process on the mine including the operation of washing plants, mineral processing facilities, mineral refineries, and extraction plants; the operation and the use of mineral loading and off-loading zones, transport facilities and mineral storage yards, whether situated at the mine or not; in which any substance is stockpiled, stored, accumulated, dumped, disposed of or transported.

A SWMP was developed for the Mooiplaats Colliery (Appendix E). Any sustainable Storm water Management Plan has to be designed to meet some specific design criteria in order to ensure a high probability of success. The same procedure was used for the design of the Stormwater Management Plan for Mooiplaats Colliery Mine. The method used in establishing the design criteria is referred to in statistical terms as the Probability of exceeding the chosen event.

It was reported that the mine was previously under Care and Maintenance since 30 September 2013 and that no mining activities were taking place until January 2018. There is currently no coal mining taking place from the existing mining pit, the mine is currently used as a crush and screening mine with coal washing activity taking place. Mooiplats Colliery receives its coal from external coal mines for processing and washing. This activity has triggered a need for large coal stockpile areas on site to accommodate the large volumes of coal stockpiles.

A Hydrological Impact Assessment Report was compiled by WSP Group Africa (Pty) Ltd. At that stage Mooiplaats Colliery had commenced with its Upper B Seam coal mining operation which has since been stopped. In the Hydrological Impact Assessment Report dated July 2019, new concrete stormwater channels were proposed as part of stormwater management and stormwater management channels at the plant and stockpile areas. Refer to Figure 45, Figure 46 and Figure 47 below for the proposed stormwater infrastructure. No Civil Engineering detailed design were done at this stage therefore no construction of the concrete channels was implemented as proposed.

GN 704 requires the following:

- Capacity: dirty water systems are to be designed, constructed, maintained, and operated so that they are not likely to spill into a clean water system or the environment more frequently than once in 50 years.
- Conveyance: all water systems are to be designed, constructed, maintained, and operated so that they convey a 1:50 year flood event.
- Freeboard: as a minimum, any dirty water dams are to be designed, constructed, maintained, and operated to have 0.8m freeboard above full supply level.
- Collect and Re-Use: ensure that dirty water is collected and re-used as far as practicable.
- Diversion: minimise flow of any surface water or floodwater into coal mine workings.

A series of design principles for stormwater management have been developed to ensure compliance with the requirements of GN 704 and BPGs. The proposed stormwater management plan for the entire site is presented on, whilst presents more detail around the plant area.

The key features include:

- Clean stormwater will be prevented from entering dirty water catchments by creating perimeter berms around dirty water areas and dirty water collection infrastructure (channels and dams).
- Dirty stormwater from the operational areas (crushers, ore stockpiles, load out stations, workshops, stores, contractor's area etc) is collected by lined drainage channels and into dirty water containment facilities, pollution control dam.
- Dirty stormwater and any groundwater collecting within the pit will be collected and pumped to the dirty water dam.
- Runoff from the hard overburden stockpile will be prevented from entering any surface water receptors by creating perimeter stormwater retention berms to collect runoff and allow it to evaporate and/or infiltrate to ground.

Given the waste rock dumps do not pose a `considered compliant with GN 704.

- The topsoil stockpile will be revegetated and any runoff from this will be classified as clean.
- Dirty water within the dirty water containment facilities will be re-used at the site for dust suppression, wash down or other non-potable uses where water quality permits.

To meet the design principles detailed above, detailed Civil Engineering design for the proposed stormwater management measures are presented on this study, along with the specific hydraulic design standards, methodologies, assumptions, and input parameters for each stormwater management correction measures proposed in the study.

Design flood peaks were calculated using the RMF, Midgley and Pitman and SDF methods. The Midgely and Pitman method used a zone number of 4, the RMF method used a Kovacs region K4 and the SDF method used drainage basin number 28. The relevant flood peaks for the 1:50- and 1:100-year return intervals for the catchment are shown in Table 28. The Midgely Pitman method generally produced lower design flood peaks than the RMF method whilst the SDF method produced the highest flood peaks for each sub catchment. Owing to the differences in the methodology and the resulting design flood peaks, the RMF design flood peaks were used to get the representative flood of the river reach.

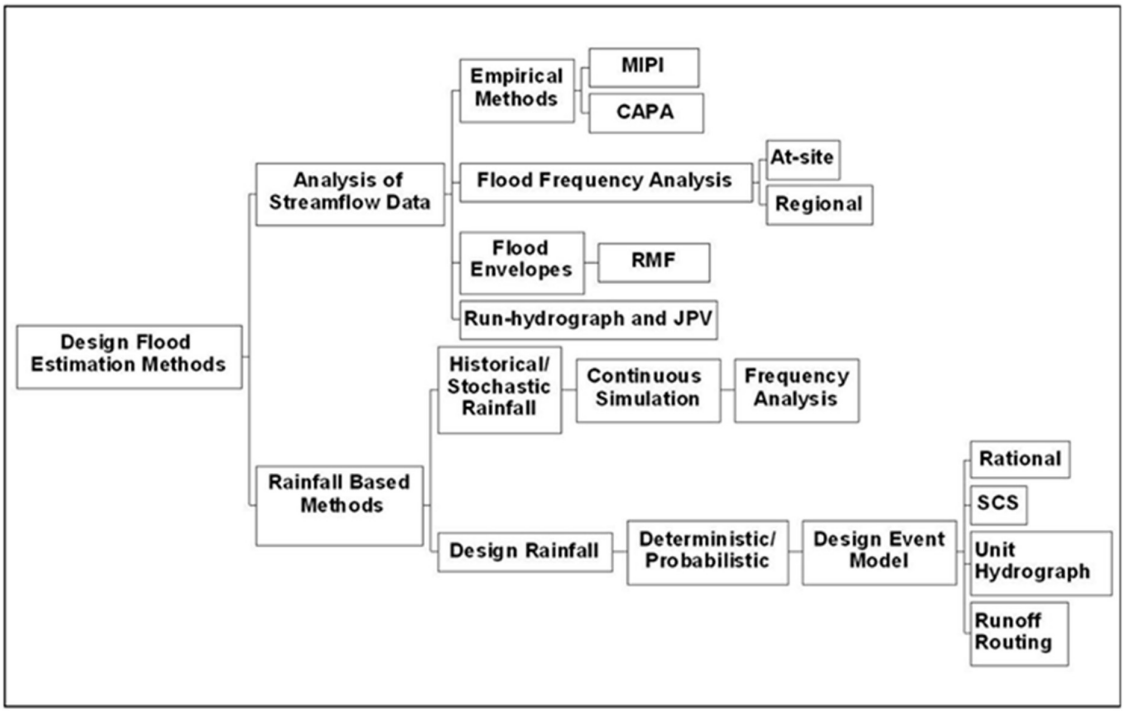

Figure 44: Approach to design flood estimation in South Africa (Smithers and Schulze, 2003)

The calculated flood extents for the 1:50- and 1:100-year flood events are depicted in Figure 13 and Figure 14 respectively. The flood extents for the 1:50- and 1:100-year flood events illustrate that the extend of the 1:50- and 1:100-year flood events pose a threat to the existing stormwater infrastructure at Mooiplaats Colliery.

Figure 45: Conceptual SWMP plant area.

Figure 46: Conceptual SWMP slurry/co-disposal dam

Figure 47: Conceptual SWMP clean catchments.

Table 28: Design Flood Volume-WSP Environmental Pty Ltd

Catchment	Return Interval	RMF	Midgley Pitman	SDF
1	1:50	66.08	61.14	133.26
	1:100	83.23	77.22	172.30
2	1:50	47.28	39.54	79.01
	1:100	59.55	49.94	102.16
3	1:50	837.62	718.03	1073.32
	1:100	1055.08	906.98	1388.16
4	1:50	858.31	715.61	1075.80
	1:100	1081.13	903.93	1391.36
5	1:50	56.15	55.48	130.66
	1:100	70.73	70.08	168.93
6	1:50	32.94	31.14	67.62
	1:100	41.49	39.34	87.41
7	1:50	28.32	25.85	51.50
	1:100	35.67	32.65	66.58
8	1:50	42.09	43.12	97.38
	1:100	53.02	54.47	125.89
9	1:50	32.52	33.33	78.90
	1:100	40.96	42.10	102.00
10	1:50	233.98	254.69	479.73
	1:100	308.85	321.71	620.39
11	1:50	90.36	82.95	174.75
	1:100	116.18	104.77	225.97

A dynamic water balance is fundamental to optimise water management and minimise raw water usage on the mine. Dynamic water balances enable instantaneous examination of the changing situation of a mining operation. They also allow the investigation of different rainfall scenarios, such as drought conditions, process changes or new developments, which are critical to the planning process. The purpose of the water balance is to demonstrate that a mine will be able to manage all water in its operational area, including rainfall, through the different phases of the LoM. Dynamic water balances are thus an important operational and regulatory tool for water and pollution control as well as an essential part of life-cycle analysis for all current and future activities at the mine.

The water balance is, therefore, utilised as a management tool, for example, in simulating the effect of additional water management measures or the effect of expansion projects on the water management system. Assessment of the water balance will reveal the areas of concern for water management at the mine as well as non-compliance with the requirements of Regulation GN 704, dated 1999.

The main input in any water balance is natural source, precipitation. Runoff is the result of precipitation (rainfall) falling on a catchment and eventually running off from the catchment. The amount of rainfall that runs off is dependent on the catchment characteristics. Natural water sources and water loses were assessed. In-stream data was based on Mean Annual Rainfall (MAR) and mine related data was based on flow rates as well as dam volumes and water quality relevant to the identified water circuits. Existing data was evaluated in order to determine where flow and quality data are not available, or where the data is outdated, unreliable or insufficient. The assessment was therefore limited to a 12-months period.

The average amount of water that flows down a monitoring point per year is MAR. The MAR can be expressed as mm of water spread evenly across the entire catchment or as a volume in m3/a of water flowing past a water

quality monitoring point. To simplify MAR Calculations, 66 mm/a based on GIS data was used based on catchment characteristics and was multiplied with the surface area of the effective catchments to produce the annual volume. Table 29 below illustrates the MAR calculations.

Table 29: Water circuits (in-stream)

Catchment ID	Monitoring Point	Effective catchment (km2)	MAR at a rate of 66.0 mm/a (m3/annum)
Segment 1	WTSO2	78.318	5168988
	WTSO3	103.15	6807900
	WTSO5	110.43	7288380
Segment 2	VLSO2	761.16	50236560
	VLSO3	782.01	51612660
Special point	WTSO4	3.683	239844
	WTSO6	3.634	243078

5.4.1 WATER CIRCUITS

The water balance system at Mooiplaats is broken down into three water main circuits based on the usage of the water: domestic, clean and dirty water circuits. Each water circuit was assessed individually to indicate all water sources, losses, and storage.

Catchment losses were determined by hydrological simulation based on quantified runoff. The applicable catchment loss is soil moisture storage referring to the amount of water held in the soil at any particular time. The amount of water in the soil depends on soil properties like soil texture and organic matter content. The maximum amount of water the soil can hold is called the field capacity. Fine grain soils have larger field capacities than coarse grain (sandy) soils. The factor applied for the office area is different from the factor applied for the stockpile area due to the roof and gutters water effect. Thus, more water is available for actual evapotranspiration from fine soils than from coarse soils. The upper limit of soil moisture storage is the field capacity, and the lower limit is 0 when the soil has dried out.

5.4.2 DOMESTIC CIRCUITS

Domestic water circuit account is sourced from external service provider. Sanitation water from the bathrooms, change houses and kitchen area, runs through a drainage pipe into the water treatment plant.

5.4.3 CLEAN WATER CIRCUIT

A clean water catchment is one that is still able to function isolated from dirty activities. It should be able to release water back to the environment before there is contact with potential contaminants as it flows overland and seeps through the ground. Clean water catchments should present opportunities for water to seep into the ground so that it can be used by plants. Water from the clean water catchment is sourced naturally from rainfall. The losses are mostly because of infiltration and excess water is allowed to flow freely to the environment. Clean water catchments are topsoil stockpiles and office areas.

Figure 48 below demonstrates the clean water components Mooiplaats Colliery. The clean water catchment runoff calculations are presented in Table 30.

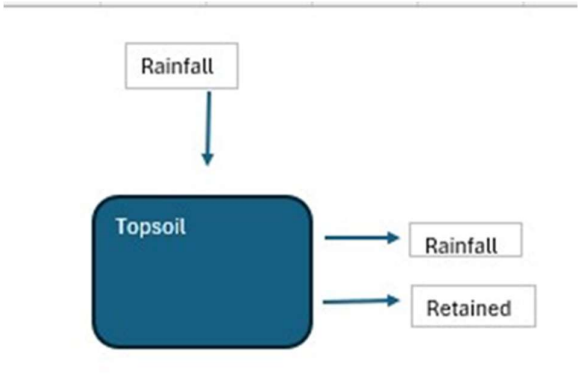

Figure 48: Clean water catchment circuits

Table 30: Clean Water Catchment

Description	Water Source	Volume in (m3/a)	Water Loss	Volume out (m3/a)
Topsoil	Rainfall	22423	Runoff	9866
			Retained	12557
	Total In	22423	Total Out	22423
			Surplus/Deficit	0

5.4.4 DIRTY WATER CIRCUIT

Dirty Water Management considers GN704 guidelines relating to water management in mines. In general, the on-site surface water management include:

- maintaining the activity footprint as small as possible,
- separate clean and dirty water runoff,

- prevent clean water runoff flowing onto the activity footprint,
- prevent dirty water runoff from the activity area from entering clean water runoff areas through berms and channels, and
- collection of dirty catchment runoff in the PCD.

5.4.5 SECTION 21(G)

Section 21 (g) water uses for dust suppression was provided by the mine. A total of 16 994 m3/a was used for dust suppression during the period under review. Most of the water used for dust suppression was pumped from the DAM 3 as shown in Table 31.

5.4.6 DIRTY WATER HYDROLOGICAL CALCULATIONS

Over and above the metered data, hydrological methods were used to estimate rainfall, catchment losses and runoff shaft and PCD and the outputs are presented in Table 31. Dirty water from the dirty water catchments is pumped to PCDs. The PCD are therefore considered as water source for dust suppression and other related requirements within the mining area.

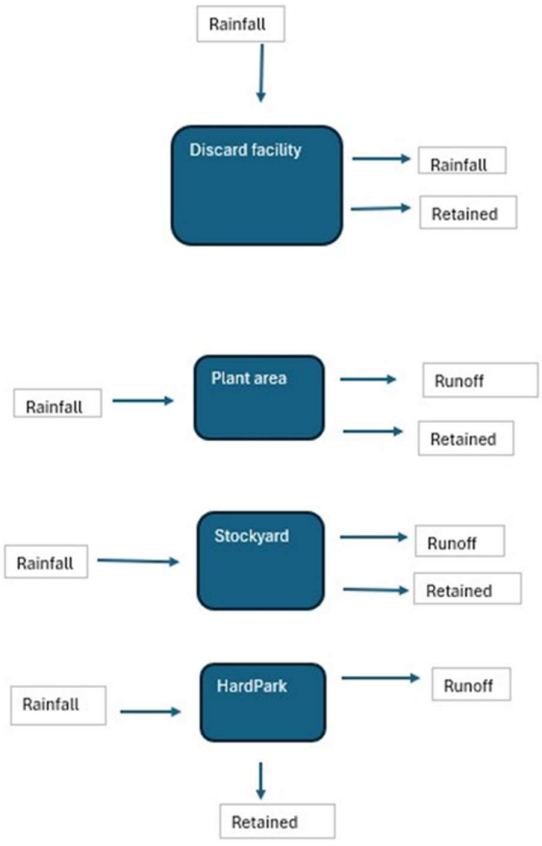

Figure 49: Dirty water catchment circuit

Table 31: Dirty water hydrological calculations

ID	Status Quo	Area (m²)	MAR (m)	MAE (m)	Runoff Coefficient	Rainfall (m³)	losses (m³)	Runoff (m³)
Discard Facility	operational	355700	0,70535	1,4	0,44	250893	140500	110393
Plant area	operational	114100			0,68	80480	25754	54727
Stock yard	operational	36920			0,68	26042	8333	17708
Topsoil	operational	31790			0,44	22423	12557	9866
Truck area	operational	38170			0,68	26923	8615	18308
Hard Park	operational	39370			0,68	27770	8886	18883

The component water balance calculations are summarised in Table 32 below

Table 32: Dirty water catchment

Description	Water Source	Volume in (m3/a)	Water Loss	Volume out (m3/a)
Discard Facility	Rainfall	250893	Runoff	110393
			Retained in Hard	140500
	Total In	250893	Total Out	250893
			Surplus/Deficit	0

Description	Water Source	Volume in (m3/a)	Water Loss	Volume out (m3/a)
Plant area	Rainfall	80480	Runoff	54727
			Retained in Hard	25754
	Total In	80480	Total Out	80480
			Surplus/Deficit	0

Description	Water Source	Volume in (m3/a)	Water Loss	Volume out (m3/a)
Stock yard	Rainfall	26042	Runoff	17708
			Retained in Hard	8333
	Total In	26042	Total Out	26042
			Surplus/Deficit	0

Description	Water Source	Volume in (m3/a)	Water Loss	Volume out (m3/a)
Hard Park	Rainfall	27770	Runoff	18883
			Retained in Hard	8886
	Total In	27770	Total Out	27770
			Surplus/Deficit	0

Based on the components above, the water balance was determined and presented Table 33 below.

Table 33: Dirty water hydrological calculations

Description	Water Source	Volume in (m3/a)	Water Loss	Volume out (m3/a)
Dam 1	Rainfall	2002	Evaporation	3973
	Plant PCD	32022	Pumped to Dam 2	382847
	Hardpack	37191		
	From Usutu	256225		
	North Shaft RWD	59380		
	Total In	386820	Total Out	386820
			Surplus/Deficit	0

Description	Water Source	Volume in (m3/a)	Water Loss	Volume out (m3/a)
Dam 2	Rainfall	2499	Evaporation	4960
	Pumped from Dam 1	382847	Pumped to Dam 3	380386
	Total In	385346	Total Out	385346
			Surplus/Deficit	0

Description	Water Source	Volume in (m3/a)	Water Loss	Volume out (m3/a)
Dam 3	Rainfall	2943	Evaporation	5841
	Pumped from Dam 2	380386	Pumped to Ericson dam	404651
	Runoff from discard facility	44157	Dust suppression	16994
	Total In	427486	Total Out	427486
			Surplus/Deficit	0

Description	Water Source	Volume in (m3/a)	Water Loss	Volume out (m3/a)
Plant PCD	Rainfall	6948	Evaporation	13790
	Plant area	54727	Runoff to PCD1	47884
	Total In	61674	Total Out	61674
			Surplus/Deficit	

Description	Water Source	Volume in (m3/a)	Water Loss	Volume out (m3/a)
North Shaft RWD	Rainfall	6962	Evaporation	13818
	Discard Facility	66236	Pumped to PCD1	59380
	Total In	73198	Total Out	73198
			Surplus/Deficit	0

5.5 GROUNDWATER

To prevent repetitions within this report template, refer to Section 4.5, as well as Section 5.13.2. The Hydrogeological Specialist Study is attached in Appendix D.

5.6 WASTE

Several waste streams are likely to originate from the activities associated with day-to-day activities in the workplace. Some of these waste streams may not be hazardous, but the majority may contain a component(s) that may require special treatment. The nature of these waste streams may also vary due to composition and physical form. In order to make informed decisions on determining the appropriate waste management options to handle, treat and dispose of waste, the different waste streams must be identified in terms of hazardous and non-hazardous wastes.

Waste streams at the Mine can be categorised into 5 (five) different streams, based on similar health and environmental concerns namely:

- General Waste:
    - Domestic wastes – general waste, plastics, food, organic, non-hazardous, putrescible consisting of, combustible material, cardboard, wood, etc.;
    - Paper waste – paper waste recycling initiative; and
    - Rubber/plastic Wastes – valves, conveyors and hoses.

On-Site Management: Currently general waste is collected and stored in bins and skips and sorted in the salvage yard for off-site reselling or disposal.

- Industrial Waste:
    - Building rubble;
    - Scrap metal; and
    - Yard cleanings and sweepings.
- Hazardous Wastes – acids, alkalis, heavy metal sludge and solutions, asbestos wastes and other harmful substances as effluent or solids.
- Oily wastes – hydrocarbons, oils, grease, diesel, petrol, paraffin, hydraulic oils, etc.; and ○ Chemicals.

On-Site Management: Collected by registered waste management contractor for off-site disposal (waste manifests) at a licensed waste disposal site.

Carbonaceous waste is disposed of on the co-disposal dump.

5.7 OPERATIONAL MANAGEMENT

The operational management of the activities in terms of the water and waste management are detailed in the following sections. This included the organisational structure, competence training and awareness and the internal and external communication.

5.8 ORGANISATIONAL STRUCTURE

The organizational structure for the Applicant is presented in Section 2.7 above and Sections 5.9 to 5.12 below includes a discussion of resources and competencies, as well as the internal and external communication processes that are implemented.

5.9 RESOURCES AND COMPETENCE

The success of environmental management is dependent upon the commitment of the organization, at all levels, to environmental excellence. Commitment to this IWWMP will benefit both the organization's business success and the community in which it operates. This commitment requires that the organization provide the necessary resources for employee training, reference material and reporting procedures. Senior executives and line managers will be held responsible and accountable for the health and safety of personnel while on duty, as well as the environmental impacts caused by mining activities. The mine will conduct its operations responsibly and with due care and regard to the impact on the environment. It is the policy of the Applicant to strive to eliminate the adverse environmental effects of all its activities and take an active role in raising the environmental awareness and responsibility of all employees, suppliers, contractors and customers.

To achieve and surpass this objective, the company endeavours to:

- Conduct all its activities in an environmentally responsible manner;
- Conform to all relevant legislation as a minimum standard;
- Ensure that all its operations have appropriate policies, procedures and facilities so that such standards can be met;
- Promote environmental awareness by continuous training, motivation and leading by example;
- Implement effective environmental management and reporting systems at all operations, that encompasses auditing, monitoring and decisive intervention;
- Conduct regular review of conformance to requirements and achievement of objectives at Board level;
- Use raw materials and resources prudently;
- Promote the recycling of used and waste materials;
- Apply the principles of continuous improvement to environmental performance;
- Develop and maintain positive relationships with all affected and interested parties, governmental departments, environmental agencies and the public; and
- Participate in environmental governance.

The overall success of environmental management is dependent upon the commitment of the organisation, at all levels, to ensure environmental excellence. Commitment to structured and effective management plan will benefit both the organisation's success and the community in which it operates. This commitment requires that the organisation provide the necessary resources for employee training, reference material and reporting and response procedures. Senior executives and line managers shall be held responsible and accountable for health and safety of personnel while on duty as well as the environmental impacts caused by mining activities.

The competence of the work force is ensured through selection, training and awareness in health, safety and environmental matters. Continual evaluation measures must be implemented to ensure that performances with regard to social, health and well-being are improved and environmental management is effectively implemented throughout the lifespan of operations. Regular reviews of the company's performance are necessary during and after operations to ensure that procedures are appropriate and to ensure the desired environmental outcomes are being achieved.

The overall management responsibility for the Environmental Management Officer (EMO) rests with project management during construction and the General/Mine Manager during operation and closure. An executive committee is to take responsibility for the impacts associated with Mooiplaats Colliery. The SHE Manager on site is responsible for ensuring that the plan remains effective and relevant. Although the company will ultimately be responsible for environmental management, it will also be the responsibility of all engineering, procurement and construction (EPC) contractors to adhere to the plan. Specific requirements for environmental management relative to their areas of operation are to be detailed in their respective contracts. Mooiplaats Colliery is to have dedicated teams of highly specialised and dedicated environmental personnel. That are committed to the environmental policies and procedures. These teams and individuals will act and respond to operations to ensure environmental compliance. The performance and implementation of the MPRDA EMP to be audited by an independent external party every second year. Findings, mitigating actions required, as well as a responsible person and schedule is listed in audit reports.

The management requirements that is the responsibility of the SHE Manager are as follows:

- Community liaison to update communities on changes to project design, potential impacts as well as health and safety;
- Develop and implement environmental training and awareness plans, including protected and indigenous species awareness and control of declared category 1, 2 and 3 invader species;
- Ensure that environmental monitoring, recording and reporting is conducted (monitoring data should be available to the Department on request);
- Implementation of an Environmental Management System (EMS); Implementation of internal and external environmental audits;
- Managed document control; and
- Overview of the EMP and IWWMP implementation.

All contractors and personnel who are appointed are to be suitable qualified and trained. They must at all times be aware of the safety of themselves, the Mooiplaats Colliery as well as the environment. Education and training is to include emergency preparedness (ex. fire outbreaks, environmental disasters, etc.). It is furthermore advised

that the applicant design and implement the following as part of socio-economic upliftment in the Local and District Municipality:

- Education and Training (including adult basic education and training); Hard-to-fill vacancies;
- Leaderships;
- Portable skills programmes; Skills development plan; and Skills programmes.
- Socio-economic upliftment objectives should include:
- Aims to facilitate the improvement of numeracy and literacy amongst the operation's workforce;
- Commitment from all stakeholders to remove barriers and to build a visible, usable, credible and sustainable vehicle for effective and creative lifelong learning; and
- To generate consensus between partners (i.e. local government and communities surrounding the area of operation) regarding the criteria and systems within which the integrity and quality of the program is protected.

In compliance with ISO 14001, ISO 9001 and OHSAS 18001; mine management has adopted a safety, health, environment and quality awareness and training procedure that includes all employees at the mine. The procedure has a training and awareness component, which is followed up by a report and recording component, and then with a review and evaluation component. The relevant training organisation, in conjunction with the SHE Officer, is responsible for ensuring that Job Specific Training, as required as a result of identified significant environmental aspects, is compiled and provided for personnel or persons performing that function. Management of the mine is required to attend training on environmental management, which will include requirements of the SHE Management System, significant impacts, establishment of objectives and programs and maintenance of the SHE Management System.

Records of this training must be retained by the SHE Officer or the relevant training organisation. The SHE Officer is responsible for managing the implementation of specific action items in the EMPR and IWWMP.

All personnel and contractors tasked with specific aspects of the project or the implementation of the EMPR and IWWMP must have the requisite knowledge, skills and training to perform that specific work. Consequently, the training is designed to assist the SHE Officer, relevant personnel and contractors, to perform their functions in respect of the implementation and monitoring of the EIA / EMPR and SHE Management System, and may include the following:

- Communication of the environmental risks for each phase of the project; Content of the EIA / EMPR, including the action plans;
- Current knowledge of environmental regulatory requirements;
- Material impacts predicted through the assessment process; and
- Methods required in order to perform the action items in a competent and efficient manner

5.10 EDUCATION AND TRAINING

Training and environmental awareness is an integral part of environmental management of a mine. The mine must ensure that all relevant employees are trained and capable of carrying out their duties in an environmentally

responsible and compliant manner and are capable of complying with the relevant environmental requirements. Environmental Awareness at Mooiplaats Colliery is addressed and conducted by means of two (2) main components namely training and communication.

Environmental awareness training at the mine will be attended to during induction for new employees and in refresher courses for ex-leave employees by means of an audio-visual environmental awareness video. Apart from own employees, the operation also makes use of numerous contractors to undertake different components of their mining activities. Each contractor will be responsible for its own environmental awareness training for its employees.

The principles to be adhered to by the mine and the contractors are based on the following:

- Environmental awareness is addressed at top management level;
- Workers receive awareness training on all environmental and SHE procedures;
- Training aids includes the use of photographs, posters and live demonstrations;
- The workers whose jobs have the greatest potential for environmental impact are identified and receive specific training in impact prevention and remediation; and
- Records are kept of environmental awareness training and all new employees receive induction before they are allowed to work on site.

5.11 INTERNAL AND EXTERNAL COMMUNICATION

The Public Participation Process (PPP) is a requirement of several pieces of South African Legislation. The aim of public participation is to ensure that all relevant interested and affected parties (I&AP's) are meaningfully notified, consulted and their opinions considered during the course of the project. The methodology applied to the PPP, must be one of openness, transparency and collaboration between the EAP and I&AP's. All documentation pertaining to the IWWMP will be made available to the public for comment in accordance with the relevant regulations. All comments received will be included in the IWWMP to be submitted to the DWS for adjudication, as well as in the Public Participation Report that will be included in Appendix H.

5.11.1 INTERNAL COMMUNICATION

The following channels will be used to communicate pertinent environmental information to the appropriate levels.

- E-mails;
- Posters;
- Management briefs;
- Management meetings;
- SHE meetings;
- Site meetings; and
- Notice boards.

5.11.2 EXTERNAL COMMUNICATION

Social impacts already start in the planning phase of a project and as such it is imperative to start with stakeholder engagement as early in the process as possible. A stakeholder engagement plan will assist Mooiplaats Colliery to outline their approach towards communicating in the most efficient way possible with stakeholders throughout the life of the project. Such a plan cannot be considered a once off activity and should be updated on a yearly basis to ensure that it stays relevant and to capture new information. Stakeholders must provide input in the Stakeholder Engagement Plan.

The Mooiplaats Colliery Stakeholder Engagement Plan should have the following objectives:

- To identify and assess the processes and/or mechanisms that will improve the communication between local communities, the wider community and the mine;
- To improve relations between the mine's staff and the people living in the local communities (Arbor and commercial farmers);
- To provide a guideline for the dissemination of information crucial to the local communities in a timely, respectful and efficient manner; and
- To provide a format for the timely recollection of information from the local communities in such a way that the communities are included in the decision-making process.

The Stakeholder Engagement Plan should be compiled in line with International Finance Corporation (IFC) Guidelines and should consist of the following components:

- Stakeholder Identification and Analysis: time should be invested in identifying and prioritizing stakeholders and assessing their interests and concerns;
- Information Disclosure: information must be communicated to stakeholders early in the decision-making process in ways that are meaningful and accessible, and this communication should be continued throughout the life of the project;
- Stakeholder Consultation: each consultation process should be planned out, consultation should be inclusive, the process should be documented and follow-up should be communicated.
- Negotiation and Partnerships: add value to mitigation or project benefits by forming strategic partnerships and for controversial and complex issues, enter into good faith negotiations that satisfy the interest of all parties;
- Grievance Management: accessible and responsive means for stakeholders to raise concerns and grievances about the project must be established throughout the life of the project;
- Stakeholder Involvement in Project Monitoring: directly affected stakeholders must be involved in monitoring project impacts, mitigation and benefits. External monitors must be involved where they can enhance transparency and credibility;
- Reporting to Stakeholders: report back to stakeholders on environmental, social and economic performance, both those consulted and those with more general interests in the project and parent company;

- Management Functions: sufficient capacity within the company must be built and maintained to manage processes of stakeholder engagement, track commitments and report on progress; and
- It is of critical importance that stakeholder engagement takes place in each phase of the project cycle and it must be noted that the approach will differ according to each phase. The stakeholder analysis done in Section 6 of this report must inform the stakeholder engagement strategy.

5.11.3 GRIEVANCE MECHANISM

In accordance with international good practice, Mooiplaats Colliery should establish a specific mechanism for dealing with grievances. A grievance is a complaint or concern raised by an individual or organisation that judges that they have been adversely affected by the project during any stage of its development. Grievances may take the form of specific complaints for actual damages or injury, general concerns about project activities, incidents and impacts, or perceived impacts. The International Finance Corporation (IFC) standards require Grievance Mechanisms to provide a structured way of receiving and resolving grievances. Complaints should be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to all segments of affected communities and is at no cost and without retribution. The mechanism should be appropriate to the scale of impacts and risks presented by a project and beneficial for both the company and stakeholders. The mechanism must not impede access to other judicial or administrative remedies.

The grievance mechanism should be based on the following principles:

- Transparency and fairness;
- Accessibility and cultural appropriateness;
- Openness and communication regularity;
- Written records;
- Dialogue and site visits; and
- Timely resolution.

Based on the principles described above, the grievance mechanism process involves four stages:

- Receiving and recording the grievance;
- Acknowledgement and registration;
- Site inspection and investigation; and
- Response.

5.12 AWARENESS RAISING

All employees and contractors have to undergo environmental and awareness training, which broadens the base of people that acts as custodians of the environment. The mine supports the comprehensive set of policies, standards and guidelines that the company applies for the various facets of the business, amongst which are:

- Safety, health, environment and risk, quality and community;
- Equity in employment;

- Information Systems;
- Compliance with the law; and
- Relationships with Governments.

The Applicant has established and maintains procedures for the internal communication between the various levels and functions of the operation. Environmental incidents are reported by either employees or I&APs via two distinct routes:

- Incident reporting directly to the surface environmental officer: I&AP's or employees report directly to the surface environmental officer, who then reports to the technical services manager who finally reports to the general manager; and
- Incident reporting to the respective head of department: Any incident is reported by an I&AP or an employee to the employees' respective head of department, who in turns reports to the technical services manager. The technical services manager reports to the surface environmental officer and general manager respectively.

5.13 MONITORING AND CONTROL

Several environmental impacts will require on-going monitoring during various phases of the proposed project. The purpose of monitoring is not merely to collect data, but to provide information necessary to make informed decisions on managing and mitigating potential impacts. Monitoring, therefore, serves the following functions;

- Serve as early warning system to detect any potential negative impacts;
- To provide information to feedback into management controls to avoid, prevent or minimise potential negative impacts;
- Provide quantitative data that can serve as evidence for the presence of negative impacts or the lack thereof; and
- Allows for trending, modelling and prediction of future conditions or potential impacts.

5.13.1 SURFACE WATER MONITORING

The design and implementation of the surface water monitoring network will be undertaken in accordance with the Best Practice Guidelines G3: Water Monitoring Systems (DWAF, 2006). The aim of the surface water monitoring network is to assist with overall water management including but not limited to the following:

- Pollution prevention;
- Assess the performance of pollution prevention; and
- Develop a more holistic understanding of current, baseline water quality on site and the changes that result from mining activities.

Mooiplaats Colliery has an existing monitoring programme which is included in Appendix N, as per the requirements of the existing WULA.

5.13.2 GROUNDWATER MONITORING

As Mooiplaats Colliery is an existing coal mine, a groundwater monitoring programme has already been implemented, as per the requirements of the guidelines documented in Best Practice Guideline G3 Water Monitoring Systems (2007) available from the DWS. A monitoring plan is necessary due to the following reasons:

- Accurate and reliable data forms a key component of many environmental management actions; and
- Water monitoring is a legal requirement.

The most common environmental management actions require data and thus the objectives of water monitoring include the following:

- Development of environmental and water management plans based on impact and incident monitoring (facilitate in decision-making, serve as early warning to indicate remedial measures or that actions are required in certain areas) for the mine and region;
- Generation of baseline/background data before project implementation;
- Identification of sources of pollution and extent of pollution (legal implications or liabilities associated with the risks of contamination moving off site);
- Monitoring of water usage by different users (control of cost and maximising of water reuse);
- Calibration and verification of various prediction and assessment models (planning for decommissioning and closure);
- Evaluation and auditing of the success of implemented management actions (ISO 14000, compliance monitoring);
- Assessment of compliance with set standards and legislation (EMPs, water use licenses); and
- Assessment of impact on receiving water environment.

Effective groundwater monitoring systems on a mine consist of the following components:

- Groundwater quality monitoring system;
- Groundwater flow monitoring system; and
- Data and information management system.

When designing the monitoring system, the following issues should also be taken into consideration:

- Potential or actual water use;
- Aquifer or catchment vulnerability;
- Toxicity of chemicals;
- Potential for seepage or releases;
- Quantities and frequency of release to the environment (point and non-point); and
- Management measures in place to minimise risk.

The groundwater monitoring points as well as the parameters that are currently measured in terms of water quality are indicated in Section 4.5.1.5.

5.13.3 BIOMONITORING

Biomonitoring of the aquatic systems associated with the Mooiplaats Colliery operational areas is conducted as part of an approved Environmental Management Programme (EMP) and as per the requirements of the WUL during the summer and the winter. The Mooiplaats Colliery is an underground coal mine located Adjacent to the Witpuntspruit, upstream of the Vaal River. at the Mooiplaats Colliery.

This biomonitoring study focuses on five sites within the region, which incorporated the Witpuntspruit, Vaal River, and a tributary of the Witpuntspruit. Sites were selected according to previous studies conducted by The Biodiversity Company (TBC, 2021). The biomonitoring is currently conducted at 5 sampling points namely:

- MPU: Upstream of the Mooiplaats Colliery on the Witpuntspruit.
- MP2: Downstream point of the Witpuntspruit.
- MPD: a dam, approximately 1.4 km downstream of the Mooiplaats Colliery on a tributary of the Witpuntspruit.
- MV1: Upstream point of the Vaal River.
- MPW: Downstream point of the Vaal River.

The location of these biomonitoring and toxicological monitoring sites are illustrated in Figure 50.

Figure 50: Mooiplaats Colliery bio-monitoring points.

A total of five biomonitoring sites used in this study were selected according to previous biomonitoring studies conducted in 2018 by The Biodiversity Company. These sites were selected to effectively monitor impacts stemming from the activities at the Mooiplaats Colliery. Sites MPU, MPD and MP2 are situated in the Witpuntspruit Sub-

Quaternary Reach (SQR) (C11B-1641), while site MV1 is situated in Vaal SQR (C11B-1693), and site MPW is situated in Vaal SQR (C11B-1770). Refer to Figure 50. Possible causes for the reduction in water quality includes natural decant from the Mooiplaats Colliery and agricultural activities.

The biomonitoring indicated modified but stable conditions within the Witpuntspruit and Vaal River. The Witpuntspruit presented water quality perturbations from the Mooiplaats Colliery, which has been entering the Witpuntspruit since the 2020 biomonitoring study. This was indicated by acidic pH levels and elevated EC levels recorded at site MPD. Urgent mitigation measures are required to stem the influx of pollutants into the watercourse, which is having a detrimental effect on the water quality of the Witpuntspruit. Additionally, the contributions of pollutants into the Vaal system from the Witpuntspruit was noted with an increase in EC levels at the downstream site.

Biotic indices indicate water quality was the predominant driver to modifying the macroinvertebrate community within the Witpuntspruit. According to the biotic indices, water quality was the predominant driver altering the biotic integrity of the Vaal system, however, heavy flooding prior to the study removed aquatic and marginal vegetation.

The study found that the Vaal River reach indicate that the system is in a moderately modified state (class C). Water quality was identified as a driver responsible for modifying local aquatic biota in the system. Several sensitive taxa were notable absent continue to be absent from the reach, including Psephenidae, Heptageniidae, and Perlidae. A decrease in ecological category was recorded from the 2018 to the 2019-2020 study period, with the reach remaining in a stable but moderately modified state. Heavy flooding during the 2019 to 2023 high flow seasons contributed to changes in habitat within the reach, with marginal and aquatic vegetation being washed away from the sites, contributing to a decrease in Hemiptera collected within the reach.

From the water quality data, it can be observed that the river system is still in an impacted state. The main influences can be attributed to agriculture, stream impediments and historical/current mining activities. The overall ecological category for the study area was in line with the categorisation as conducted by DWA in 2012, the water quality was not in line with the parameters stipulated in the WUL as well as the Grootdraai Dam Forum instream water quality guideline.

The aquatic resources near the study area have already been significantly disturbed by mining and agricultural activities in the area, as well as some impacts because of the existing ash dam and associated infrastructure of the Camden Power Station.

The annual wet and dry season monitoring programme should be maintained until a closure certificate has been issued. It is also of paramount importance to ensure that dirty water management infrastructure is well maintained throughout the life of the mine.

The findings of the aquatic biomonitoring study indicate that the Mooiplaats Colliery is contributing pollutants into the Witpuntspruit, as recorded by increases in EC levels. It is recommended that urgent mitigation measures are taken to reduce the influx of pollutants into the natural environment. It is further recommended that aquatic biomonitoring continue.

5.13.4 WASTE MONITORING

The Applicant will develop and implement a waste management plan, which complies with the principles of the NEMWA and provides a mechanism for the effective management of waste throughout the LoM. This plan should

ensure the appropriate management of all solid waste, including construction debris (cement bags, wrapping material, timber, cans, wire, nails, etc.), waste and surplus food, food packaging, organic waste, etc. The objectives of a waste monitoring programme are to identify and sufficiently manage waste related impacts through:

- Avoiding and minimising waste;
- Reducing and recycling waste; and
- The prevention of pollution.

Solid waste must be monitored in accordance with the waste management conditions detailed below:

- The Applicant shall develop and maintain a hazardous substance register for all hazardous materials that shall be kept on site. Material Safety Data Sheets (MSDS) must be available on site at the point of use and readily accessible for all hazardous substances stored;
- All equipment must be inspected regularly (daily) to ensure that it is in good working condition, clean, and free from leaks of oil, petrol, diesel, hydraulic fluid and contaminating compounds;
- Daily inspections shall be carried out to ensure such spill prevention measures are in place and remain effective;
- The Applicant shall maintain a waste register which shall be used to track all waste removed from site. Proof of appropriate waste disposal shall be kept on file at the site for auditing purposes.

5.13.5 STORMWATER MANAGEMENT STRUCTURES

Storm water structures (channels, silt traps, dirty water containment facilities and energy dissipaters) should be monitored every year in September, before the rainy season begins, for any blockages or breaches. They should further be monitored immediately after every storm event during the rainy season. Should blockages or breaches occur, immediate action should be undertaken to remove debris and / or repair breaches. Monitoring should be undertaken by the onsite Environmental Officer or maintenance manager. Inspections should be recorded and should include the following:

- Date of inspection;
- Rainfall amount received;
- Photographs of blockages and / or breaches witnessed;
- What action were taken to fix issues and amount of time taken to address issues; and
- Photographs post action taken.

The inspection reports should be presented to the DWS.

5.14 RISK ASSESSMENT / BEST PRACTICE ASSESSMENT

An risk assessment was undertaken for this IWWMP in line with the DWS Risk Assessment Matrix (GN 509 of 26 August 2016) for the watercourses and wetlands (and the Hydrology and Geohydrology impacts are assessed according to the methodology presented below (Table **36**). The following prediction and evaluation of impacts is based on the mining activities conducted at the project area.

The first stage of impact assessment is the identification of environmental activities, aspects and impacts. The receptors and resources are also identified, which allows for an understanding of the impact pathway and assessment of the sensitivity to change.

The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The values for the likelihood and consequence (severity, spatial scope and duration) of the impact are then used to determine whether mitigation is necessary.

The following criteria have been used to describe magnitude and significance of impacts in a systematic manner:

- Extent or spatial scale of the impact;
- Intensity or severity of the impact;
- Duration of the impact;
- Mitigatory potential;
- Acceptability;
- Degree of certainty; and
- Impact Magnitude/Significance.

Describing the impacts in terms of the above criteria, provides a consistent and systematic basis for the comparison and application of scoring impacts. The rating for each criterion is provided in Table **34**.

Table 34: Criterion for Risk assessment

Rating	Comment
Impact criteria: Intensity or severity of the impact	
High	Disturbance of pristine areas that have important conservation value.
	Destruction of rare or endangered species.
Medium	Disturbance of areas that have potential conservation value or are of use as a resource.
	Complete change in species occurrence or variety.
Low	Disturbance of degraded areas that little conservation value.
	Minor change in species occurrence or variety.
Impact criteria: Duration of the impact	
High (Long term)	Permanent

Rating	Comment
(more than 15 years)	Beyond decommissioning
	Long term (more than 15 years)
Medium (Medium term) (5 to 15 years)	Reversible over time
	Lifespan of the project
	Medium term (5-15 years)
Low (Short term) (0 to 5 years)	Quickly reversible
	Less than the project lifespan
	Short term (0-5 years)
Mitigatory potential	
High:	High potential to mitigate negative impacts to the level of insignificant effects
Medium:	Potential to mitigate negative impacts. However, the implementation of mitigation measures may still not prevent some negative effects.
Low:	Little or no mechanism to mitigate negative impacts.
Acceptability	
High (Unacceptable)	Abandon project in part or in its entirety
	Redesign project to remove impact or avoid impact
Medium (Manageable)	With regulatory controls
	With project proponent's commitments
Low (Acceptable)	No risk to public health
Degree of certainty	

Rating	Comment
Definite	More than 90% sure of a particular fact. Substantial supportive data exist to verify the assessment.
Probable	Over 70% sure of a particular fact, or of the likelihood of that impact occurring.
Possible:	Only over 40% sure of a particular fact, or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact, or the likelihood of an impact occurring.
Categories for the rating of impact magnitude and significance	
High	Of the highest order possible within the bounds of impacts that could occur. In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or a combination of these. Social, cultural and economic activities or communities are disrupted to such an extent that these come to a halt. In the case of beneficial impacts, the impact is of a substantial order within the bounds of impacts that could occur.
Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of adverse impacts, mitigation is both feasible and fairly easily possible. Social, cultural and economic activities of communities are changed, but can be continued (albeit in a different form). Modification of the project design or alternative action may be required. In the case of beneficial impacts, other means of achieving this benefit are about equal in time, cost and effort.
Low	Impact is of a low order and therefore likely to have a little real effect. In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. Social, cultural and economic activities of communities can continue unchanged. In the case of beneficial impacts, alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time-consuming.
No impact	Zero impact.

Table 35: Impact Assessment for wetlands and watercourses.

Impact	Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Probability	Significance (max = 100)	Rating	Confidence level
Altered hydrology reducing wetland health and functioning.	**4**	2	4	**10**	**4**	**40**	80%	**32**	**M**	High
Introduction and / or proliferation of alien invasive vegetation from disturbed areas.	**6**	1	4	**11**	**4**	**44**	40%	**17,6**	**L**	High
Chemical contaminates and coal sediment deposits entering watercourses.	**10**	3	4	**17**	**4**	**68**	60%	**40,8**	**M**	High
Overall wetland degradation.	**6**	2	4	**12**	**4**	**48**	40%	**19,2**	**L**	High
Depletion and/ or contamination of groundwater reserves.	**8**	2	4	**14**	**4**	**56**	40%	**22,4**	**L**	High
Altered overland flow from increased hardened surfaces.	**4**	1	4	**9**	**4**	**36**	60%	**21,6**	**L**	High
Vegetation and biodiversity disturbance.	**4**	1	4	**9**	**4**	**36**	60%	**21,6**	**L**	High
Induced erosion and sedimentation.	**4**	1	4	**9**	**4**	**36**	44%	**15,84**	**L**	High
Water quality impairment from stochastic fuel and oil spills.	**6**	1	4	**11**	**4**	**44**	40%	**17,6**	**L**	High

Impact	Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Probability	Significance (max = 100)	Rating	Confidence level
Filling excavations with topsoil.	**4**	1	1	**6**	**4**	**24**	80%	**19,2**	**L**	High
Re-vegetating bare soils.	**-10**	1	2	**-13**	**4**	**-52**	60%	**-31,2**	**+**	High
Treating affected areas to prevent AMD contamination and water pollution from runoff.	**6**	2	2	**10**	**4**	**40**	60%	**24**	**L**	High

Table 36: Hydrology and geohydrology impact assessment.

IMPACT DESCRIPTION	Pre-Mitigation							Post Mitigation								Priority Factor Criteria			
Impact	Nature	Extent	Duration	Magnitude	Reversibility	Probability	Pre-mitigation ER	Nature	Extent	Duration	Magnitude	Reversibility	Probability	Post-mitigation ER	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score
Groundwater abstraction can potentially have a negative impact on groundwater and surface water quantities. Lowering of regional groundwater levels due to a depletion in aquifer storage will cause the formation of a cone of depression i.e. groundwater zone of influence and consequently lowering of the regional phreatic/ piezometric levels.	-1	3	3	2	1	5	-11.25	-1	3	3	2	1	3	-6.75	High	2	2	1.25	-8.44
Should the groundwater zone of influence i.e. capture zone reach local drainages, a reduction in groundwater contribution to baseflow of local rivers and streams will occur.	-1	2	3	4	2	4	-11	-1	2	3	4	2	4	-11	Medium	1	2	1.13	-12.38
Poor quality leachate may emanate from various source areas and waste generated, e.g. coal stockpiles, discard dump, pollution control dam, slurry ponds, dirty roads, etc. which will have a negative impact on water quality.	-1	4	4	4	3	4	-15	-1	1	3	2	2	3	-6	High	2	2	1.25	-7.50
Mobilisation and maintenance of mine heavy vehicle and machinery on-site may cause hydrocarbon contamination of surface water and groundwater resources.Impact on groundwater quality due to hydrocarbon contamination caused by mine heavy vehicles and machinery.	-1	2	4	4	4	3	-10.5	-1	1	3	2	2	3	-6	High	2	2	1.25	-7.50
Poor storage and management of hazardous chemical substances on-site may cause surface water and groundwater pollution.	-1	2	4	4	2	3	-9	-1	1	2	2	2	2	-3.5	High	2	2	1.25	-4.38
Surface and groundwater deterioration and siltation due to contaminated stormwater run-off.	-1	3	4	3	2	3	-9	-1	2	3	2	2	3	-6.75	High	2	2	1.25	-8.44

5.15 ISSUES AND RESPONSES FROM PUBLIC CONSULTATION PROCESS

I&AP's were afforded an opportunity to review and comment on the original draft IWWMP. The draft IWWMP was made available to all registered I&AP for a period of 60 days from the 20 March 2020 until 25 May 2020. The Public Participation Report describing the PPP for this WUL application is attached as Appendix H to this IWWMP. This final IWWMP has been updated to address relevant comments received during the review period. These comments related to potential pollution of third-party water sources. Stringent measures to mitigate and manage this impact are included herein.

5.16 MATTERS REQUIRING ATTENTION / PROBLEM STATEMENT

The following matters require attention:

- The proposed SWMP needs to be implemented;
- The groundwater model needs to be updated on a regular basis and implementation of identified mitigation measures to prevent water pollution (cut-off trench/interception boreholes around the Discard Dump must be implemented).
- Annual wet and dry season biomonitoring must be undertaken.
- Monthly surface and groundwater monitoring must be undertaken.
- Should pollution of third-party water sources be noted, negotiations and suitable compensation must be commenced with immediately.

5.17 ASSESSMENT OF LEVEL AND CONFIDENCE OF INFORMATION

The assessment undertaken by the specialist included the following assumptions and limitations:

5.17.1 WETLAND AND AQUATIC ASSESSMENT

- It has been assumed that the extent of the project area provided to the specialist is accurate;
- Areas characterised by external wetland indicators, such as vegetation and soil indicators to identify wetlands was the focus for this assessment;
- The assessed site was taken to be the 'Preferred' site, as no alternative options were given; and
- The GPS used for water resource delineations is accurate to within five meters. Therefore, the wetland delineation plotted digitally may be offset by a maximum of five meters to either side.

5.17.2 HYDROLOGY AND STORM WATER SPECIALIST STUDY

The following assumptions were made during the calculation of the annual average water balance:

- It was assumed that plant water supply is equal to 48l/s. This was based on the water balance diagram received from the client;
- It was assumed that groundwater ingress to the North Shaft is equal to 50l/s. This was based on the water balance diagram from the client;

- Water usage data was obtained for three months only (August-October 2018). These values were extrapolated were possible for an annual average water balance;
- It was assumed that borehole abstraction would be equal to the maximum limit within the water use licence application; and
- It was assumed that 40% of the water loss would occur within the change house. This was based on the water balance calculations from the client.

5.17.3 GEOHYDROLOGY SPECIALIST STUDY

- The scale of the investigation was set at 1:50 000 resolutions in terms of topographic and spatial data, a lower resolution of 1:250 000 scale for geological data and a 1: 500 000 scale resolution for hydrogeological information;
- The Digital Elevation Model (DEM) data was interpolated with a USGS grid spacing of 25 m intervals;
- Rainfall data and other climatic information was sourced from the WR2012 database;
- Water management and catchment-based information was sourced from the GRDM and Aquiworx databases;
- The concept of representative elementary volumes (REV) have been applied i.e. a scale has been assumed so that heterogeneity within a system becomes negligible and thus can then be treated as a homogeneous system. The accuracy and scale of the assessment will result in deviations at point e.g. individual boreholes;
- The investigation relied on data collected as a snapshot of field surveys and existing monitoring data. Further trends should be verified by continued monitoring as set out in the monitoring program;
- Groundwater divides have been assumed to align with surface water divides and it is assumed that groundwater cannot flow across this type of boundaries;
- Model calibration was achieved by assigning a ratio of 1:1 for Hydraulic Conductivity (K) in x and y directions, with a ratio of 1:10 in the z direction i.e. anisotropic aquifer;
- Perennial rivers within the model domain have been treated as gaining type streams. As such groundwater is lost from the system via baseflow to local drainages;
- The numerical groundwater flow model was developed considering site specific information. It should be stated that influences from neighbouring mining developments were not taken into consideration as part of this investigation;
- Prior to development of the groundwater model, the system is in equilibrium and therefore in steady state i.e. quasi steady state; and
- Where data was absent or insufficient, values were assumed based on literature studies and referenced accordingly.

6 WATER AND WASTE MANAGEMENT

The following section describes water and waste aspects at the Applicants project area, as well as the related operational processes.

6.1 WATER AND WASTE MANAGEMENT PHILOSOPHY

The general principle of water management is the recognition that water is a scarce resource. This in turn leads to the other principles, such as water use minimisation (water conservation) or reuse of water and pollution prevention or the limitation of pollution of water.

Water that exceeds the quality, as set by DWS shall not be released from site, with the exception of emergency conditions, but it must be reused, thus reducing the quantity of intake of clean water. The Applicant will endeavour to:

- Continually seek ways to improve its performance in terms of consumption, and water related impacts;
- Reduce consumption of clean water;
- Implement pollution prevention at source;
- Maximise, recycling and reuse of dirty storm water and process water;
- Implementation of process water treatment to facilitate reuse; and
- Collect, contain dirty storm water and process water on site for preferential use as process water.
- The hierarchical management approach comprises the implementation of best practice measures to minimise water consumption and reduce impacts on water resources, by:
- Implementing measures to ensure compliance with relevant water and waste legislation and with other standards to which the organisation subscribes;
- Proactively identifying and implement actions that are required to achieve the water and waste related objectives;
- Implement these actions in an open and transparent manner;
- Implement on-going water and waste related monitoring to support legal compliance;
- Continually seeking ways to improve the performance of water and waste management systems, process and objectives; and
- Encourage open and transparent communication with regulatory authorities and other interested and affected parties within the context of the National Water Resource Strategy and Local Catchment Management Strategies.

6.2 STRATEGIES

6.2.1 SURFACE WATER

The general principle of water management is the recognition that is a scarce resource. This principal is guided by water use minimisation (water conservation) or re-use of water and pollution prevention or the limitation of pollution of water.

The goal of the Applicant is to minimise water consumption, impacts to the environment, running costs and to achieve environmental legal compliance, whilst maintaining adequate water supply as not to compromise the mining operations and supply of coal to industry. The following objectives are, therefore, set for the project:

- Water conservation by minimising water use. Water is reused wherever possible;
- Prevention of water pollution where possible;
- Minimise impacts on water resources and receiving water environment;
- Achieve and maintain legal compliance;
- Third party mining operation to supply market need; and
- Production of quality coal for industry.

In order to achieve the above objectives, the Applicant is committed to uphold the following broad commitments:

- All water that can remain unpolluted will be kept separate and dirty water areas will be minimised;
- The use of water resources for processing and mining activities will constantly be evaluated to ensure that their use is optimised;
- No water will be discharged unless authorised by the DWS, especially water that exceeds the catchments water quality objectives, as set out by the National Authority, with the exception of emergency conditions if safety should demand so; and
- Dirty water catchments will be minimised and kept separate from clean catchments and all water contained here shall be re-used as far as possible, thus reducing the quality or raw water extracted;
- All the relevant principles contained in DWA's Best Practice Guidelines (BPG) will be utilised to guide mine design and management practices. The Applicant will also ensure compliance with GNR 704 of the NWA and is applying for the relevant exemption indicated in Section 3.3 above.

6.2.2 WETLANDS AND AQUATIC ECOLOGY

Management actions should consider that the main impacts of the development are likely to be to water quality, as well as water quantity (flows) within receiving watercourses. As such, the main objectives for management are:

- To take all reasonable measures to prevent any disturbance, damage or impact to aquatic ecosystems outside of mining footprint;

- Minimise and prevent disturbance to wetlands and watercourses;
- Prevent impacts to water quality;
- Prevent and minimise erosion and sedimentation;
- Prevent flow changes in receiving watercourses;
- Effective bio-monitoring programme be implemented as soon as possible to assess and mitigate negative impacts on aquatic ecosystems;
- Manage biodiversity; and
- On-going rehabilitation.

6.2.3 GROUNDWATER

In order to prevent repetition in retaining the GNR 267 heading requirements for IWWMP's, kindly refer to Section 5.5 and Section 5.15.

6.2.4 WASTE

The following waste management strategies will be implemented:

- The waste management plan will ensure the appropriate management of all solid waste, including construction debris (cement bags, wrapping material, timber, cans, wire, nails, etc.), waste and surplus food, food packaging, organic waste etc;
- The Mine and Contractor(s) will comply with the environmental management principles referenced in the NEMA. In respect of waste management, the 'cradle-to-grave' principle in particular must be adhered to so as to ensure accountability for correct waste handling, storage and disposal;
- The waste management system will provide for adequate waste storage (in the form of waste skips and bins with lids), waste separation for recycling, and frequent removal of non-recyclable waste for permanent disposal at an appropriately licensed waste disposal facility. No waste material is to be disposed of on site. Under no circumstances may there be any burial of waste underground or on the site;
- Waste will be separated into reusable, recyclable and non-recyclable waste, and shall be further separated as follows:
    - Hazardous waste, consisting of substances that may be harmful to the receiving environment, and, therefore, require precautionary measures when handled. Examples include (but not limited to) oil, paint, diesel.
    - General waste, consisting of non-hazardous substances and substances that cannot be recycled. Examples include (but are not limited to) construction rubble, excess construction materials that cannot be reused.
    - Recyclable waste, (where volumes are sufficient to make recycling feasible) will preferably be deposited in separate bins. Recyclable material includes paper, tins and glass.

- The mine will implement a waste removal regime that ensures waste containers do not exceed their capacity before being removed from site for disposal;
- Environmental awareness training given to workers on site will include appropriate waste management practices to be implemented on site;
- Particular caution is to be exercised with regards to handling of hazardous waste, to ensure that it does not spill or leak from the waste collection containers. Refuse must also be protected from rain, which may cause pollutants to leach out;
- Littering will be strictly prohibited. The site shall remain in a neat and tidy condition at all times. If required, the Applicant shall make use of regular litter patrols to remove litter and ensure the site remains clean, neat and tidy; and
- The mine will maintain a waste register which shall be used to track all waste removed from site. Proof of appropriate waste disposal shall be kept on file at the site for auditing purposes.

6.3 PERFORMANCE OBJECTIVES AND GOALS

The Applicant has an Occupational Health, Safety and Environmental Policy in place, which outlines the mine's commitment towards environmental management and which provides the framework for all environmental activities on the mine. The policy is aimed at achieving excellence and ensuring continual improvement in the mine's endeavour to create a sustainable environment. There is a continual process of reviewing to assess the impacts of the mine's activities on the environment. The performance objectives are summarised in Table **37** below.

Table 37: Performance objective for the Applicant

Item:	Performance objective:
Process Water:	Required water quality standard
	Re-use and recycling of process water
	Accurate water balance (hour meter flows)
Ground Water:	Prevent deterioration of ground water quality
	Prevent aquifer contamination
Storm / Surface Water:	Clean and dirty water separation
	Diversion of clean storm water runoff around the mine area
	Collection and containment of contaminated water
Waste:	Ensure legal proper disposal of waste at registered sites
	Minimize waste generation

Item:	Performance objective:
	Re-use of recycle if possible
	Ensure proper storage before disposal to prevent pollution of environment

6.4 MEASURES TO ACHIEVE AND SUSTAIN PERFORMANCE OBJECTIVES

The IWWMP action plan identifies measures to achieve the water and waste related objectives. Refer to Section 6.6 below.

6.5 OPTION ANALYSES AND MOTIVATION FOR IMPLEMENTATION OF PREFERRED OPTIONS

Option analysis was not conducted as part of this report. The mine has an existing EMPR for which alternatives have been considered. Closure phase water management options were identified and assessed by the Hydrogeologist and the modelled scenarios are presented in Section 4.5.4.

6.6 IWWMP ACTION PLAN

This part of the IWWMP details the actions that will be taken to ensure that the objectives and measures set out in Section 5 and Section 6 above, as well as the commitments made throughout the rest of this document, are achieved. The main purpose of this section of the IWWMP is to identify the direct actions to be taken by the mine, as well as to allocate responsibility for the implementation of these actions and set a target in terms of the timeline(s) within which the actions will be achieved. The action plan included in Table 38 focuses on the measures that will be implemented during the construction, operational and decommissioning phases of the mine.

Table 38: IWWMP Action Plan

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
STAFF AND MANAGEMENT AWARENESS					
Staff awareness program and training	Risk mitigation	The Applicant must inform its employees of risk associated with their operations and make sure that all employees are trained prior to undertaking any activity associated with their operations. Ensure that the Contractor and key personnel are aware of the relevant provisions of the EMPR, sensitive environmental features and agreements made with individual landowners and/or land users.	Permanent/ Continuous	• Reducing in incidents and identified risks	Management • EMPR
Appoint Contractors Environmental Officer (CEO)	Oversee and enforce EMPR.	The Applicant's management to assign a team that will monitor EMPR implementation and compliance by the employees. Enforcement should be applied to those employees that are not complying.	Permanent/ continuous	• Management satisfied with CEO performance based on EMPR implementation	Management • EMPR • Compliance checklists • Audit reports

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
SITE OPERATION					
Water for human consumption	Water and soil pollution, health	Water for human consumption shall be available at the site offices and at other convenient locations on site. All drinking water must be from a legal source and comply with recognised standards for potable use. The Applicant shall comply with the provisions of the NWA and its Regulations pertaining to the abstraction of water from rivers and streams and the use thereof. All effluent from the office shall be collected and disposed of properly, (e.g., chemical toilets should be emptied). If this is not feasible (due to the construction duration or other difficulties), all effluent water from the camp / office sites shall be disposed of in a properly designed and constructed system, situated so as not to adversely affect water sources	Weekly monitoring of waste and effluent removal/ disposal	• Adequate quantities of potable water, • Proper effluent disposal at STP.	Management • EMPR • Compliance checklists

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		(streams, rivers, pans dams etc). Only domestic type wastewater shall be allowed to enter this drain. The effluent system should comply with provisions of the NWA.			
Sewage	Soil and water pollution; Waste disposal	Ensure that the sewage plant is working.	Weekly monitoring of sewage facilities, maintenance and disposal	• Adequate and operation sewage treatment/disposal	Management • EMPR • Compliance checklists
Waste Management	Soil and water pollution; Waste disposal	Where practically possible, general waste on-site must be reused or recycled. Bins and containers must be available on-site for collection, separation, and storage of waste streams (such as wood, metals, general refuse etc.).	Weekly monitoring of waste clean-up	• No waste or litter accumulation on site	Management • EMPR • Compliance checklists

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
Solid Waste	Soil and water pollution; Waste disposal	A refuse control system shall be established for the collection and removal of refuse. Bins and containers must be available on-site for collection, separation, and storage of waste (such as wood, metals, general refuse etc.). Solid waste shall be stored within a designated area that is covered, utilising plastic wheelie bins for collection and disposal. Disposal of solid waste shall be at a DWS licensed landfill site or at a site approved by DWS in the event that an existing operating landfill site is not within reasonable distance from the site. No waste shall be burned or buried at or near the site offices, or anywhere else on the site.	Weekly monitoring	• No waste or litter accumulation on site • Proof of disposal certificates. • No burning of waste.	Management • EMPR • Compliance checklists
Wastewater	Soil and water pollution;	The Applicant shall comply with the provisions of the NWA and its	Monthly monitoring	• No ground and water contamination	Management • EMPR

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		Regulations pertaining to the storage and reuse of wastewater collected on site. Wastewater collection ponds should be lined and in compliance with the NEMWA and other legal requirements.			• Compliance checklists
Litter	Soil and water pollution; Waste disposal	No littering by construction workers shall be allowed. During the construction and operation period, the facilities shall be maintained in a neat and tidy condition and the site shall be kept free of litter. Measures shall be taken to reduce the potential for litter and negligent behaviour with regard to the disposal of all refuse. At all places of work the contractor shall provide litter collection facilities for later safe disposal at approved sites.	Bi-weekly monitoring	• No waste or litter accumulation on site • Proof of disposal certificates. • Availability and maintenance of litter / refuse collection facilities. • No burning of waste.	Management • EMPR • Compliance checklists

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
Hazardous waste	Soil and water pollution Waste disposal	Hazardous waste such oils etc. shall be disposed of in a DWS approved landfill site. Any spillage shall be attended to immediately and affected areas shall be promptly reinstated to the satisfaction of the engineer.	Weekly monitoring	• No spillages or direct disposal. • No waste or litter accumulation on site • Proof of disposal certificates. • Proof of reinstatement following any spillages. • No burning of waste.	Management • EMPR • Compliance checklists
Control at the workshop	Soil and water pollution; Waste disposal	Management and maintenance of plant and machinery will be strictly monitored according to the subsections below, regardless of whether it is serviced on the site (i.e. at the place of construction activity or at a formalised workshop). All maintenance, including washing and refuelling of plant on site shall take place at designated locations at the workshop	Monthly monitoring	• Random visual inspection during site visits.	Management • EMPR • Compliance checklists

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		area. All machinery servicing areas shall be bunded.			
Hazardous Material Storage	Soil and water pollution Waste disposal	Petrochemicals, oils and identified hazardous substances shall only be stored under controlled conditions. All hazardous materials shall be stored in a secured, appointed area that is fenced and has restricted entry. The Applicant should ensure that they keep proof that relevant authorisation to store such substances has been obtained from the relevant authority. In addition, hazard signs indicating the nature of the stored materials shall be displayed on the storage facility or containment structure. Before containment or storage facilities can be erected the Applicant should ensure that preventative measures are put in place to mitigate against pollution of the surrounding environment	Weekly monitoring	• No hazardous waste accumulation on site • Proof of disposal certificates. • No burning of waste. • Suitable and adequate hazardous substance storage areas. • Proof of submission and approval from the Employers Environmental Manager/Environmental Officer.	Management • EMPR • Compliance checklists

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		from leaks or spillage. The preferred method shall be a concrete floor that is bunded. Any deviation from the method will require proof from the relevant authority that the alternative method proposed is acceptable to that authority. The proposals shall also indicate the emergency procedures in the event of misuse or spillage that will negatively affect an individual or the environment.			
Fuel and Gas Storage	Soil and water pollution; Waste disposal	Fuel shall be stored in a secure area in a steel tank supplied and maintained by the fuel suppliers. An adequate bund wall, at least 110% of the volume stored, shall be provided for fuel and diesel areas to accommodate any leakage spillage or overflow of these substances. The area inside the bund wall shall be lined with an impervious lining to prevent infiltration of the fuel into the soil. Any	Weekly monitoring	• Inspect bunded area for leaks / drainage. • Proof of disposal certificates. • No burning of waste.	Management • EMPR • Compliance checklists

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		leakage, spillage or overflow of fuel shall be attended to immediately. Gas welding cylinders and LPG cylinders shall be stored in a secure, well-ventilated area. Storage of hazardous substances must comply with construction regulations under the OHSA.			
Oil and Lubricant Waste	Soil and water pollution; Waste disposal	Used oil, lubricants and cleaning materials from the maintenance of vehicles and machinery shall be collected in a holding tank and sent back to the supplier. Oils collected in this manner, shall be retained in a safe holding tank and removed from site by a specialist oil recycling company for disposal at approved waste disposal sites for toxic/hazardous materials. Oil collected by a mobile servicing unit shall be stored in the service unit's sludge tank and discharged into the safe holding tank for	Weekly monitoring	• Inspect bunded area for leaks / drainage • Proof of disposal certificates. • No burning of waste.	Management • EMPR • Compliance checklists

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		collection by the specialist oil recycling company. All used filter materials shall be stored in a secure bin for disposal off site. Any contaminated soil shall be removed and replaced. Soils contaminated by oils and lubricants shall be collected and disposed of at a facility designated by the local authority to accept contaminated materials.			
Soil and Stockpile Management	Soil erosion	Topsoil shall be removed from all areas where physical disturbance of the surface will occur and shall be stored and adequately protected. The Applicant will provide for the stripping and stockpiling of topsoil from the site for later re-use. Topsoil is considered to be the natural soil covering, including all the vegetation and organic matter. Depth may vary at each site. The areas to be cleared of topsoil	Monthly monitoring	• Visual inspection of stockpiles • Groundwater monitoring	Management • EMPR • Compliance checklists

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		shall include the storage areas. All topsoil stockpiles and windrows shall be maintained throughout the contract period in a weed-free condition. Weeds appearing on the stockpiled or windrowed topsoil shall be removed by hand. Soils contaminated by hazardous substances shall be disposed of at an approved DWS waste disposal site. The topsoil stockpiles shall be stored, shaped and sited in such a way that they do not interfere with the flow of water to cause damming or erosion, or itself be eroded by the action of water. Stockpiles of topsoil shall not exceed a height of 2m, and if they are to be left for longer than 6 months, shall be analysed, and if necessary, fertility improved before replacement. Stockpiles shall be protected against infestation by weeds. The Applicant shall ensure that no topsoil is lost due to erosion – either by wind or			

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		water. Areas to be top-soiled and grassed shall be done so systematically to allow for quick cover and reduction in the chance of heavy topsoil losses due to unusual weather patterns.			
Discard Dump and groundwater pollution	Groundwater pollution	In order to address the pollution plume that was modelled around the Discard Dump, the detailed design for the proposed interception boreholes / cut-off drain must be investigated in detail and completed within 1 year of issuance of the new WUL and relevant construction thereof must be completed within the second year of issuance of the WUL. In order to address the additional pollution plume following implementation of the proposed interception boreholes / cut-off drain, as part of the groundwater model update, additional mitigation measures must be investigated and	Monthly	• Groundwater and surface water monitoring	Mine Manager EMPr, IWWMP, WUL

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		implemented where reasonably possible (such as a deeper cu-toff trench however these mitigation measures must be practically implementable as well as cost effective.			
Drainage / Storm water Management	Soil erosion /storm water management	The quality, quantity and flow direction of any surface water runoff shall be established with the aid of a qualified engineer prior to disturbing any area for construction purposes. Cognisance shall be taken of these aspects and incorporated into the planning of all construction activities. Before a site is developed or expanded, it shall be established how this development or expansion will affect the drainage pattern. No water source shall be polluted in any way due to proposed development.	Weekly monitoring	• Visual inspection, no excessive soil erosion or sedimentation.	Management • EMPR • Compliance checklists

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		No wastewater may run freely into any of the surrounding environment or neighbouring properties. The contractor shall implement the storm water design in accordance with the approved Storm Water Management Plan. The Applicant and Contractor(s) shall ensure compliance with the requirements of the NWA and GN 704. All areas susceptible to erosion shall be protected by ensuring that there is no undue soil erosion resultant from construction and/or mining activities. Berms shall be constructed where necessary to direct all runoff into the storm water system. Care must be taken to avoid scouring and erosion and suitable measures should be placed in areas where runoff concentrates, in order to detain the sediment load and slow down the runoff. All erosion damage shall be repaired as soon as possible as			

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		directed by the Environmental Representative. Consideration shall be given to the placement of silt traps or barriers where the soils are of a dispersive nature or where toxic fluids are used in the construction process. The silt traps must be large enough to contain runoff so that they function properly under heavy rain conditions.			
Stockpiles	Soil erosion Visual impact Noise	No construction and operation related activities including stockpiling, temporary storage areas, temporary and permanent access routes, and temporary working areas are to take place within the area beyond the demarcated site boundary. The Applicant shall plan their activities so that materials in so far as possible, can be transported directly to, and placed at,	Weekly monitoring	• Visual inspection, no excessive dust	Management • EMPR • Compliance checklists

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		the point where they will be used. The areas for the stockpiling of excavated and imported material shall be indicated and demarcated on the site plan, together with the contractor's proposed measures for prevention, containment and rehabilitation against environmental damage. The areas chosen shall have no naturally occurring indigenous trees and shrubs present that may be damaged during operations. Care shall be taken to preserve all vegetation in the immediate area of these temporary stockpiles. During the life of the stockpiles the contractor shall at all times ensure that they are: • Positioned and sloped to create the least visual impact; • Structurally sound and present no safety risk; • Constructed and maintained so as to avoid erosion of the material and			

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		contamination of surrounding environment; and kept free from all alien/undesirable vegetation. After construction, any areas no longer required for operation shall be re-instated to its original condition. No foreign material generated / deposited during construction shall remain on site. Areas affected by stockpiling shall be landscaped, top soiled, grassed and maintained until closure from the Environmental Advisor and the relevant National Authority is received. In all cases, Environmental Advisor shall approve the areas for stockpiling and disposal of construction rubble before any operation commences and shall approve their clause only when they have been satisfactorily rehabilitated.			

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
Spillages	Soil & water pollution	Watercourses such as streams, rivers, dams, etc. shall be protected from direct or indirect spillage of pollutants such as refuse, garbage, cement, concrete, sewage, chemicals, fuels, oils, aggregate, wash water, wastewater and organic materials. In the event of a spillage, the Applicant should arrange for professional service providers to clear the affected area. All spills must be dealt with as per the Emergency Response Procedure. Should water downstream of the spill be polluted, and fauna and flora show signs of deterioration or death, specialist hydrological or ecological advice will be sought for appropriate treatment and remedial procedures to be followed. In the event of contamination of third-party water sources, the mine must enter	Weekly monitoring	• Visual inspection	Management • EMPR • Compliance checklists

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		into negotiations with the relevant third party and agree on suitable compensation within a period of 1 month of identified contamination occurring.			
Areas of Specific Importance	• Loss of populations of threatened plant species • Loss of habitat of threatened animal species • Loss of indigenous natural vegetation (primarily grassland) • Erosion and siltation due to change in runoff and drainage patterns • Establishment and spread of declared weeds and alien invader plants.	Any area, as determined and identified as sensitive or of special interest within the site (e.g., wetlands) shall be treated according to the express instructions contained in these specifications or the approved EMPR. The overriding principle is that such defined areas requiring protection shall not be changed. • No unnecessary vegetation clearing will be allowed in natural vegetation areas.	Weekly monitoring	• No vegetation has been unnecessary removed, (photo graphic evidence)	Management • EMPR • Compliance checklists

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
	• Noise impacts on local residents				
Dust Control	Nuisance pollution	Dust caused by strong winds and operational activities shall be controlled by means of water spray vehicles. Exposed soils and material stockpiles shall be protected against wind erosion. The location of stockpiles shall take into consideration the prevailing wind directions and locations of sensitive receptors A dust monitoring system needs to be put in place to ensure that dust falls within the acceptable limits as per the ambient air quality standards	Monthly monitoring	• Routine observation, no complaints from residents	Management • EMPR • Compliance checklists
Alien Vegetation	Habitat destruction	The Applicant shall establish an on-going monitoring programme to detect and quantify any alien species that may	Monthly monitoring	• Visual inspection, vegetation removal record by contractor, no	Management • EMPR • Compliance checklists

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		become established and identify the problem species (as per Conservation of Agricultural Resources Act and Biodiversity Act). The Applicant shall be held responsible for the removal of alien vegetation within the boundary of the site disturbed during construction. This includes, for example, service roads, stockpile areas, and wherever material generated for or from construction has been stored temporarily.		unnecessary vegetation clearing	
Resubmission of the new WULA	Water use compliance	Any additional water uses triggering licensing or permitting requirements must be identified prior to activities commencing (i.e., crossing rivers and road construction in wetlands -section c and i). Mooiplaats submitted an application for the additional water uses and amendments to the existing licence in 2020. In August 2022 the DWS	Weekly monitoring	• Routine check for WUL availability and awareness.	Management • WUL • Compliance checklists

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		requested additional information on the application which the applicant was not able to provide and the application was subsequently withdrawn.			
DECOMMISSIONING PHASE					
Decommissioning	Decommissioning and rehabilitation	Any additional licensing or permitting requirements must be identified prior to any decommissioning activities commence. Prior to the decommissioning a detailed decommissioning plan must be prepared. This plan should aim to follow the waste management hierarchy (reuse, recycle, reduce and dispose) in order to prevent unnecessary wastes. All waste which requires disposal must be disposed of at a suitably licenced facility. An inventory of infrastructure and wastes together with the ultimate destination (e.g. recycler, waste disposal) should be	Weekly	• Routine check for EMPR availability and awareness.	Management • EMPR • Compliance checklists

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		kept for future records. A rehabilitation plan must be prepared by a suitably qualified specialist. The sites must be rehabilitated to the pre-construction condition or alternatively to align with the surrounding land-uses at the time. The rehabilitated site must be protected from future erosion.			
Decommissioning	Decommissioning and rehabilitation	The area where the site offices are placed will require rehabilitation at the end of the contract. All construction material, including concrete slabs shall be removed from the site on completion of the contract, to the Applicants satisfaction.	Weekly	• Routine check for EMPR availability and awareness.	Management • EMPR • Compliance checklists
Shafts	Sealing of shafts to prevent decant	Shafts shall be properly sealed off in accordance with industry best practices and the work must be overseen by a suitably qualified engineer who must	Monthly	• Groundwater and surface water monitoring results.	Management • EMPR • IWWMP

Activity	Environmental Aspect	Mitigation measures	Monitoring frequency and tools	Monitoring Indicators	Responsible party for implementation and Monitoring Tool
		provide a sign off on completion of works.			• Water Monitoring Programme
Decommissioning	Decommissioning and rehabilitation	Any disturbed areas should be rehabilitated with natural vegetation endemic to the area as soon as possible after decommissioning.	Monthly until adequate and sustained cover is achieved.	• Routine check for EMPR availability and awareness.	Management • EMPR • Compliance checklists

Recommendations

- It is recommended that urgent mitigation measures are taken to reduce the influx of pollutants into the natural environment. It is further recommended that aquatic biomonitoring continue.
- The pH of process / wastewater should be closely monitored and managed to prevent damage to water infrastructure.
- Water quality should be closely monitored.

6.7 CONTROL AND MONITORING

In order to determine the impact of the facility on the surface and groundwater regimes, monitoring systems have been implemented, by which data can be continually gathered and analysed, with corrective action being taken as required. Refer to Section 5.13.

6.8 MONITORING OF CHANGE IN BASELINE INFORMATION

The results of the monitoring plan will be submitted to the relevant DWS directorates, as well as other government departments as required in terms of management objectives, action plan and applicable legislation and other legislative requirements.

6.8.1.1 SURFACE WATER MONITORING

As detailed in Section 4.4 on surface water monitoring is currently undertaken at Mooiplaats Colliery. The Applicant will need to amend the surface water monitoring to ensure that it is in line with any conditions specified in the amended WUL.

6.8.1.2 BIOMONITORING

The Biodiversity Company undertook biomonitoring on behalf of Mooiplaats Colliery in 2023. The aim of the study was to characterise the current state of the aquatic systems associated with the Mooiplaats Colliery project area bi-annually. The biomonitoring points are indicated in Figure **51**.

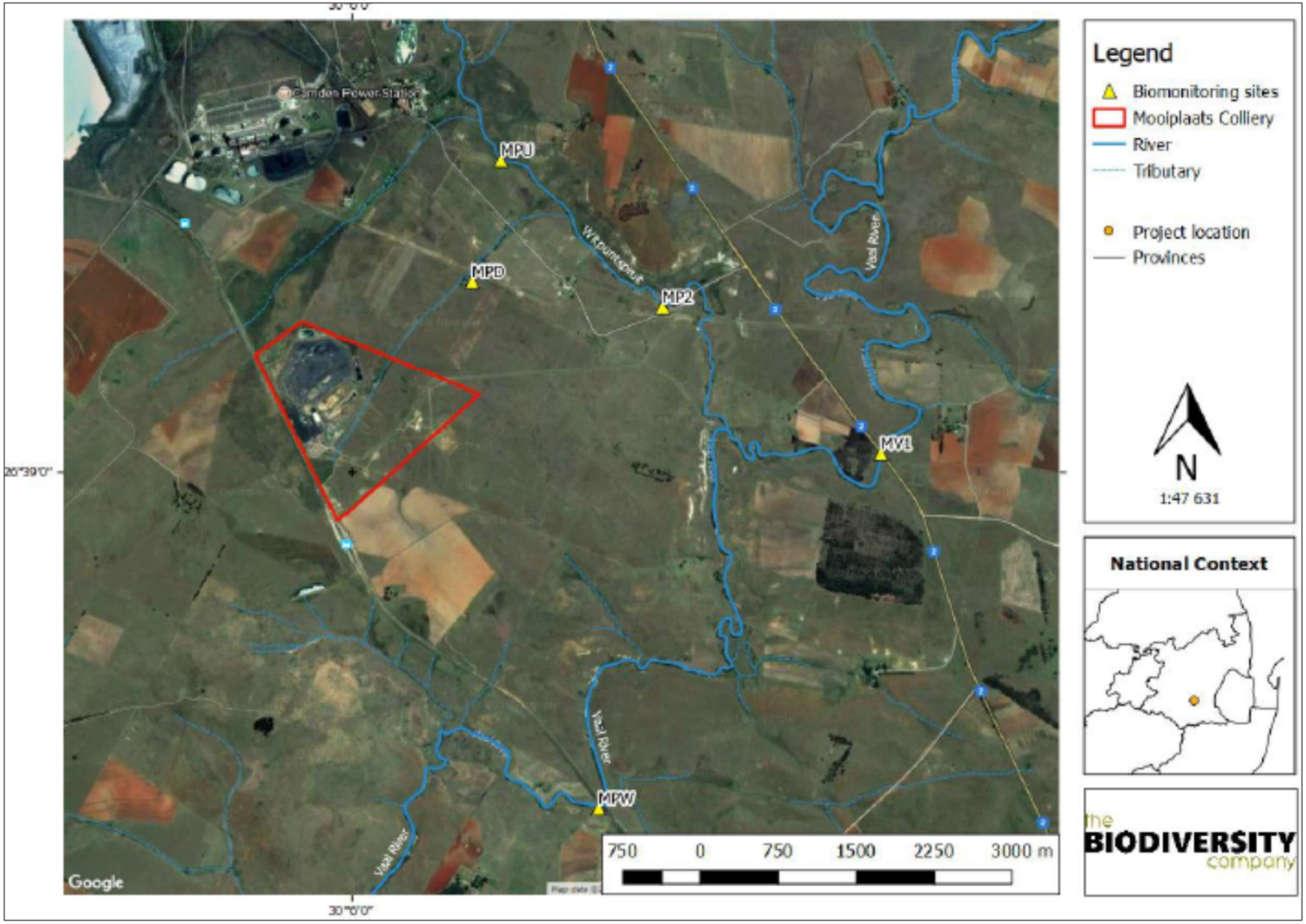

Figure 51: Biomonitoring points for the Mooiplaats Colliery

6.8.1.3 GROUNDWATER MONITORING

As detailed in Section 4.13.5, groundwater monitoring is currently undertaken at Mooiplaats Colliery. The groundwater monitoring plan should be amended as proposed by the Geohydrologist (refer to Section 5.15 and Appendix D) and updated on a regular basis as required by the WUL.

6.9 AUDIT AND REPORT ON PERFORMANCE MEASURES

The WUL and other applicable authorisations require that regular formal audits be undertaken in order to assess the compliance with, amongst others, the WUL and IWWMP. As such, the applicant will cater for this requirement through regular internal and external audits in line with the frequency required by the WUL (usually on an at least an annual basis) and the other applicable authorisations.

6.10 AUDIT AND REPORT ON RELEVANCE OF IWWMP ACTION PLAN

The existing WULAs requires that the efficacy of the measures proposed as part of the action plan be reviewed and updated where required. As such, the IWWMP action plan will be reviewed and updated in line with the frequency required by the WUL and the other applicable authorisations. A copy of the last WUL audit report is attached in Appendix L.

7 CONCLUSION

This section provides the concluding statements relating to the regulatory status of the activity, the motivation of the activity in terms of Section 27 of the NWA and the proposed WUL amendments.

7.1 REGULATORY STATUS OF ACTIVITY

The Operation has an approved Mining Right (MP 30/5/1/2/68MR), as well as existing WUL (Ref #; 08/C11B/AGJ/2141). Amendment is to be made to the existing WUL. Mooiplaats submitted an application for the additional water uses and amendments to the existing licence in 2020. In August 2022 the DWS requested additional information on the application which the applicant was not able to provide and the application was subsequently withdrawn. A new WUL amendment application was commenced in 2023 to include new and existing water uses. This application is pending.

7.2 STATEMENT OF WATER USES REQUIRING AUTHORISATION, DISPENSING WITH LICENCING REQUIREMENT AND POSSIBLE EXEMPTION FROM REGULATION

The NWA includes considerations set out in Section 27(1) that must be applied in the assessment of licence applications for water use. The objective of this section is to provide the necessary information required in terms of Section 27(1) to allow the DWS to evaluate this application.

7.2.1 SECTION 27(1)(A)

Existing Lawful Water Uses

The current WUL (Licence No.) authorises various water uses in terms of Section 21 (a), (b), (e), (f) (g) and (j) of the NWA (refer to Section 3.1 and Appendix A). The applicant may require that some conditions be amended.

7.2.2 SECTION 27(1)(B)

The Need to Redress the Results of Past Racial and Gender Discrimination

One objective of the NWA is to address past racial and gender discrimination and to alleviate poverty in South Africa; therefore, it is of utmost importance to support and stimulate economic development in order to realise the upliftment of previously disadvantaged groups and/or individuals.

7.2.3 SECTION 27(1)(C)

Efficient and Beneficial Use of Water in the Public Interest

The IWWMP of the mine has been developed in accordance with the DWS's hierarchy of water use. Recommendations stemming from this IWWMP document have been incorporated in setting the relevant objective, targets and management plans steering towards a goal of efficient and beneficial use of water in the public interest. Refer to Section 6.1 for a description on the objective and management plans steering towards a goal of efficient and beneficial use of water in the public interest.

7.2.4 SECTION 27(1)(D)

Socio Economic Impact

The mine provides the following socio-economic benefits:

- Employment;
- Training; and
- Local economic development.

7.2.5 SECTION 27(1)(E)

Any Catchment Management Strategy Applicable to the Relevant Water Resources

The catchment management agency for the Vaal River System was established on 29 January 2016, through the promulgation of GNR 81 in terms of the NWA and is called the Vaal River Catchment Management Agency. This notice specified the following amongst others:

- The Vaal Water Management Area (WMA) is the result of the consolidation of the Upper, Middle and Lower Vaal catchments. The Vaal Water Management Area occupies the Central North Eastern area of South Africa. It extends to Ermelo in Mpumalanga, just west of Swaziland in the east across to Kuruman in the Northern Cape to the West. To the northwest, the WMA borders Botswana and the Crocodile (West) and Olifants Catchments. Johannesburg sits on the boundary of the CMA. To the south-east it is bounded by Lesotho;
- The major water uses in the water management area include industrial, mining sectors, power generation, commercial agriculture (including stock watering, small and large irrigation schemes, dry land farming and forestry), nature conservation, as well as urban and rural human settlements;

- The business case of the Vaal River Catchment Management Agency has been approved;
- All initial, inherent and delegated functions will be performed in the Vaal River CMA; and
- A Water Resource Management charge will be billed by the Vaal River CMA in accordance with Section 57(2) of the NWA.

The following impacts have been considered for this IWWMP:

- The direct impact of physical structures (environmental constraints to construction e.g., of weirs or dams);
- The implications of allocating and licensing water for use. Forestry and irrigation are examples of users where development based on water can mean the transformation of extensive areas of otherwise 'natural' environments;
- The allocation of water for equity. will include approaches towards the application of Schedule 1 Use, General Authorisations, the revitalisation of irrigation schemes, etc.;
- Failure to support equity, or appropriate development – noting the consequential impacts of poverty;
- Sanitation systems and the impacts on groundwater quality;
- The implementation of the Reserve; and
- The ability to monitor and manage compliance, thus protecting the resource and with it the environment.

All decisions regarding water are critical to the environment. Decisions must be made on a balance of social, economic and ecological costs and benefits, considering both the immediate and the long-term, and always with an eye out for the unintended consequence. It is the intention of the Internal Strategic Perspective (ISP) (DWS, 2004) to provide the basis for integrated decision-making. The principles of environmental management underpin every strategy developed in this document.

There are a number of strategic areas with a particularly strong biophysical/ ecological emphasis. These include:

- The Reserve (groundwater, rivers, wetlands and estuaries);
- Water quality - surface and groundwater;
- The approach towards the clearing of Invasive Alien Plants;
- The management of wetlands;
- Land degradation. Erosion and sedimentation (land care); and
- Land use and especially how this is impacted by land reform and the re-allocation of water.
- The roles of co-operative governance and the need for awareness raising and capacity building are key strategic elements of many strategies. In reality all strategies and all aspects of management have a strong interaction with the biophysical environment. This ISP captures these concerns in discussion and through a strategic approach emphasises the will of the DWS to manage the environment to the best benefit of the country and its people (DWS, 2004).

7.2.6 SECTION 27(1)(F)

The Likely Effect of the Water Uses to be Authorised on the Water Resources and on the Water Users

The economy of the Upper Vaal Management area consists of widespread urbanisation, mining and industrial activity, which relate to gold and coal deposits in the area occur in the northern part of the water management area. Collectively, mining and industrial development in the Upper Vaal River water management area produce a total of 45 % of South Africa's Gross Domestic Product (GDP). Economic activity in the rest of the Upper Vaal water management area mostly relates to livestock farming and rain fed cultivation (Hall and Jennings, 2007; NWRS, 2004). Due to ongoing economic growth and continued urbanisation, further growth in water demand is expected in the area. It is therefore paramount that water allocation decisions are made, taking cognisance of only marginal potential for further resource development. The main water use in the Upper Vaal is, therefore, shared by the industrial, urban and mining sectors, which account for 80% of water usage. Irrigation accounts for 9% of water usage and power generation accounts for 7%. The remainder is used for supply to rural areas. These percentages do not include water transfer in and out of the management areas. Aside from these usages, water is also transferred in and out of the Management areas. The Upper Vaal area transfers water out to the Crocodile, Marico and Olifants Management areas and transfers water in from the Thukela, Usutu & Mhlatuze Management areas as well as from Lesotho as per the agreement between South Africa and Lesotho via the Lesotho Highlands Water Project. The Upper Vaal area has an impact on Botswana, Lesotho, Namibia, Zimbabwe, Mozambique and Swaziland (DWA, 2014).

7.2.7 SECTION 27(1)(G)

The Class and Resource Quality Objectives of the Water Resources

A summary of the water resource classes for Integrated Units of Analysis (**Figure 52**) and Mooiplaats falls within the UA2 resource unit. The PES for the resource unit is a Class C and the recommended Ecological category is also a Class C. Integrated Units of Analysis (IUA) are classified in terms of their extent of permissible utilization and protection as either Class I: indicating high environmental protection and minimal utilization; or Class II indicating moderate protection and moderate utilization; and Class III indicating sustainable minimal protection and high utilization.

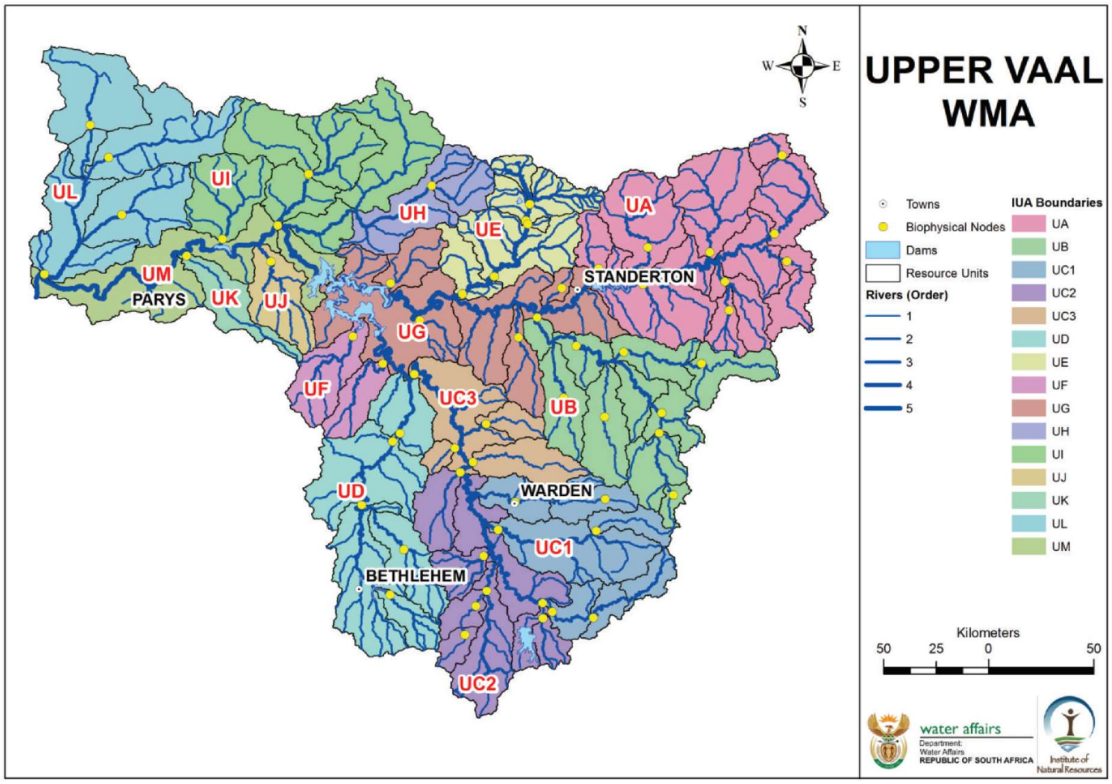

Figure 52: Classification of significant water resources (river, wetlands, groundwater and lakes) in the upper, Vaal water management areas (WMA)

7.2.8 SECTION 27(1)(H)

Investments Already Made and to be Made by the Water User in Respect of the Water Use in Question

The Applicant has made several investments in respect of applying for the existing WUL, including:

- Undertaken an EA process;
- Conducted a GN 704 Audit to identify any shortcomings in respect to compliance with the said Regulations;
- Developed an Integrated Water and Waste Management Plan detailing specific alterations required;
- Updated the Water balance as a management tool for all water use activities taking place at; and
- Implemented water use optimisation strategies, which include improved monitoring and control.

In terms of this IWWMP, the Applicant has made investments in terms of the following:

- Updating of the IWWMP;
- Undertaken a wetland delineation study;
- Updated the hydrogeological model; and

- Updated the hydrological study.

7.2.9 SECTION 27(1)(I)

The Strategic Importance of the Water Use to be Authorized.

As demonstrated from the mining activities, the mine would not be able to proceed without the existing WUL. The mine provides important socio-economic advantages to the community and to South Africa. Authorising the additional water uses will ensure the LoM continues for an additional 12 years (2023 to 2034).

7.2.10 SECTION 27(1)(J)

The Quality of Water in the Water Resource. Which may be required for the Reserve and for Meeting International Obligations

The following reservations apply with respect to the transfer of water into and out of the water management area, and the provision of water for future growth:

- The existing transfer of 491 million m^3/a from Lesotho, which is to be increased to 835 million m^3/a after the commissioning of Mohale Dam in Lesotho. – reserved by international agreement for use in and transfer from the Upper Vaal water management area;
- Existing transfers from the Thukela water management area up to the installed capacity of 630 million m^3/a. The yield benefit in the Vaal System is 736 million m^3/a – reserved in the Thukela water management area;
- Future large-scale water resources development on the Thukela River is reserved mainly for transfer to the Upper Vaal water management area. Current planning allows for an additional transfer of 475 million m^3/a – reserved in the Thukela water management area;
- Existing transfer of 55 million m^3/a from the Buffalo River in the Thukela water management area to the Upper Vaal water management area – reserved in the Thukela water management area;
- Transfers from the Usutu to Mhlatuze water management area at the current capacity of 63 million m^3/a – reserved in the Usutu to Mhlatuze water management area;
- Existing transfers from the Upper Vaal water management area to the Olifants water management area of 36 million m^3/a for power generation, plus an allowance of 38 million m^3/a for future growth reserved in the Upper Vaal water management area;
- Transfers from the Upper Vaal water management area through the Rand Water distribution system to meet requirements in the Crocodile (West) and Marico water management area which are in excess of the capacity of the local resources in the Crocodile (West) and Marico water management area. Currently this amounts to 514 million m^3/a and is projected to increase to 723 million m^3/a. As an upper high growth scenario, transfers may need to increase to 1 125 million m^3/a;
- Releases from the Upper Vaal water management area along the Vaal River to users in the Middle Vaal and Lower Vaal water management areas to meet their realistic needs that cannot be supplied from own resources. Little change is expected from the current transfer of 828 million

m^3/a, although it may increase to about 910 million m^3/a in 2025 under the high growth scenario – reserved in the Upper Vaal water management area;

- Current surplus transfer capacity into the Upper Vaal water management area is to be reserved for growth in urban, industrial and mining water requirements in the Upper Vaal and Crocodile (West) and Marico water management areas, and is not to be used for commercial irrigation;
- The allocation of surplus yield in the Upper Vaal water management area will be subject to national authorisation as it can be allocated to users in the Upper, Middle, Lower Vaal as well as Crocodile (West) and Marico and Olifants water management areas; and
- The Upper Vaal water management area forms the central component of the Vaal River System, which extends over several water management areas. As water resources management in the Vaal River System impacts to some degree on the water quantity and quality in all the interlinked water management areas, management of the Vaal River System is to be controlled at a national level.

7.2.11 SECTION 27(1)(K)

The Probable Duration of Any Undertaking for Which Water is to be Authorized.

It is anticipated that the project would have a lifespan of 12 years, (2023 to 2034), before it would be decommissioned.

7.3 KEY COMMITMENTS

The Applicant is committed to implementing and reviewing the IWWMP action plan every 2 years or as required by the WULA and as included into this document (refer to Section 6.6 above).

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APPENDIX A: WATER USE LICENCE

APPENDIX B: MINING RIGHT

APPENDIX C: MAPS

APPENDIX D: HYDROGEOLOGICAL BASELINE INVESTIGATION AND GROUNDWATER IMPACT ASSESSMENT

APPENDIX E

APPENDIX F: WETLAND SPECIALIST STUDY

APPENDIX G: ROCK ENGINEER REPORT

APPENDIX H: PUBLIC PARTICIPATION REPORT

APPENDIX I: ENVIRONMENTAL MANAGEMENT PROGRAMME

APPENDIX J: DESIGN DRAWINGS

APPENDIX K: IMPACT ASSESSMENT

APPENDIX L: WUL AUDIT REPORT

APPENDIX M: QUARTERLY WATER QUALITY REPORT

APPENDIX N: MOOIPLAATS MONITORING PROGRAMME

APPENDIX O: WATER AND SALT BALANCE