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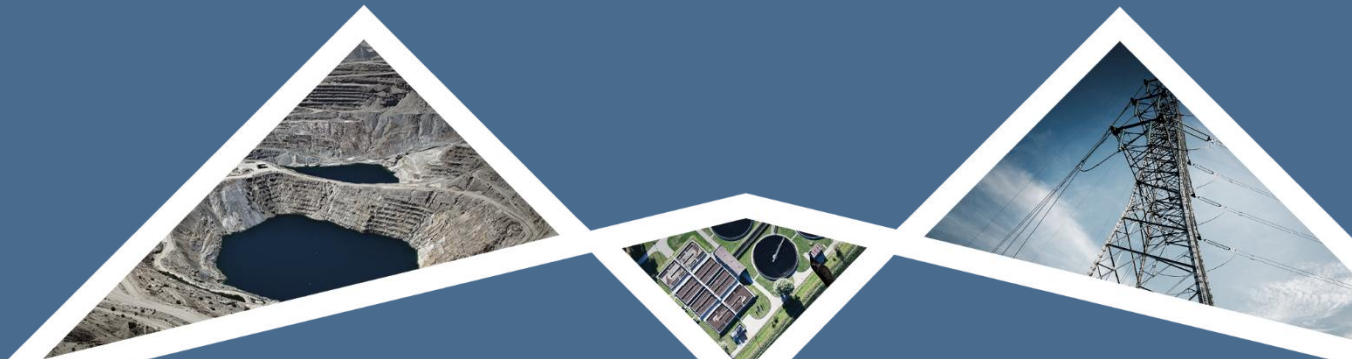
INTEGRATED WATER AND WASTE MANAGEMENT PLAN

CLOVER ALLOYS RIETFONTEIN PLANT

LICENCE NUMBER: 07/A22H/AG/5292

FILE NO: 27/2/2/A822/19/1



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REVISION AND AMENDMENTS

REVISION DATE:	REV #	DESCRIPTION
2026/04/24	ORIGINAL DOCUMENT	IWWMP
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1 INTRODUCTION

Environmental Impact Management Services (Pty) Ltd (EIMS) has been appointed by Clover Alloys SA (Pty) Ltd (hereafter referred to as the Applicant), as the Environmental Assessment Practitioner (EAP), to assist with undertaking the required authorisation processes in terms of Section 24G of the National Environmental Management Act (107 of 1998, NEMA) and Section 21 of the National Water Act (36 of 1998, NWA), including the statutory public participation, and to compile and submit the required documentation in support of applications for:

- Environmental Authorisation (EA) in accordance with the National Environmental Management Act - Act 107 of (NEMA) Section 24G for - Listed activities detailed in subsection 2.2 of this report.
- Water Use Licence (WUL) amendment in accordance with the National Water Act – NWA (Act 36 of 1998) - Listed activity/ies:
    - Section 21 (a)
    - Section 21 (c) and (i); and
    - Section 21 (g)

1.1 ACTIVITY BACKGROUND

Clover Alloys SA (Pty) Ltd (the applicant) operates a chrome processing facility in the North West Province. Clover Alloys is undertaking a formal water use license amendment for proposed expansion of the operations at the beneficiation plant. A Water Use Licence (Licence Number: 07/A22H/5292, File No: 27/2/2/A822/19/1) was issued to Rietfontein Operations on 11 June 2017 in terms of Chapter 4 of the National Water Act, 1998 (Act 36 of 1998). The licence is being amended to accommodate additional and amended water uses associated with changes to the operational footprint and the inclusion of proposed water management infrastructure, and to align the authorisation with current and proposed activities in order to ensure ongoing compliance with the National Water Act.

The existing infrastructure at the Rietfontein plant includes two stockpile areas, a chrome wash plant, drying pads, weighbridges, a sump, as well as site offices and staff accommodation. These facilities support the processing, storage, and operational activities associated with chrome beneficiation.

The proposed infrastructure includes:

- The expansion of one of the existing stockpile areas;
- The construction of dirty water channels and culverts to manage contaminated surface runoff;
- The installation of a clean water channel to divert uncontaminated stormwater away from operational areas;
- A Pollution Control Dam (PCD) with a design capacity of 8 000 m^3, which will receive all dirty water collected on site; and
- A proposed pipeline approximately 2.5 km in length, to be constructed between the Rietfontein plant and the main mine, facilitating the transfer of materials or water as part of integrated operations.

1.2 REGIONAL SETTING AND LOCATION OF ACTIVITY

The proposed project is located on Portion 23 and Portion 24 of the farm Rietfontein 338 JQ, within the Rustenburg Local Municipality, North West Province. The site is approximately 15 km southeast of Rustenburg, along the N4 highway. The centre point of the site is 25°44'54.40"S 27°21'52.69"E., please refer to Figure 1.

1.3 PROPERTY DESCRIPTION

Table 1 indicates the details of the project area for the proposed project including details on the project location as well as the distance from the proposed project area to the nearest towns.

Table 1: Locality details

Project Area	Portion 23 and 24 of the farm Rietfontein 338 JQ
Application Area (ha)	12
Cadastral description	**Farm Name:** Portion 23 of Farm Rietfontein 338 JQ **21-Digit SG Code:** T0JQ00000000033800023
	Farm Name: Portion 24 of Farm Rietfontein 338 JQ **21-Digit SG Code:** T0JQ00000000033800024
Magisterial District	Rustenburg Magisterial District
District Municipality	Bojanala District Municipality
Local Municipalities	Rustenburg Local Municipality

The locality of the proposed project and the current layout are shown in Figure 1. Figure 2 and Figure 3 show the intended final layout of the site including the stormwater management infrastructure and the proposed pipeline.

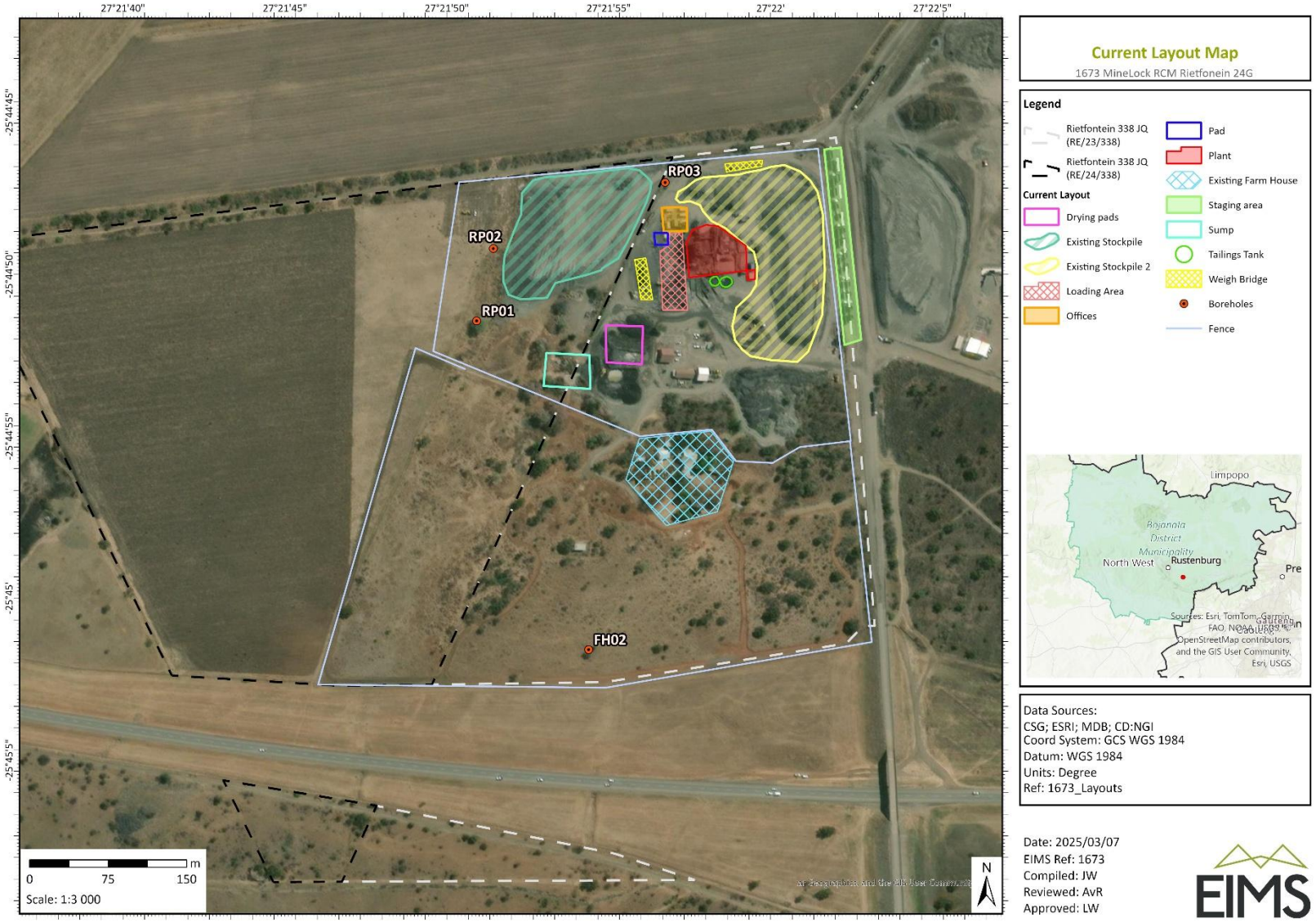


Figure 1: Locality of the project – Current site layout.

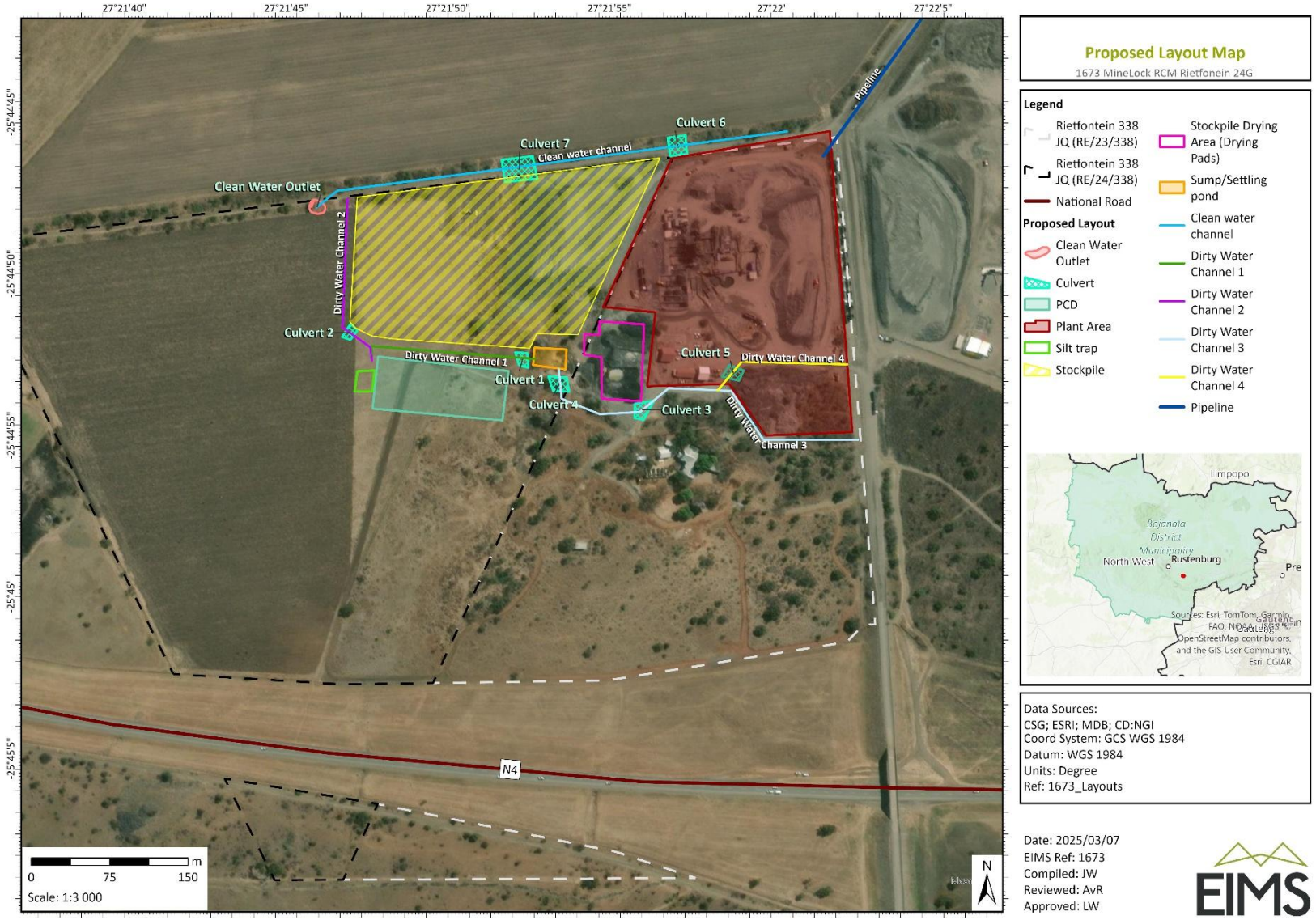


Figure 2: L Locality of the project – Planned site layout

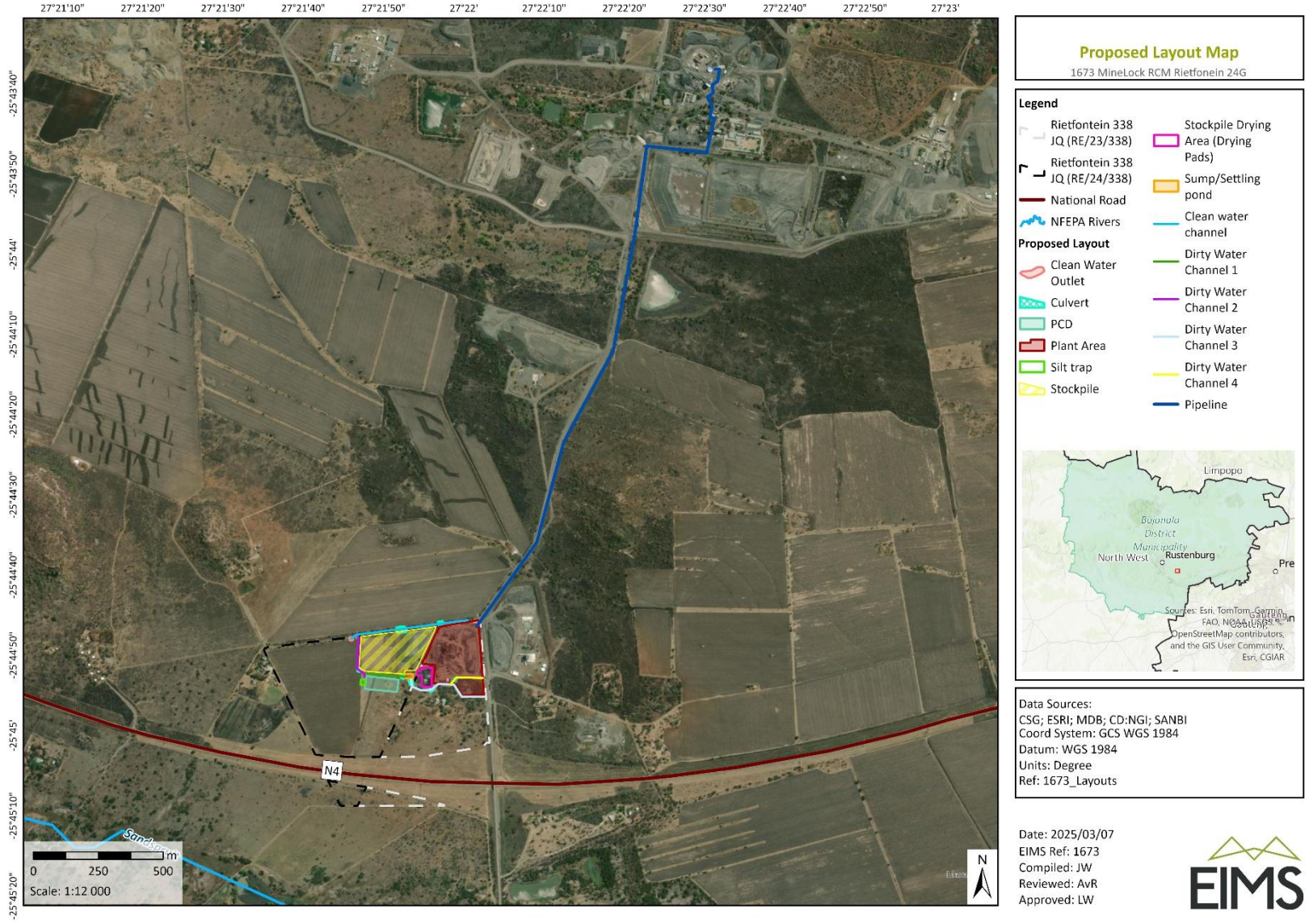


Figure 3: L Locality of the project – Planned site layout (with pipeline)

1.4 PURPOSE OF IWWMP

Although the requirement for the compilation of an Integrated Water and Waste Management Plan (IWWMP) was originally aimed at collating and rationalising the information submitted for Water Use Licence Applications (WULA) to the Department of Water and Sanitation (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.

The IWWMP should 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 the Industries and Mines. The Department and/or relevant Catchment Management Agency(CMA) implement the 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 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 a 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 from the 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 of a 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 Departmental 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);
- When converting Existing Lawful Use (ELU) to licensed water use; and
- In order to comply with the conditions of an existing water use licence.

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 conducted in terms of it could lead to its shortcomings, which 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 4 provides a guide to the structure of the IWWMP.

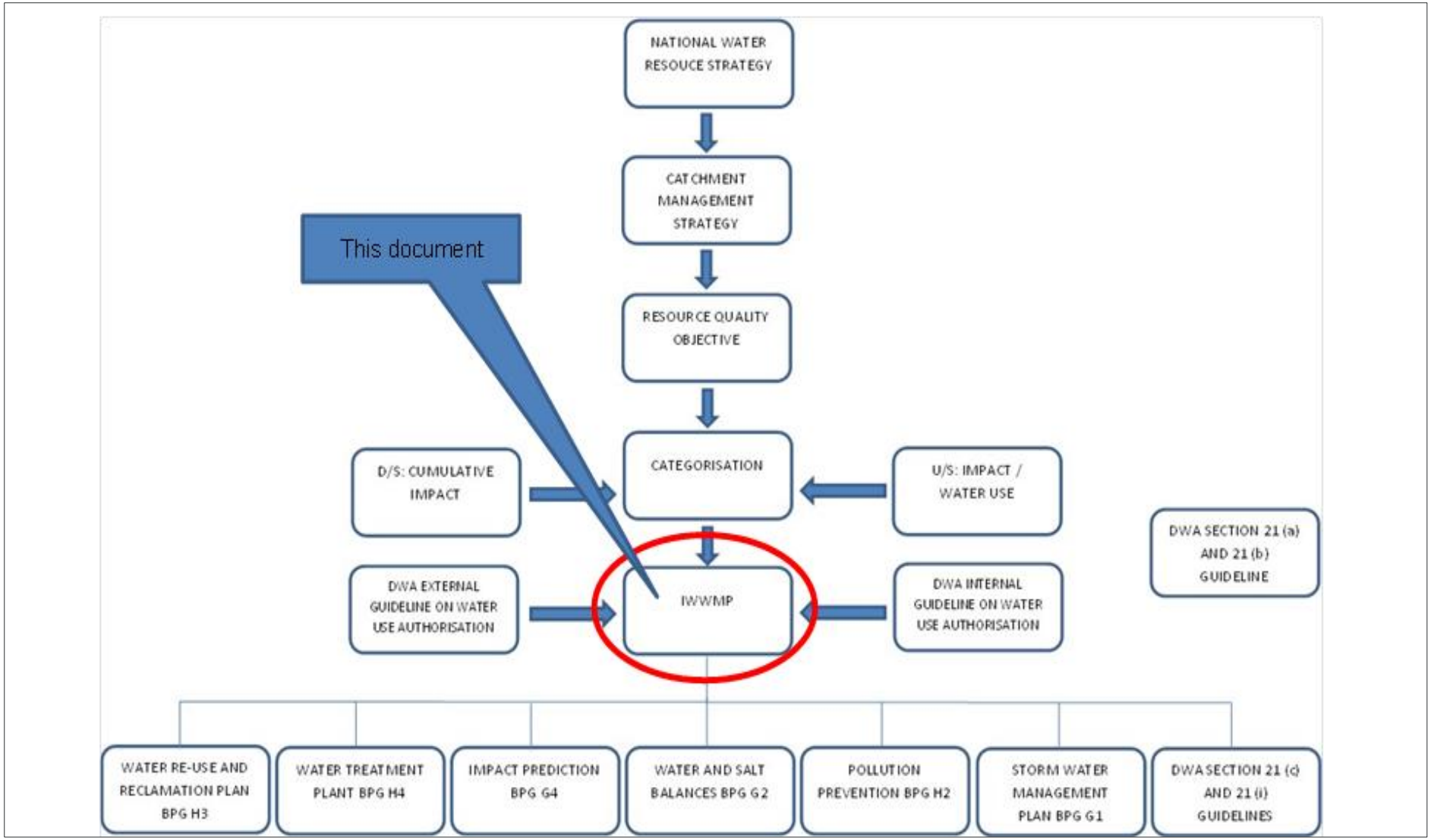


Figure 4: Schematic Layout of the IWWMP Approach

2 CONCEPTUALISATION OF ACTIVITY

The section below provides a detailed project description. The aim of the description is to indicate the activities that are performed at the site as well as that are proposed in future. Furthermore, the detailed project description facilitates the understanding of the activities taking place that will result in impacts on the environment and for which mitigation measures are in place or plans are in place to implement these mitigation measures.

2.1 DESCRIPTION OF ACTIVITY

Clover Alloys SA (Pty) Ltd (the applicant) operates a chrome processing facility in the North West Province. The existing infrastructure at the Rietfontein plant includes two stockpile areas, a chrome wash plant, drying pads, weighbridges, a sump, as well as site offices and staff accommodation. These facilities support the processing, storage, and operational activities associated with chrome beneficiation.

The proposed infrastructure includes:

- The expansion of one of the existing stockpile areas;
- The construction of dirty water channels and culverts to manage contaminated surface runoff;
- The installation of a clean water channel to divert uncontaminated stormwater away from operational areas;
- A Pollution Control Dam (PCD) with a design capacity of 8 000 m^3, which will receive all dirty water collected on site; and
- A proposed pipeline approximately 2.5 km in length, to be constructed between the Rietfontein plant and the main mine, facilitating the transfer of materials or water as part of integrated operations.

2.2 EXTENT OF ACTIVITY

The final footprint of the Rietfontein site will be approximately 12ha, refer to Figure 2 and Figure 3 whereas the total present footprint of the site comprises approximately 8ha. The footprint will be inclusive of the stockpiles, wash plant. Weighbridges, stormwater attenuation infrastructure and other operational infrastructure.

2.3 KEY ACTIVITY RELATED PROCESSES AND PRODUCTS

Rietfontein Plant has identified several key waste and water management streams as part of its proposed infrastructure upgrades to improve environmental control and operational efficiency.

- Stormwater Infrastructure: The plant will implement a system of clean and dirty water channels to manage surface runoff. These channels are designed to separate uncontaminated water from water that may be affected by operational activities. This infrastructure is currently in the planning phase and will be constructed as part of the Section 24G rectification process.
- Dirty Water Stream: All dirty water generated from operational areas will be directed into a proposed Pollution Control Dam (PCD). This dam will serve as a containment facility to prevent uncontrolled discharge and allow for controlled reuse or treatment.
- Tailings and Return Water: The plant does not deposit tailings on-site. Instead, tailings and return water generated during processing are transported to the Rustenburg Chrome Mine for deposition. A dedicated pipeline is proposed to replace the current trucking method, further reducing environmental risk and improving efficiency.

2.4 ACTIVITY LIFE DESCRIPTION

The lifespan of the Rietfontein plant is intrinsically linked to the Life of Mine for the main Rustenburg Chrome Mine. The current anticipated LoM of the main mine is currently anticipated at 30 years. The Rietfontein plant then is also anticipated to have a 30-year lifespan which will continue in conjunction with the main mine.

2.5 ACTIVITY INFRASTRUCTURE DESCRIPTION

The Rietfontein Chrome Wash Plant currently operates with a range of infrastructure supporting its beneficiation activities. Existing infrastructure includes, refer to Figure 1, Figure 2 and Figure 3 for the existing and proposed layout of infrastructure:

- Two stockpile areas (east and west of the plant);
- Chrome mud processing plant;
- Two weighbridges;
- Site offices and staff accommodation (including JoJo tanks for water supply);
- Loading area;
- Two tailings containment tanks;
- Stockpile drying pad; and
- Sump for wastewater collection.

To improve environmental management and address historical non-compliance, the plant proposes the following infrastructure upgrades under the Section 24G application:

- Pollution Control Dam (PCD) with a capacity of 8 000 m^3 to contain dirty water runoff;
- Stormwater management system comprising clean and dirty water channels and culverts to separate and direct surface runoff appropriately;
- Expansion of the existing stockpile area to accommodate operational needs; and
- 2.5 km slurry and return water pipeline connecting the plant to the main Rustenburg Chrome Mine (RCM), enabling direct transfer of tailings and return water for deposition at the licensed waste facilities.

2.6 ORGANISATIONAL STRUCTURE OF ACTIVITY

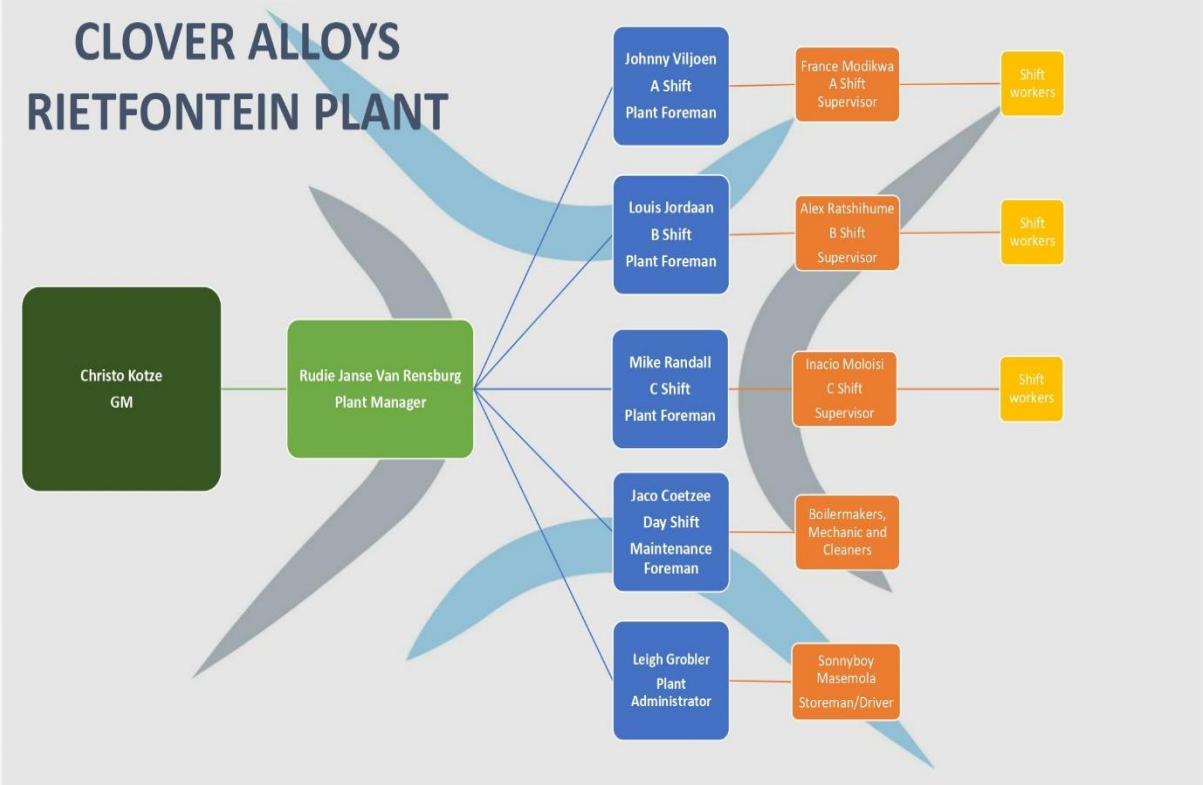
Rietfontein plant has a Safety, Health and Environmental Policy (SHE) which is provided by Clover Alloys. The Management of the plant believes it is the fundamental right of each employee, as well as persons who are not employees, but who may be directly affected by the activities at the plant, to have their Health and Safety protected.

The commitment of the HSE policy for the plant commits to the following:

- Identify and manage SHE risks and impacts associated with their operations;
- Setting and defining SHE objectives and targets and providing the necessary resourced to support these;
- Establish competence and awareness regarding SHE matters to all employees and contractors through training and communication;
- Strive to eliminate incidents and prevent pollution through proper maintenance of company property, safeguarding of the work environment and continual monitoring; and
- Conserve natural resources and reduce impacts associated with waste generation, effluent discharge and water quality.

The communication structure for the plant is shown in Figure 5 below.

Figure 5: Organisational structure of the Rietfontein plant.



2.7 QUALITY POLICY

The management structure at the Rietfontein Plant is committed to fostering a culture of awareness, enthusiasm, and healthy competition across all operational sections. This approach encourages teams to safeguard their assets through the consistent application of protective measures aligned with the ISO 9001:2000 code of practice. By doing so, the plant aims to uphold its reputation and maintain its position as a leading chrome producer. These quality policies are actively implemented by Heads of Department and reinforced through clear working instructions and procedures that are well understood and diligently followed by all employees.

2.8 EDUCATION AND TRAINING

The Rietfontein Plant actively promotes employee education and training on Health, Safety, and Environmental (SHE) matters. This is achieved through the dissemination of a dedicated monthly SHE topic, which is shared with all personnel during toolbox talks or displayed on notice boards throughout the mining area. This approach ensures continuous awareness, engagement, and alignment with the plant's commitment to a safe and environmentally responsible workplace.

2.9 AWARENESS RAISING

The purpose of the Environmental Awareness Plan is to define the approach used to educate Rietfontein Plant staff about environmental risks associated with their working environment. It outlines the methods for identifying and communicating these risks, as well as the strategies for mitigating them to prevent potential environmental degradation. Through this plan, employees are empowered to recognize and respond to environmental challenges, fostering a culture of responsibility and sustainability within the operation.

2.10 COMMUNICATION STRATEGY

Environmental risk communication for each phase of the project is conducted at local training centres, involving personnel from both administrative and operational sectors of the Rietfontein Plant. To reinforce ongoing awareness, monthly environmental topics are prominently displayed on notice boards. This ensures that all employees remain informed and engaged with current environmental priorities and best practices.

2.11 ENVIRONMENTAL AWARENESS PLAN

The evaluation of the Environmental Awareness Plan at the Rietfontein Plant will be conducted by either the plant's management team or qualified subcontractors appointed by the operation. As an ongoing process within an established facility, this evaluation will focus on auditing current activities during routine operational phases. The aim is to assess the effectiveness of environmental communication and awareness initiatives, ensure compliance with relevant standards, and identify areas for continuous improvement in environmental performance.

The Environmental Awareness Plan at the Rietfontein Plant serves to inform all personnel of the environmental risks associated with ongoing operations, as well as the mitigation measures required to minimise these risks. Guided by the IWWMP Action Plan and the site-specific EMPr, the Environmental Awareness Plan demonstrates the plant's commitment to environmental stewardship, community empowerment, and the responsible rehabilitation of land for future use. Environmental issues are regularly communicated through monthly talk topics, which are discussed during scheduled meetings and displayed on notice boards throughout the site, ensuring consistent engagement and awareness across all levels of staff.

3 REGULATORY WATER AND WASTE MANAGEMENT FRAMEWORK

The Rietfontein plant has an existing WUL and is applying for additional water uses and the amendment of existing water uses in this formal amendment application.

3.1 SUMMARY OF ALL WATER USES

Table 2 below summarises both the existing water uses as well as the additional water uses applicable to Rietfontein Plant Operation, including existing lawful water uses, relevant exemptions, generally authorised water uses, and new water uses. A Water Use Licence (Licence Number: 07/A22H/5292, File No: 27/2/2/A822/19/1) was issued to Rietfontein Operations on 11 June 2017 in terms of Chapter 4 of the National Water Act, 1998 (Act 36 of 1998). The licence is being amended to accommodate additional and amended water uses associated with changes to the operational footprint and the inclusion of proposed water management infrastructure, and to align the authorisation with current and proposed activities in order to ensure ongoing compliance with the National Water Act.

Table 2: Summary of all water uses

Water Use	Type	Name	Purpose	Annual Volume (m^3)	Discharge volume (m^3) per year	Storage Capacity (m^3)	Decimal Degrees		21 Digit SG Code
							Latitude	Longitude	
Section 21 (g)	Existing	Containment of wastewater into septic tank	Containment of wastewater into septic tank	517.44	N/A	517.44	-25.746984°	27.364764°	T0JQ00000000033800023
Section 21 (g)	Existing	Stockpiling	Feedstock for the processing plant	6000000	N/A	6 000 000	-25.746617°	27.366674°	T0JQ00000000033800023
Section 21 (g)	Existing	Dust suppression on haul roads with dirty water from settling dam	Dust suppression	N/A	2774 m^3/a	N/A	-25.747622°	27.365845°	T0JQ00000000033800023
Section 21 (g)	Existing	Disposing of water containing waste into settling dam	Disposing of water containing waste into settling dam	N/A	N/A	4055	-25.748030°	27.364860°	T0JQ00000000033800023
Section 21 (g)	Existing - Amend	Feed stockpile	Feedstock for the processing plant	7040000	N/A	7 040 000	-25.746984°	27.364764°	T0JQ00000000033800023
Section 21 (a)	Existing - Amend	Taking water from borehole 2 for domestic use	Abstraction for Domestic sues	7120	N/A	N/A	-25.74878446	27.3658364	T0JQ00000000033800023
Section 21 (a)	Existing - Remove	Taking water from Borehole 1 for industrial use	Abstraction for industrial sues	5460	N/A	N/A	-25.746986°	27.364221°	T0JQ00000000033800023
Section 21 (a)	New	Abstraction from borehole RP03	Abstraction for industrial sues	7120	N/A	N/A	-25.746433°	27.365762°	T0JQ00000000033800023

Water Use	Type	Name	Purpose	Annual Volume (m^3)	Discharge volume (m^3) per year	Storage Capacity (m^3)	Decimal Degrees		21 Digit SG Code
							Latitude	Longitude	
Section 21 (a)	New	Abstraction from borehole RP01	Abstraction for industrial sues	5473	N/A	N/A	-25.747621°	27.364145°	T0JQ00000000033800023
Section 21 (a)	New	Abstraction from borehole RP02 (BH01)	Abstraction for industrial sues	7120	N/A	N/A	-25.747000°	27.364288°	T0JQ00000000033800023
Section 21 (c&i)	New	Disposing of water containing waste into settling dam	Disposing of water containing waste into settling dam	N/A	N/A	N/A	-25.748030°	27.364860°	T0JQ00000000033800023
Section 21 (c&i)	New	Stockpiling	Feedstock for the processing plant	N/a	N/A	6 000 000	-25.746617°	27.366674°	T0JQ00000000033800023
Section 21 (c&i)	New	Feed stockpile	Feedstock for the processing plant	N/A	N/A	7 040 000	-25.746984°	27.364764°	T0JQ00000000033800023
Section 21 (c&i)	New	Berm for separation of clean water Start	Clean/dirty water separation	N/A	N/A	N/A	-25.746028°	27.367121°	T0JQ00000000033800023
Section 21 (c&i)	New	Berm for separation of clean water End	Clean/dirty water separation	N/A	N/A	N/A	-25.746634°	27.362803°	T0JQ00000000033800023
Section 21 (c&i)	New	Dirty water channel 2 Start	Clean/dirty water separation	N/A	N/A	N/A	-25.746574°	27.363019°	T0JQ00000000033800023
Section 21 (c&i)	New	Dirty water channel 2 End	Clean/dirty water separation	N/A	N/A	N/A	-25.747950°	27.363250°	T0JQ00000000033800023
Section 21 (c&i)	New	Dirty water channel 1 start	Clean/dirty water separation	N/A	N/A	N/A	-25.747950°	27.363250°	T0JQ00000000033800023

Water Use	Type	Name	Purpose	Annual Volume (m^3)	Discharge volume (m^3) per year	Storage Capacity (m^3)	Decimal Degrees		21 Digit SG Code
							Latitude	Longitude	
Section 21 (c&i)	New	Dirty water channel 1 End	Clean/dirty water separation	N/A	N/A	N/A	-25.747966°	27.364594°	T0JQ00000000033800023
Section 21 (c&i)	New	Dirty water channel 3a Start	Clean/dirty water separation	N/A	N/A	N/A	-25.748121°	27.364834°	T0JQ00000000033800023
Section 21 (c&i)	New	Dirty water channel 3a Middle	Clean/dirty water separation	N/A	N/A	N/A	-25.748388°	27.365548°	T0JQ00000000033800023
Section 21 (c&i)	New	Dirty water channel 3a End	Clean/dirty water separation	N/A	N/A	N/A	-25.748223°	27.366222°	T0JQ00000000033800023
Section 21 (c&i)	New	Dirty water channel 4 Start	Clean/dirty water separation	N/A	N/A	N/A	-25.748223°	27.366222°	T0JQ00000000033800023
Section 21 (c&i)	New	Dirty water channel 4 End	Clean/dirty water separation	N/A	N/A	N/A	-25.74806743	27.3672869	T0JQ00000000033800023
Section 21 (c&i)	New	Dirty water channel 3B Start	Clean/dirty water separation	N/A	N/A	N/A	-25.748223°	27.366222°	T0JQ00000000033800023
Section 21 (c&i)	New	Dirty water channel 3B Middle	Clean/dirty water separation	N/A	N/A	N/A	-25.74862089	27.3666064	T0JQ00000000033800023
Section 21 (c&i)	New	Dirty Water channel 3B End	Clean/dirty water separation	N/A	N/A	N/A	-25.74864658	27.3673547	T0JQ00000000033800023
Section 21 (c&i)	New	Culvert 1	Clean/dirty water separation	N/A	N/A	N/A	-25.74796272	27.3645264	T0JQ00000000033800023

Water Use	Type	Name	Purpose	Annual Volume (m^3)	Discharge volume (m^3) per year	Storage Capacity (m^3)	Decimal Degrees		21 Digit SG Code
							Latitude	Longitude	
Section 21 (c&i)	New	Culvert 2	Clean/dirty water separation	N/A	N/A	N/A	-25.74772243	27.3630266	T0JQ00000000033800023
Section 21 (c&i)	New	Culvert 3	Clean/dirty water separation	N/A	N/A	N/A	-25.74842072	27.3655496	T0JQ00000000033800023
Section 21 (c&i)	New	Culvert 4	Clean/dirty water separation	N/A	N/A	N/A	-25.7481768	27.3648423	T0JQ00000000033800023
Section 21 (c&i)	New	Culvert 5	Clean/dirty water separation	N/A	N/A	N/A	-25.74808899	27.3663133	T0JQ00000000033800023
Section 21 (c&i)	New	Culvert 6	Clean/dirty water separation	N/A	N/A	N/A	-25.7462349	27.3658857	T0JQ00000000033800023
Section 21 (c&i)	New	Culvert 7	Clean/dirty water separation	N/A	N/A	N/A	-25.74636829	27.3644944	T0JQ00000000033800023
Section 21 (c&i)	New	Stockpile drying pads	Drying of feedstock	95805	N/A	257	-25.7478103	27.3653436	T0JQ00000000033800023
Section 21 (c&i)	New	Rietfontein plant and associated infrastructure	Chrome processing plant and associated infrastructure located within the regulated area.	N/A	N/A	N/A	-25.74726006	27.3657385	T0JQ00000000033800023
Section 21 (c&i)	New	Pipeline Start	The conveyance of return water and slurry between	N/A	N/A	N/A	-25.746143°	27.367080°	T0JQ00000000033800013 T0JQ00000000033800019 T0JQ00000000033800021 T0JQ00000000033800023

Water Use	Type	Name	Purpose	Annual Volume (m^3)	Discharge volume (m^3) per year	Storage Capacity (m^3)	Decimal Degrees		21 Digit SG Code
							Latitude	Longitude	
			Rietfontein plant and RCM						
Section 21 (c&i)	New	Pipeline End	The conveyance of return water and slurry between Rietfontein plant and RCM	N/A	N/A	N/A	-25.72989847	27.3753821	T0JQ00000000033800023
Section 21 (c&i)	New	Silt trap associated with PCD	Silt control to the PCD	104390	N/A	285	-25.748151°	27.363181°	T0JQ00000000033800023
Section 21 (g)	New	Pollution Control Dam	To support the stormwater infrastructure to allow for clean and dirty water separation	104390	N/A	8000	-25.748447°	27.364280°	T0JQ00000000033800023
Section 21 (g)	New	Silt trap associated with PCD	Silt control to the PCD	104390	N/A	286	-25.748151°	27.363181°	T0JQ00000000033800023
Section 21 (g)	New	Stockpile drying pads	Drying of the feedstock materials	95805	N/A	257	-25.7478103	27.3653436	T0JQ00000000033800023

3.1.1 EXISTING LAWFUL WATER USES

An Existing Lawful Water Use (ELWU) is a water use which has taken place at any time during a period of two years 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 NWA and which was authorised by or under any law which was in force immediately before the date of commencement of the NWA.

Rietfontein Plant has an existing IWUL with license number 07/A22H/AG/5292 which is not per definition ELWU's but are mentioned for completeness. This IWUL authorises water uses at Rietfontein Plant for:

Section 21(a) water uses

- Taking of groundwater from 2 boreholes.

Section 21(g) water uses

- Disposing of water containing waste into settling dam
- Containment of wastewater into septic tank
- Stockpiling
- Feed stockpile
- Dust suppression on haul roads with dirty water from settling dam

3.1.2 GENERALLY AUTHORIZED WATER USES

General authorisations (GA) are put into place to allow small scale water uses to be permissible without the need for a water use license under the National Water Act (Act 36 of 1998). Relevant government notices containing the generally authorisation requirements under the NWA are:

- GN 399 of 26 March 2004, dealing with water uses under NWA Section 21 (a), (b), (e), (f), (g) and (h);
- GN 1199 of 18 December 2009, dealing with water uses under NWA Section 21 (c) and (i); and
- GN 665 of 6 September 2013, replacing sections from GN no. 398 of 26 March 2004 and GN no. 399 of 26 March 2004.

There are currently no general authorisations in place for the Rietfontein plant.

3.2 NEW WATER USES TO BE LICENCED

This application aims to add additional water uses to the existing water use license for the Clover Alloys Rietfontein Beneficiation plant. The new water uses to be licensed consist of various water uses in terms of section 21 of the NWA as indicated in Table 3 below.

Table 3: New water uses to be licensed.

Water Use	Name	Purpose	Annual Volume in cubic meters per year	Discharge volume in cubic meters per year	Storage Capacity in cubic meters	Decimal Degrees Latitude	Longitude
Section 21 (a)	Abstraction from borehole RP03	Abstraction for industrial sues	7120	N/A	N/A	-25.746433°	27.365762°
Section 21 (a)	Abstraction from borehole RP01	Abstraction for industrial sues	5473	N/A	N/A	-25.747621°	27.364145°
Section 21 (a)	Abstraction from borehole RP02	Abstraction for industrial sues	7120	N/A	N/A	-25.747000°	27.364288°
Section 21 (c&i)	Disposing of water containing waste into settling dam	Disposing of water containing waste into settling dam	N/A	N/A	N/A	-25.748030°	27.364860°
Section 21 (c&i)	Stockpiling	Feedstock for the processing plant		N/A	6 000 000	-25.746617°	27.366674°
Section 21 (c&i)	Feed stockpile	Feedstock for the processing plant		N/A	7 040 000	-25.746984°	27.364764°
Section 21 (c&i)	Berm for separation of clean water Start	Clean/dirty water separation	N/A	N/A	N/A	-25.746028°	27.367121°
Section 21 (c&i)	Berm for separation of clean water End	Clean/dirty water separation	N/A	N/A	N/A	-25.746634°	27.362803°
Section 21 (c&i)	Dirty water channel 2 Start	Clean/dirty water separation	N/A	N/A	N/A	-25.746574°	27.363019°

Water Use	Name	Purpose	Annual Volume in cubic meters per year	Discharge volume in cubic meters per year	Storage Capacity in cubic meters	Decimal Degrees Latitude	Decimal Degrees Longitude
Section 21 (c&i)	Dirty water channel 2 End	Clean/dirty water separation	N/A	N/A	N/A	-25.747950°	27.363250°
Section 21 (c&i)	Dirty water channel 1 start	Clean/dirty water separation	N/A	N/A	N/A	-25.747950°	27.363250°
Section 21 (c&i)	Dirty water channel 1 End	Clean/dirty water separation	N/A	N/A	N/A	-25.747966°	27.364594°
Section 21 (c&i)	Dirty water channel 3a Start	Clean/dirty water separation	N/A	N/A	N/A	-25.748121°	27.364834°
Section 21 (c&i)	Dirty water channel 3a Middle	Clean/dirty water separation	N/A	N/A	N/A	-25.748388°	27.365548°
Section 21 (c&i)	Dirty water channel 3a End	Clean/dirty water separation	N/A	N/A	N/A	-25.748223°	27.366222°
Section 21 (c&i)	Dirty water channel 4 Start	Clean/dirty water separation	N/A	N/A	N/A	-25.748223°	27.366222°
Section 21 (c&i)	Dirty water channel 4 End	Clean/dirty water separation	N/A	N/A	N/A	-25.7480674	27.3672869
Section 21 (c&i)	Dirty water channel 3B Start	Clean/dirty water separation	N/A	N/A	N/A	-25.748223°	27.366222°
Section 21 (c&i)	Dirty water channel 3B Middle	Clean/dirty water separation	N/A	N/A	N/A	-25.7486209	27.3666064

Water Use	Name	Purpose	Annual Volume in cubic meters per year	Discharge volume in cubic meters per year	Storage Capacity in cubic meters	Decimal Degrees Latitude	Longitude
Section 21 (c&i)	Dirty Water channel 3B End	Clean/dirty water separation	N/A	N/A	N/A	-25.7486466	27.3673547
Section 21 (c&i)	Culvert 1	Clean/dirty water separation	N/A	N/A	N/A	-25.7479627	27.3645264
Section 21 (c&i)	Culvert 2	Clean/dirty water separation	N/A	N/A	N/A	-25.7477224	27.3630266
Section 21 (c&i)	Culvert 3	Clean/dirty water separation	N/A	N/A	N/A	-25.7484207	27.3655496
Section 21 (c&i)	Culvert 4	Clean/dirty water separation	N/A	N/A	N/A	-25.7481768	27.3648423
Section 21 (c&i)	Culvert 5	Clean/dirty water separation	N/A	N/A	N/A	-25.748089	27.3663133
Section 21 (c&i)	Culvert 6	Clean/dirty water separation	N/A	N/A	N/A	-25.7462349	27.3658857
Section 21 (c&i)	Culvert 7	Clean/dirty water separation	N/A	N/A	N/A	-25.7463683	27.3644944
Section 21 (c&i)	Stockpile drying pads	Drying of feedstock	95805	N/A	257	-25.7478103	27.3653436
Section 21 (c&i)	Rietfontein plant and associated infrastructure	Chrome processing plant and associated infrastructure located within the regulated area.	N/A	N/A	N/A	-25.7472601	27.3657385

Water Use	Name	Purpose	Annual Volume in cubic meters per year	Discharge volume in cubic meters per year	Storage Capacity in cubic meters	Decimal Degrees Latitude	Longitude
Section 21 (c&i)	Pipeline Start	The conveyance of return water and slurry between Rietfontein plant and RCM	N/A	N/A	N/A	-25.746143°	27.367080°
Section 21 (c&i)	Pipeline End	The conveyance of return water and slurry between Rietfontein plant and RCM	N/A	N/A	N/A	-25.7298985	27.3753821
Section 21 (c&i)	Silt trap associated with PCD	Silt control to the PCD	104390	N/A	285	-25.748151°	27.363181°
Section 21 (g)	Pollution Control Dam	To support the stormwater infrastructure to allow for clean and dirty water separation	104390	N/A	8000	-25.748447°	27.364280°
Section 21 (g)	Silt trap associated with PCD	Silt control to the PCD	104390	N/A	286	-25.748151°	27.363181°
Section 21 (g)	Stockpile drying pads	Drying of the feedstock materials	95805	N/A	257	-25.7478103	27.3653436

3.3 APPLICATION FOR EXEMPTION TO REGULATION GN 704 OF JUNE 1999

The following GNR 704 exemptions are applied for as part of this application. The table below includes or refer to an impact assessment, a management plan and a monitoring plan in support of the exemption application.

Table 4: Exemption motivations to the GNR 704.

No.	GN 704 Regulation	Activity requiring exemption	Motivation and reason for exemption
1.	4a. Restrictions on locality No person in control of a Mine or activity may – Regulation 4(a): locate or place any residue deposit, dam, reservoir, together with 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.	Product stockpiles and Rietfontein Operations	Impact assessment: The wetlands were delineated as part of the Wetland Baseline and Risk Assessment for the Clover Alloys Rietfontein Plant Project. The impacts on the wetlands were assessed as part of the above-mentioned report that is attached as Appendix 2 and is further discussed in sections 4.3.3 and 10 with monitoring requirements discussed in section12. Further management requirements are also detailed in section 11 .The risk assessment is also included in Appendix 3. Management plan: The Wetland Baseline and Risk Assessment for the Clover Alloys Rietfontein Plant Project study includes various mitigation measures to minimize the impact on the wetlands. Refer to Appendix 2 for the assessment. and is further discussed in sections 4.3.3 and 10 with monitoring requirements discussed in section12. Further management requirements are also detailed in section 11 Monitoring plan: Refer to Section 12 for the monitoring plan applicable to the project.

3.4 KEY WATER USES AND WASTE STREAMS

The Rietfontein Plant engages in several water-related activities that trigger authorisation requirements under Section 21 of the National Water Act (NWA). The key water uses include:

- Abstraction (Section 21(a)): Groundwater is abstracted via multiple boreholes for use in chrome processing and domestic purposes.
- Watercourse Interaction (Section 21(c) & (i)): The proposed pipeline route crosses at least one wetland, implicating the alteration and potential diversion of watercourses.

- Waste Disposal (Section 21(g)): A Pollution Control Dam (PCD) is proposed to manage contaminated stormwater and process water, ensuring controlled disposal that mitigates impacts on surrounding water resources.

The plant's waste streams primarily consist of:

- Tailings Material: Generated during chrome beneficiation, currently transported by truck to the main mine. A proposed slurry and return water pipeline will facilitate direct transfer, reducing spillage risks and improving containment.
- General Waste: Includes domestic and operational waste, managed in accordance with the National Environmental Management: Waste Act (NEMWA), with disposal via licensed service providers.
- Stormwater Runoff: Managed through the construction of clean and dirty water channels, ensuring separation and containment of potentially contaminated flows.

No waste management activities listed under NEMWA are triggered at the Rietfontein Plant, and no hazardous waste requiring lined containment is stored on-site. All process waste is directed to approved facilities at the main Rustenburg Chrome Mine.

3.5 WASTE MANAGEMENT ACTIVITY (NEMWA)

The nature of the plant's operations inherently results in the generation of tailings material during the beneficiation process. Presently, all tailings are transported by truck to the main Rustenburg Chrome Mine (RCM) for deposition at its licensed waste management facilities. This practice ensures that no waste requiring a lined barrier is stored at the Rietfontein site.

To further reduce environmental risk and improve operational efficiency, the Rietfontein plant intends to construct the following infrastructure:

- Slurry and Return Water Pipeline: A 2.5 km pipeline will be constructed to transport tailings directly from the Rietfontein plant to the main mine. This will eliminate the need for trucking, thereby reducing the potential for spillage and associated pollution risks.
- Stormwater Management Infrastructure: The installation of clean and dirty water channels will ensure effective separation of uncontaminated and contaminated surface runoff. All dirty water will be directed to a newly proposed Pollution Control Dam (PCD) with a capacity of 10,000 m^3.

These measures are designed to enhance the plant's compliance with Section 16 of NEMWA, which mandates that holders of waste must take all reasonable steps to avoid, minimise, and manage waste in a manner that does not endanger health or the environment. The plant does not however require a waste management license for the site activities as no waste management activities are triggered.

3.6 WASTE RELATED AUTHORISATIONS

In accordance with the National Environmental Management: Waste Act (Act No. 59 of 2008) and the National Norms and Standards for the Storage of Waste (2013), waste storage facilities are subject to authorisation only when they exceed specific volume thresholds. These thresholds are:

- General (non-hazardous) waste: storage capacity exceeding 100 m^3.
- Hazardous waste: storage capacity exceeding 80 m^3.

The Rietfontein Plant does not maintain any general waste storage areas larger than 100 m^3, nor any hazardous waste storage areas exceeding 80 m^3. Additionally, the plant does not operate tailings storage facilities on-site. Instead, all tailings generated during processing are returned to the main mine for deposition, which is managed under the mine's own waste licensing and residue deposit protocols in accordance with the Mineral and Petroleum Resources Development Act (MPRDA) and the National Environmental Management Act (NEMA)

As such, the Rietfontein Plant falls below the thresholds that would trigger the requirement for a waste management licence under the Waste Act. The facility is therefore not required to obtain waste authorisation for its current waste storage and handling activities

Waste management practices at the plant are guided by the Integrated Waste and Water Management Plan (IWWMP) Action Plan and the site-specific Environmental Management Programme Report (EMPr), which ensure compliance with the duty of care principle outlined in Section 28 of NEMA. These documents provide a framework for responsible waste handling, minimisation, and environmental protection.

3.7 OTHER AUTHORISATION

Other applications as they relate to the Clover Alloys Rietfontein Plant are as follows:

- Application for retrospective environmental authorisation in terms of Section 24G of NEMA (107 of 1998) for Environmental authorisation and approval of the accompanying EMPr.

4 PRESENT ENVIRONMENTAL STATUS

This section of IWWMP provides a description of the environment that may be or has been affected by the project as well as may be affected by the proposed new infrastructure. Aspects of the biophysical and socio-economic environment that could be directly or indirectly affected by, or could affect, the development have been described. This information has been sourced from existing information available for the area and where relevant specialist assessments.

4.1 CLIMATE AND WEATHER

4.1.1 RAINFALL

The area falls within the middle-veld climatic zone with hot summers and mild winters. Regional Mean Annual Precipitation (MAP) varies between 558 mm and 730 mm. Precipitation occurs primarily during the summer months in the form of high intensity, short duration thunderstorms between November and March with the peak rainfall occurring in January.

Daily rainfall data was obtained from the CCWR (Computing Centre for Water Research, Natal University) database. CCWR gauge 0511672 (Klipfontein) was used. The gauge is located 4km northwest of mine. The records provided 73 years of recorded and patched daily data that can be representative of the rainfall that occurs on the mine (Minelock, 2022). Table 5 represents the average amount of rainfall per month in Kroondal (Northwest). The numbers are calculated over a 30-year period to provide a reliable average.

Table 5: Average rainfall and evaporation (Minelock, 2022)

Month	Average rainfall (mm)	Average evaporation (mm – S-Pan)
January	117	182
February	91	152
March	80	147
April	46	116
May	16	99
June	8	81
July	4	90
August	5	119
September	16	160
October	52	186
November	82	176
December	116	192
Mean annual	**633***	**1 700**

4.1.2 EVAPORATION

The development is located Evaporation Zone 3B. The closest Evaporation station A2E008, the Rustenburg station, is located 8km East of the proposed development, and gives a mean annual evaporation (MAE) of 1645mm for the S-Pan value and 2054mm for the A-Pan value. The evaporation measurements cover the years 1957 to 1979.

4.2 SURFACE WATER

The project area falls within the Crocodile West and Marico Water Management Area (WMA), quaternary catchment A22H.

The A22H quaternary catchment area is 579 km^2 and has a MAR of 14.07 million m^3. Runoff emanating from this quaternary catchment drains in a north–easterly direction via the Hex River. Elevations in the A22H quaternary range from 1220 meters above mean sea level (mamsl) at the highest point within the catchment and drop to 1112 mamsl at the outlet of the catchment.

The elevation of this area ranges from 1130 mamsl to 1150 mamsl. Surface drainage at the Rietfontein Chrome Plant area occurs mainly towards the South, directly into the Sandspruit as this site is situated ap-proximately 1 km from the Sandspruit.

The main water course in the A22H quaternary catchment is the Hex River found on the western side of the project area; this river joins the Elands River which is a tributary to Crocodile River.

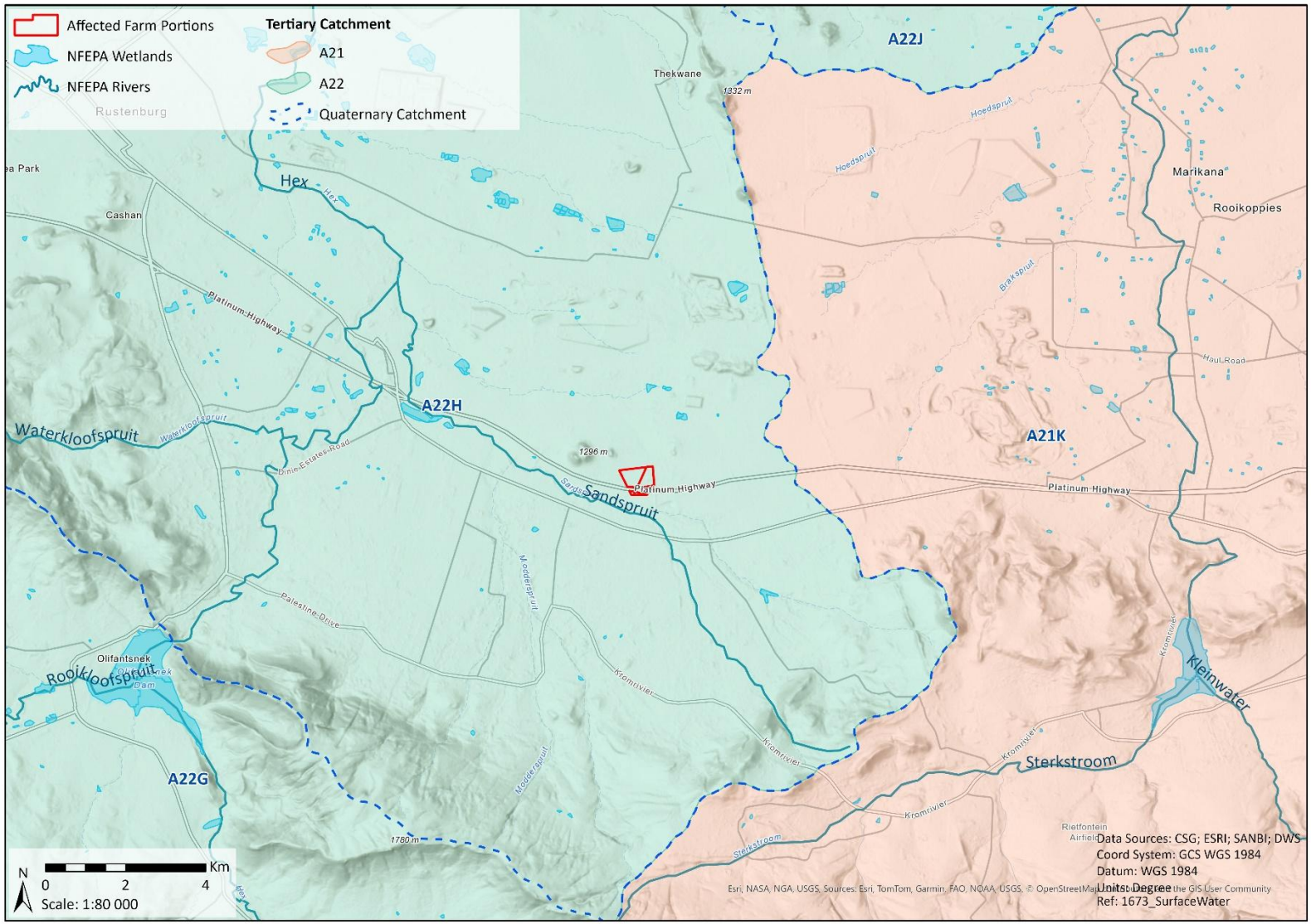


Figure 6: Regional drainage and surface topography.

4.2.1 WATER MANAGEMENT AREA

The Rietfontein plant falls within the A22H quaternary catchment. Quaternary catchment A22H falls within the Crocodile West and Marico Water Management Area (WMA), part of the Limpopo drainage region. This catchment includes segments of the Hex River, specifically from Olifantsnek Dam to Bospoort Dam, and is ecologically categorized with a Present Ecological State (PES) of D, indicating a heavily modified condition.

The Ecological Importance and Sensitivity (EI/ES) rating for A22H is moderate, and the Ecological Water Requirement (EWR) is set at 7.96% of the Natural Mean Annual Runoff (NMAR). The Basic Human Needs (BHN) Reserve is 0.01% of NMAR, resulting in a total Reserve of 7.97% of NMAR.

This catchment is subject to integrated water resource management under the National Water Act (Act No. 36 of 1998), with ongoing classification and monitoring efforts to ensure sustainable water use and ecological protection

4.2.2 SURFACE WATER HYDROLOGY

The project area of influence (PAOI), a 500-metre buffer around the project area, falls within the Bushveld Basin Ecoregion, within the Limpopo-Olifants Water Management Area (WMA). At a finer scale, within the A22H quaternary catchment. The fine scale hydrological features are presented in the following section.

4.2.2.1 TOPOGRAPHICAL RIVER LINES AND INLAND WATER AREAS

The topographical inland and river line data for the “2527” dataset indicated no inland water areas within the project area (Figure 7). Additionally, no perennial or non-perennial drainage features were identified according to the dataset (Figure 7).

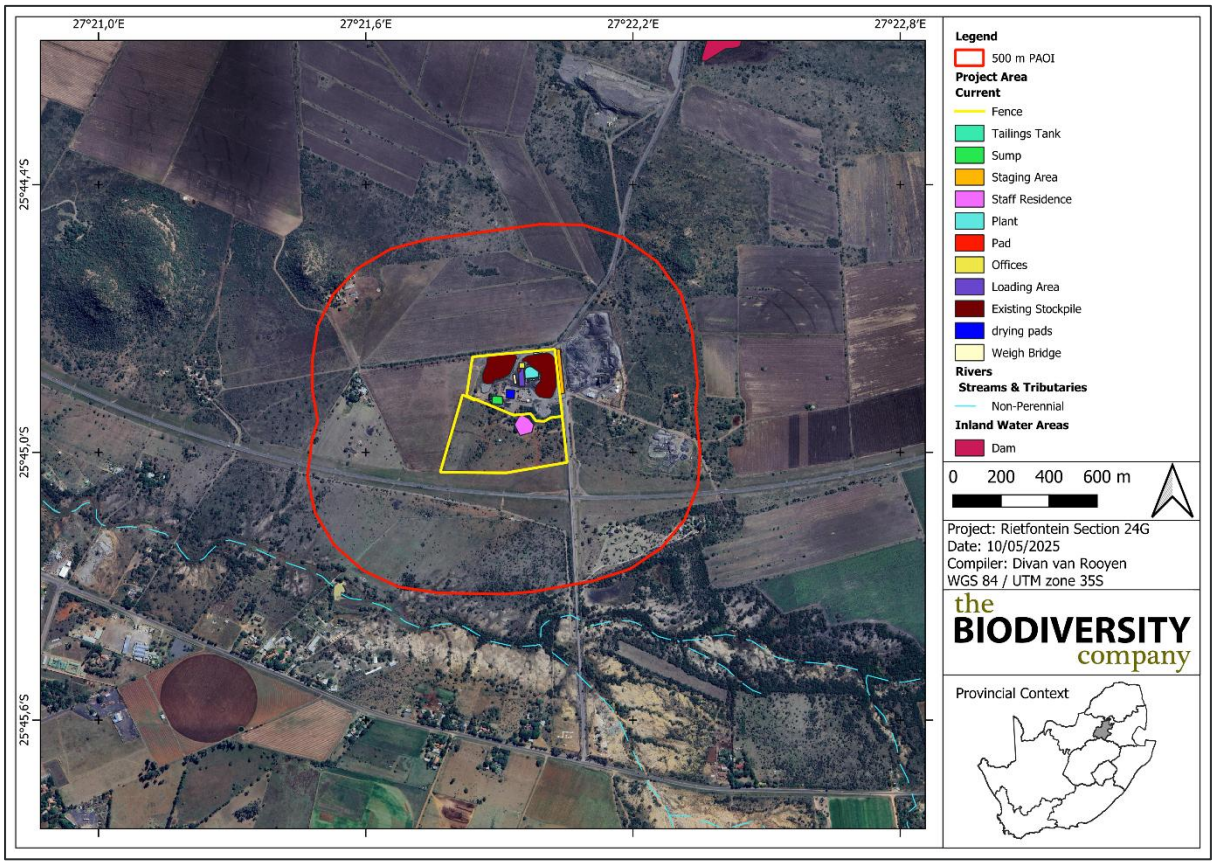


Figure 7: Topographical Inland Water Areas and Drainage Lines that intersect the Project Area of Influence

4.2.2.2 WATER MANAGEMENT AREA

The project area is located in the Crocodile West and Marico Water Management Area (WMA 3) within the Hex River quaternary catchment (A22H).

The surface water attributes of the affected catchment namely the mean annual precipitation (MAP), mean annual runoff (MAR) and mean annual evaporation (MAE) are summarised in section 4.1.The A22H quaternary catchment area is 579 km^2, and has an MAR of 14.07 million cubic metres (mcm). Runoff emanating from this quaternary catchment drains in a north–easterly direction via the Hex River. Elevations in the A22H quaternary range from 1220 meters above mean sea level (mamsl) at the highest point within the catchment, and drop to 1112 mamsl at the outlet of the catchment.

Rietfontein Plant is located to the west of the A21K Catchment which could be denoted as bordering the site despite being a distance of approximately 5km to the west of the boundary. The A21K quaternary catchment area is 865 km^2, and has an MAR of 9.11 million m^3. Runoff emanating from this quaternary catchment also drains in a north-easterly direction via the Sterkstroom River.

4.2.2.3 RIVERS AND DRAINAGE

The topography of the site indicates a slope towards the west causing runoff to be taken by two tributaries of the Sandspruit, which flow into the Hex River. The one non-perennial tributary of the Sandspruit drains from the east to the west and originates on the Rustenburg Chrome Mine property to the northeast. The affected watercourse is the portion (approximately 1 km in length) of this non-perennial tributary which traverses the mining area associated with Rustenburg Chrome mine, this will only overlap with the pipeline infrastructure associated with the Rietfontein plant. The receiving water body is the remaining portion of the tributary and the Sandspruit, approximately 5 km downstream of the plant.

The main water course in the A22H quaternary catchment is the Hex River found on the western side of the project area, this river joins the Elands River which is a tributary to Crocodile River.

There are two major tributaries to the Hex River namely the Sandspruit and Waterkloofspruit. The Sandspruit flows from the south of the project area in a north-west direction towards the Hex River. The Waterkloofspruit is located on the western side of the Hex River and it flows in an easterly direction to join the Hex River.

On the eastern side of the project area is the A21K quaternary catchment which consist of four rivers/streams namely the Sterkstroom, Kleinwater, Tshukutswe and the Maretlwana River. The Sterkstroom River is the main river in the mentioned quaternary and it drains in a north–easterly direction into the Crocodile River, which is a tributary to the Limpopo River.

4.2.2.4 SURFACE WATER USERS

The plant does not utilise water from any local surface water resources for its activities. Rand Water is the primary supplier of water to the plant which is supplemented with abstraction from existing boreholes on site. Due to the non-perennial nature of the unnamed streams around the project area, there are limited surface water users that are registered on the DWS Water Users Registration Management Systems (WARMS) database. The farmers downstream (west of the project area) utilise water from small farm dams together with the Holthausen Dam, which is 4 km away from the site, for agricultural purposes such as irrigation, stock feed and livestock watering.

4.2.2.5 SURFACE WATER QUALITY

At present, there is limited empirical data available to comprehensively characterise the surface water quality within the A22H catchment, which includes the Hex River and its tributaries. Existing monitoring records, if any, are either spatially sparse or temporally inconsistent, making it difficult to establish definitive trends or baseline conditions. Until such data becomes available, water quality-related decisions should be made with caution, prioritising precautionary principles and stakeholder engagement to mitigate potential risks to aquatic ecosystems and downstream users.

4.2.2.6 RESOURCES CLASS AND RIVER HEALTH RECEIVING WATER QUALITY OBJECTIVES AND RESERVE

4.2.2.6.1 RESOURCE CLASS DETERMINATION

The Hex River, situated within the A22H quaternary catchment, has been classified in accordance with the National Water Act (Act 36 of 1998) and the Classification System for Water Resources. Based on ecological importance, hydrological function, and socio-economic value, the Hex River is provisionally classified as a Class II resource, indicating a moderate level of ecological protection with allowance for sustainable development.

This classification reflects the river's role in supporting aquatic biodiversity, agricultural irrigation, and downstream domestic water use. The classification process considered the Present Ecological State (PES), Ecological Importance and Sensitivity (EIS), and the Recommended Ecological Category (REC) derived from available monitoring data and stakeholder input.

4.2.2.6.2 RIVER HEALTH STATUS

The river health assessment for the Hex River indicates a moderately impacted system, primarily due to agricultural runoff, sedimentation, and episodic discharges from mining and industrial activities. Macroinvertebrate indices (SASS5 scores), habitat integrity assessments, and water chemistry data suggest that the river maintains ecological functionality but exhibits signs of stress in certain reaches, particularly downstream of intensive land use zones.

4.3 ECOLOGICALLY IMPORTANT LANDSCAPE FEATURES

The Geographic information system analysis (GIS) pertaining to the relevance of the proposed project to ecologically important landscape features is summarised in Table 6. Only features that were identified to be relevant to the proposed project were further discussed.

Table 6: Summary of relevance of the proposed project to ecologically important landscape features

Desktop Information Considered	Relevant/Irrelevant
Strategic Water Source Areas	Project Area of Influence (PAOI) overlaps with a groundwater SWSA.
Provincial Conservation Plan	Relevant – POAI overlaps with Aquatic Ecological Support Areas of the North West Biodiversity Sector Plan.
South African Inventory of Inland Aquatic Ecosystems (SAIIAE)	Irrelevant – PAOI does not overlap with SAIIAE wetlands.
National Freshwater Priority Area	Irrelevant – PAOI does not overlap with NFEPA wetlands.

4.3.1 STRATEGIC WATER SOURCE AREAS

Strategic Water Source Areas (SWSAs) are areas that supply a disproportionate amount of mean annual runoff to a geographical region of interest. The areas supplying ≥ 50% of South Africa's water supply (which were represented by areas with a mean annual runoff of ≥ 135 mm/year) represent national Strategic Water Source Areas (SANBI, 2013). Groundwater and interflow play a key role in sustaining surface water flows during the dry season and account for up to 42% of river baseflow, thereby sustaining aquatic and water-dependent biota. Therefore, the protection and management of these areas are imperative (Le Maitre *et al*., 2018). Proposed mitigatioons were [provided by the specialists and are capture d in section 11.

According to the SWSAs of South Africa, Lesotho and Swaziland, the proposed site PAOI is overlapping with the Kroondal / Marikana groundwater SWSA (Figure 8; Lotter and Le Maitre, 2021).

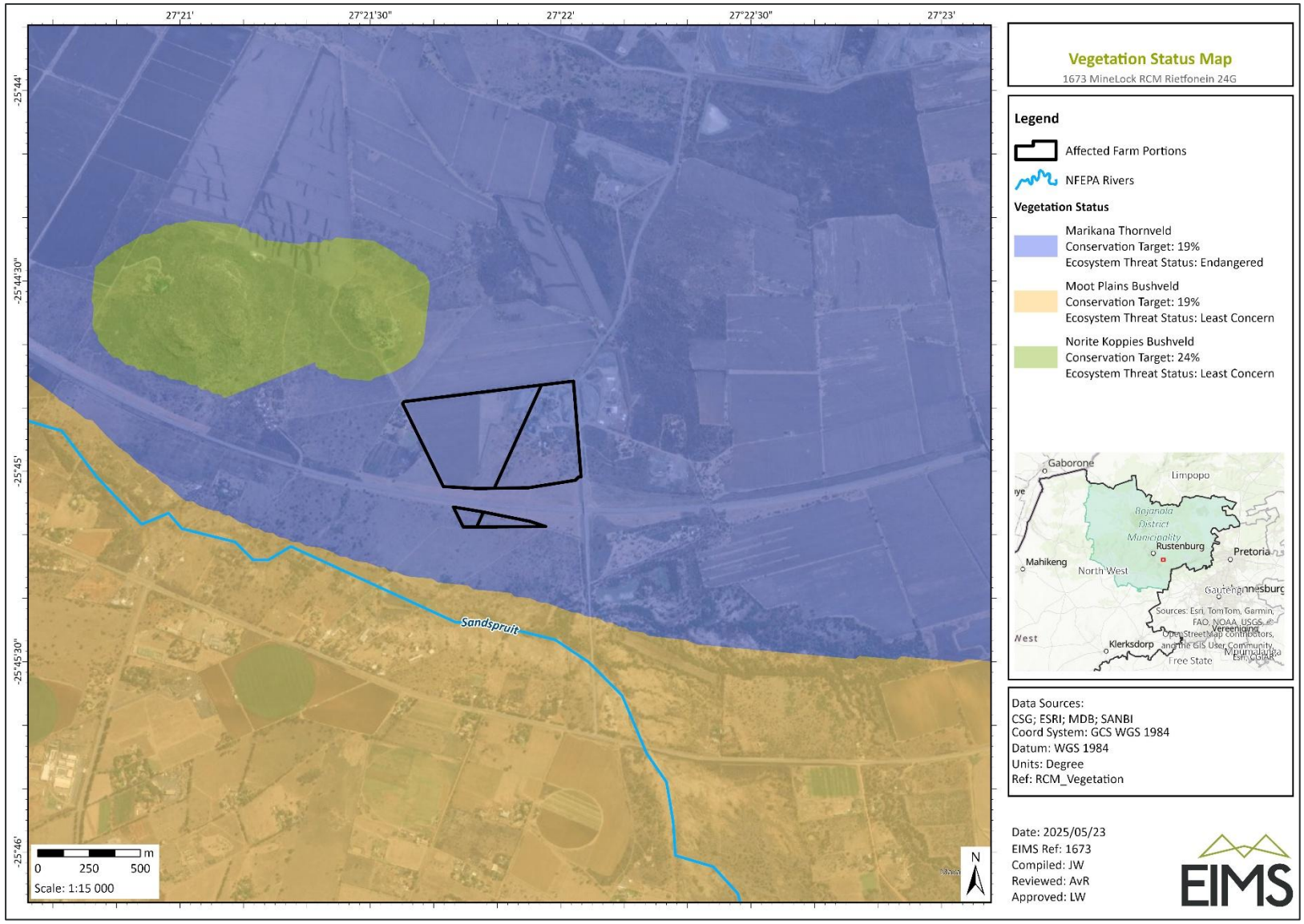


Figure 8: Strategic Water Source Areas in relation to the Project Area of Influence

4.3.2 NORTH WEST BIODIVERSITY SECTOR PLAN

The North West Biodiversity Sector Plan (READ, 2015) classifies areas within the province on the basis of their contributions to reaching the associated conservation targets within the province. These areas are primarily classified as either Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species, as well as the long-term ecological functioning of the landscape as a whole.

- CBAs are areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and healthy functioning of important species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then provincial biodiversity targets cannot be met (SANBI, 2017).
- ESAs are areas that are not essential for meeting biodiversity representation targets but play an important role in supporting the ecological functioning of ecosystems as well as adjacent Critical Biodiversity Areas, and/or in delivering ecosystem services that support socio-economic development (SANBI, 2017).

Provincial CBAs and ESAs are often further classified into sub-categories, such as CBA1 and CBA2 or ESA 1 and ESA 2. These present fine scale habitat and biodiversity area baseline requirements and associated land management objectives or outcomes. The highest categorization level is often referred to as an 'Irreplaceable Critical Biodiversity Area' which usually represents pristine natural habitat that is very important for conservation.

The PAOI partially overlaps with the North West Biodiversity Spatial Plan in southern boundary. These areas were identified as Ecological Support Areas 1 and 2. Importantly, none of the current or proposed infrastructure overlaps with any of the Ecological Support Areas (Figure 9).

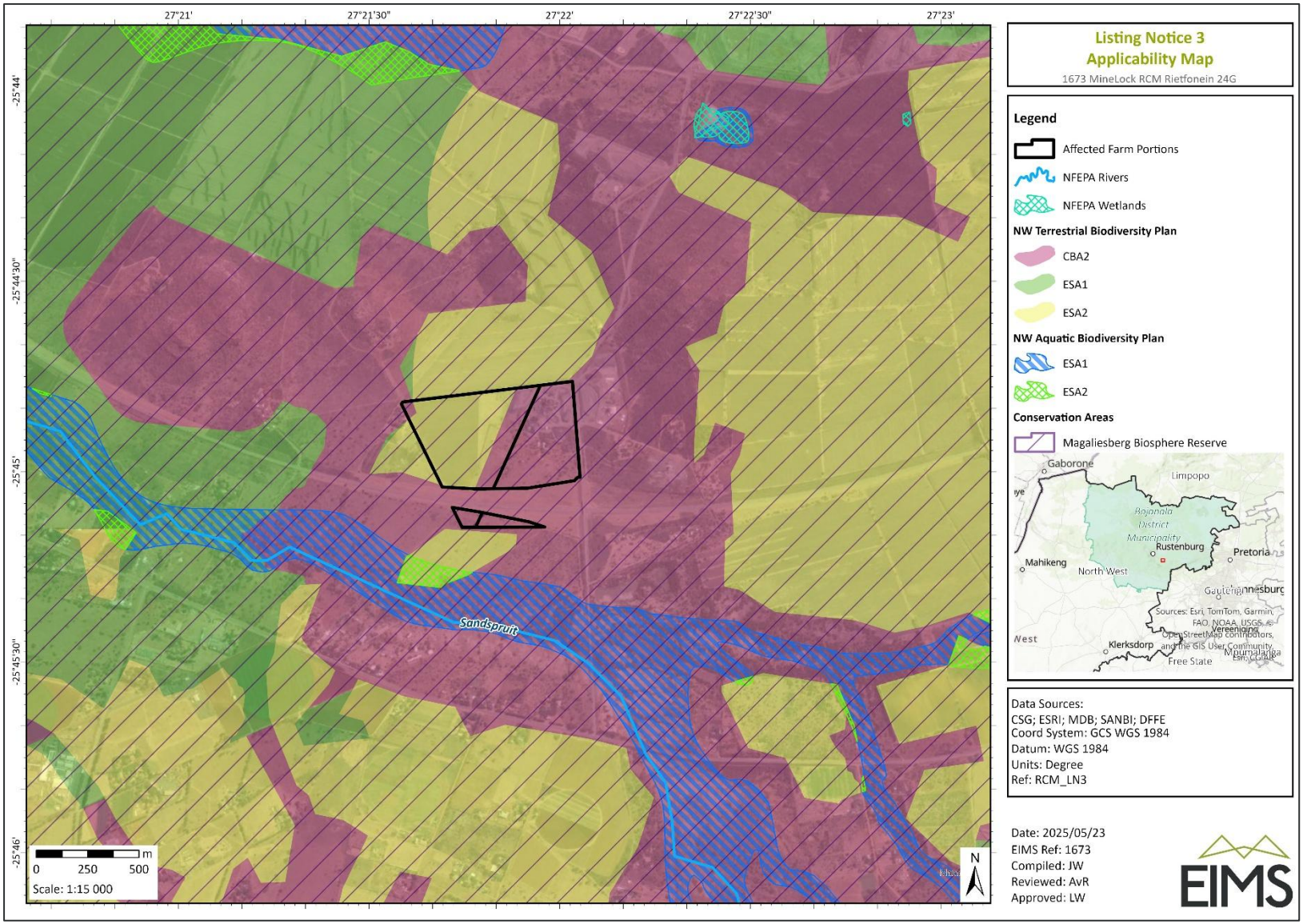


Figure 9: North West Biodiversity Spatial Plan in relation to the Project Area of Influence

4.3.3 WETLAND FIELD SURVEY

4.3.3.1 DELINEATION

Four Hydrogeomorphic units (HGM) were identified during the site assessment and these four HGM units were classified as two unchannelled valley-bottoms and two hillslope seep wetlands (Figure 10 & Figure 11). Additionally, several artificial resources were identified and classified as artificial channel, artificial seep, collection dam, dams (in-stream and off-channel), pollution control dam and stormwater runoff. Furthermore, one drainage feature was identified within the PAOI.

Preferential flow paths were identified within the PAOI and were particularly noted to be present within cultivated areas. These preferential flow paths consist of grassed flow areas and sandy eroded channels that are orientated drain the crop fields after rainfall. These features are not considered to be natural drainage lines and have no ecological functionality; therefore, they are not eligible for buffers.

A summary of the identified watercourses is shown in the table below.

Table 7: Summary of the identified watercourses

Wetland Type	Wetland Name
Unchannelled valley-bottom	HGM 1 HGM 2
Hillslope Seeps	HGM 3 HGM 4
Drainage	Drainage Features Stormwater Runoff
Dams	Dam (In-stream)
	Dam (Off-channel)
	Collection Dam
	Pollution Control Dam
Artificial	Artificial Seep
	Artificial Channel
Flow Paths	Preferential Flow Paths

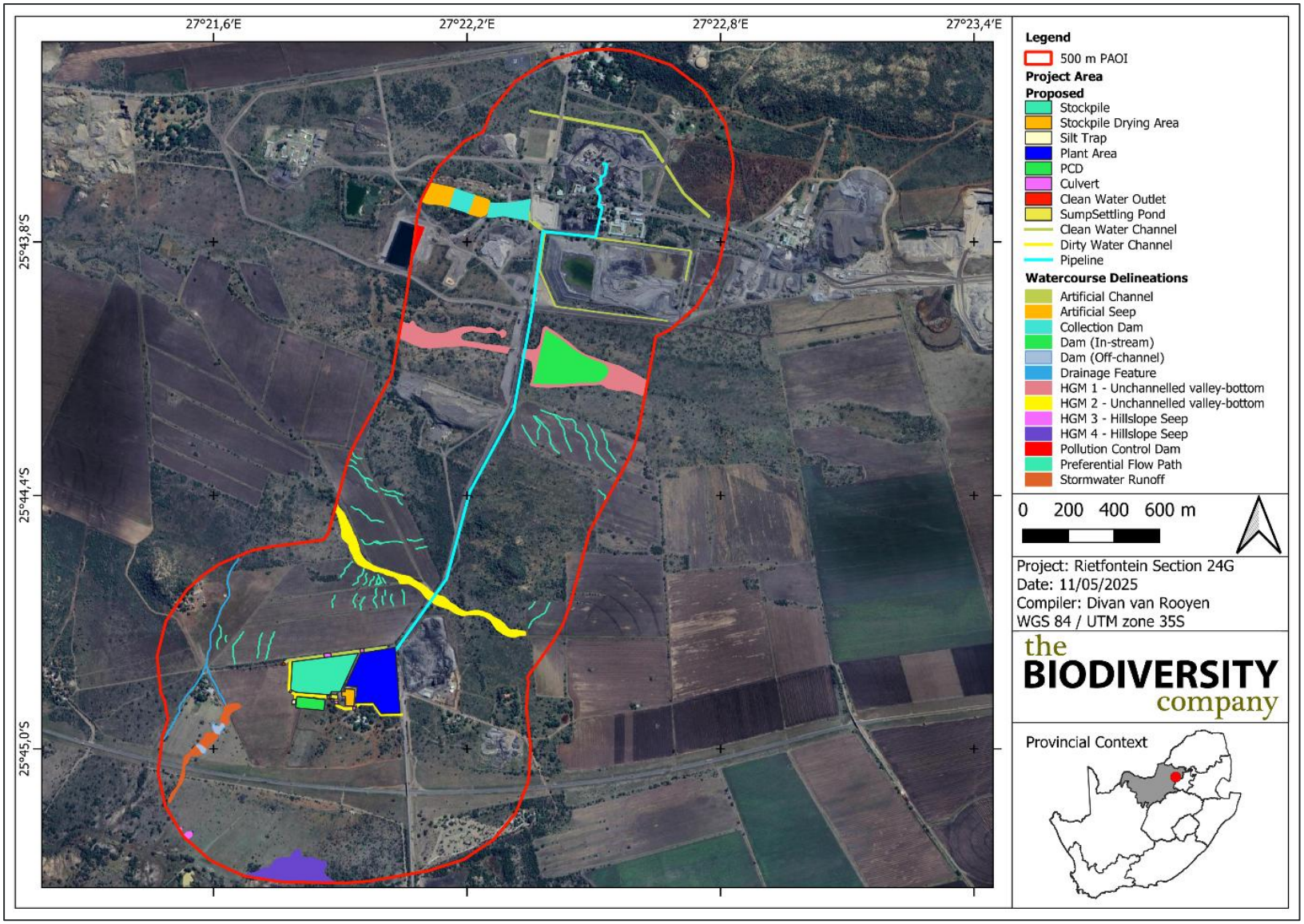


Figure 10: Delineated watercourses within the Project Area of Influence

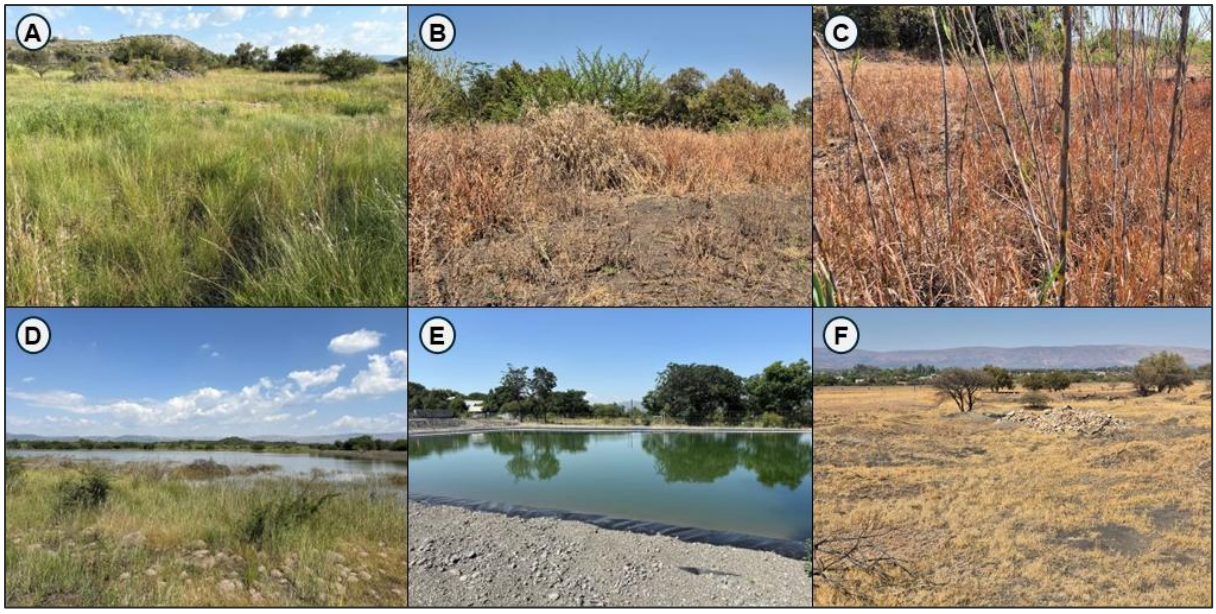


Figure 11: Examples of a few of the different features identified and delineated. A) Unchannelled valley-bottom, B) Hillslope Seep, C) Drainage Feature, D) In-stream Dam, E) Pollution Control Dam and F) Stormwater Runoff

4.3.3.2 EXTENT OF WETLANDS

The table below summarises the individual wetland areas and the percentage that each HGM unit comprises of the total wetland area within the PAOI, which amounts to 10.47 ha (Table 8).

Table 8: Summary of wetland area within the project area of influence

HGM Units	Area (Ha)	Size (%)
HGM 1	4.88	46.61
HGM 2	2.80	26.74
HGM 3	0.09	0.86
HGM 4	2.70	25.79
Total	**10.47**	**100**

4.3.3.3 CLASSIFICATION AND DESCRIPTION

The wetland classification of the unchannelled valley-bottoms and seep wetlands as per SANBI guidelines (Ollis et al., 2013) is presented in Table 9.

Table 9: Wetland classification as per SANBI guideline (Ollis et al., 2013)

Wetland Unit	Level 1	Level 2		Level 3	Level 4		
	System	DWS Ecoregion/s	NFEPA Wet Veg Group/s	Landscape Unit	4A (HGM)	4B	4C
HGM 1	Inland	Bushveld Basin	Central Bushveld Group 2	Valley Floor	Unchannelled valley-bottom	N/A	N/A
HGM 2							
HGM 3				Slope	Seep	With Channelled outflow	N/A
HGM 4							

Unchannelled valley bottom wetlands are typically found on valley floors where the landscape does not allow high energy flows. Figure 12 presents a diagram of a typical unchannelled valley bottom wetland, showing the dominant movement of water into, through and out of the system.

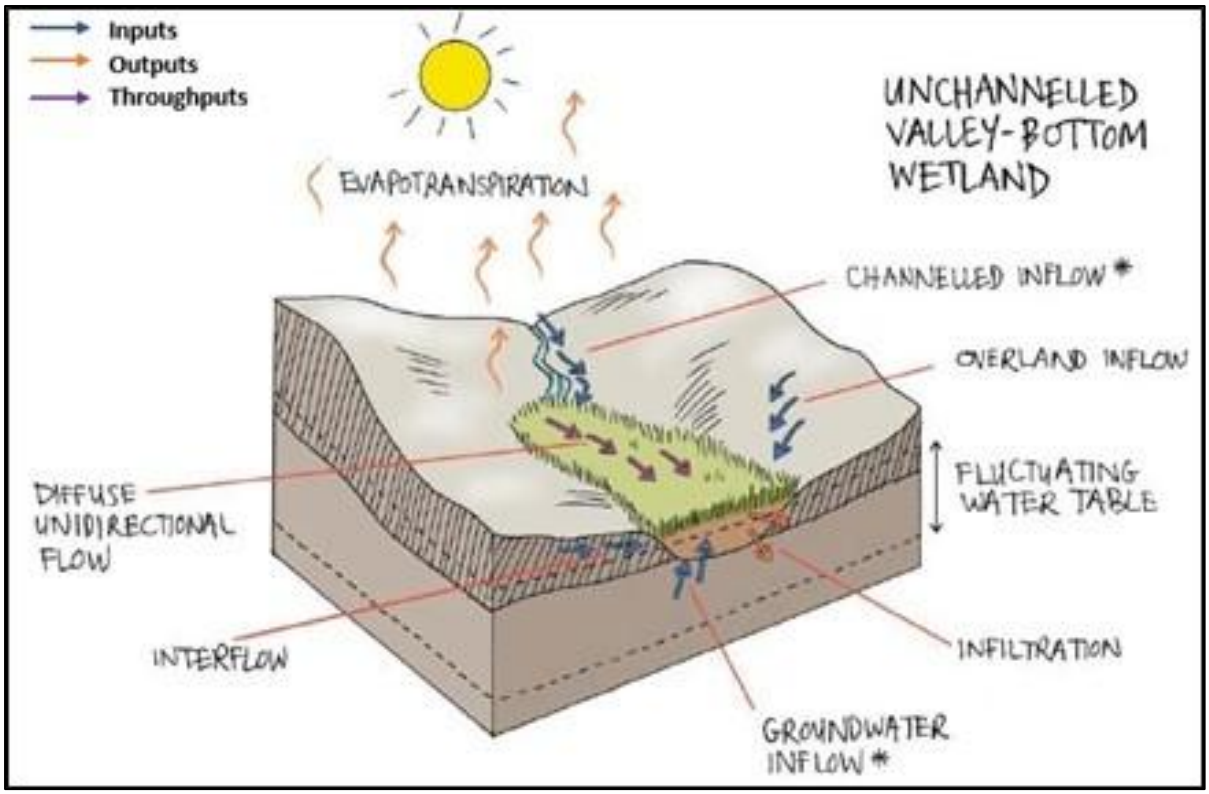


Figure 12: Amalgamated diagram of a typical channelled valley-bottom, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al., 2013)

A typical hillslope seep is located on the slope terrain unit. Isolated hillslope seeps are characterised by colluvial movement of material. These systems are fed by very diffuse sub-surface flows which seep out at very slow rates, ultimately ensuring that no direct surface water connects this wetland with other water courses within the valleys. Figure 12 illustrates a diagram of the hillslope seeps, showing the dominant movement of water into, through and out of the system.

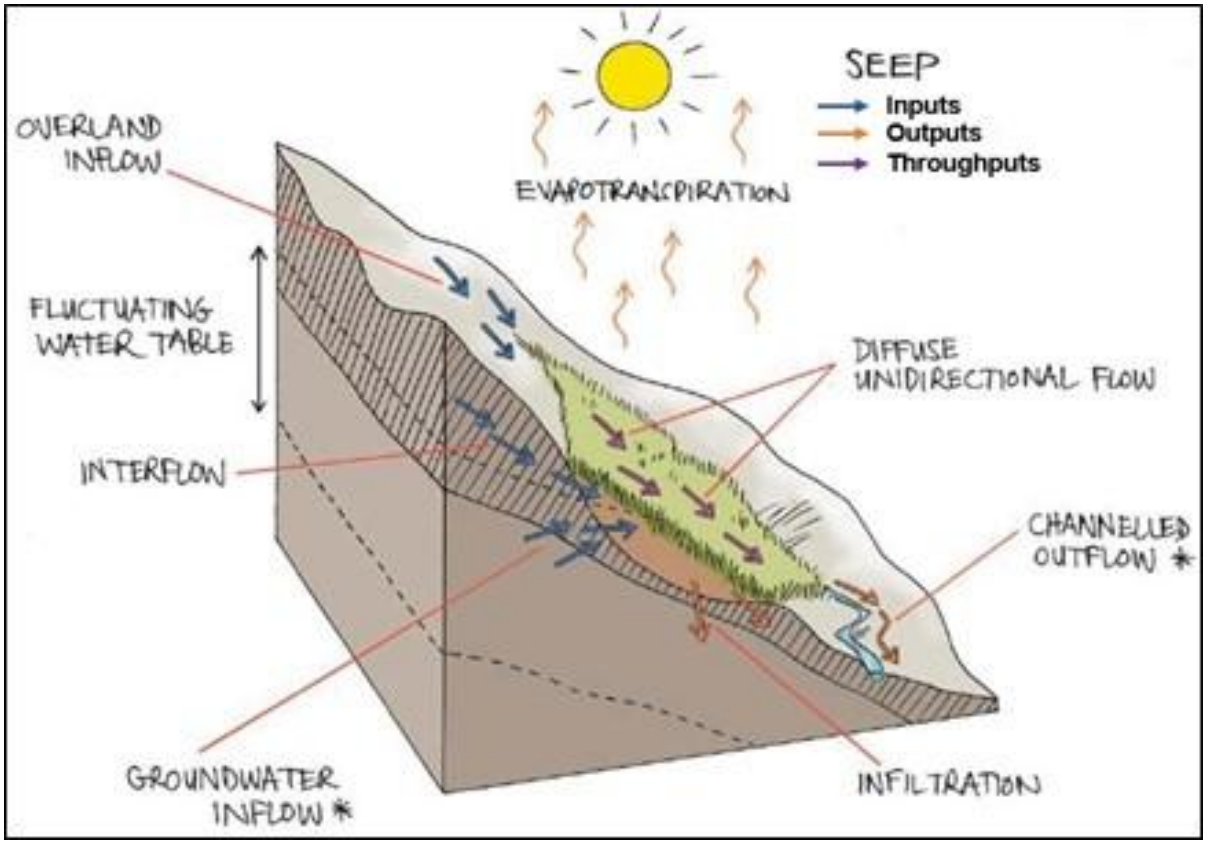


Figure 13: Amalgamated diagram of a seep wetland, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al., 2013)

The DWAF (2005) manual separates the classification of watercourses into three (3) separate types of channels or sections defined by their position relative to the zone of saturation in the riparian area. The classification system separates channels into:

- those that do not have baseflow ('A' Sections);
- those that sometimes have baseflow ('B' Sections) or non-perennial; or
- those that always have baseflow ('C' Sections) or perennial.
- The drainage features can be classified as 'A' Section channels.

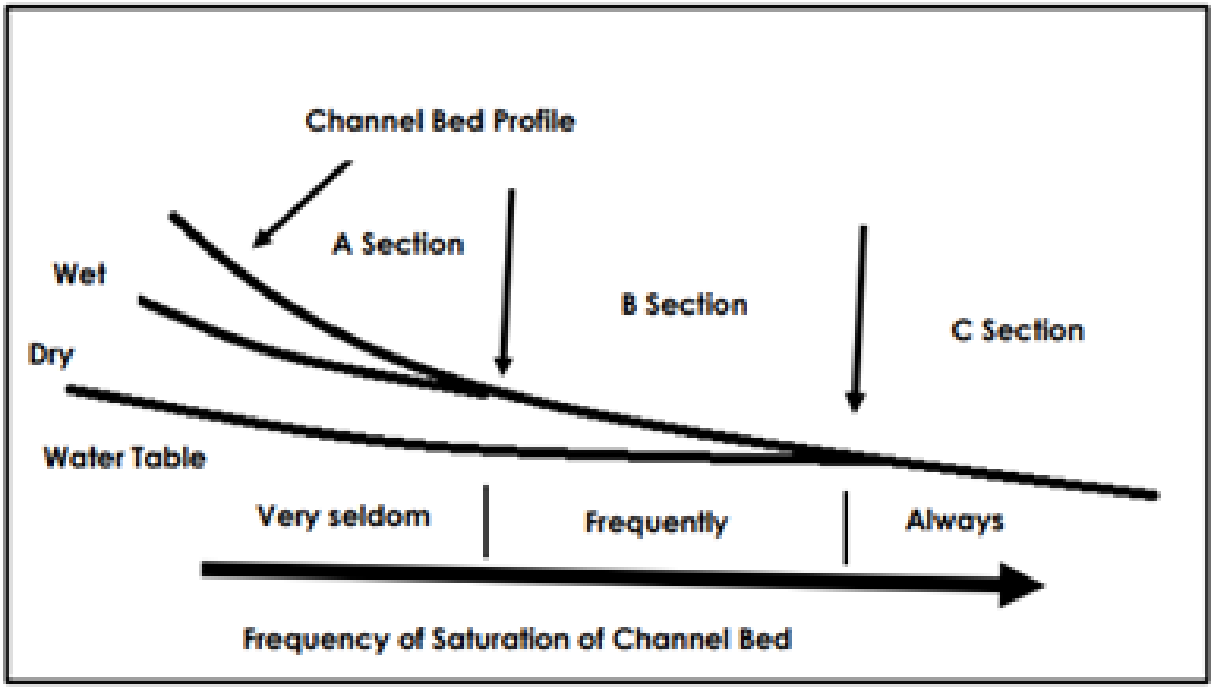


Figure 14: The watercourse classifications (DWAF, 2005)

4.3.3.4 RISK SCREENING

Table 10 provides the results of risk screening for the natural wetlands and provides motivation for each of the determined categories.

Table 10: Risk status of the delineated wetlands

HGM unit / Feature	Risk Status	Reasoning
HGM 2	At Risk	The proposed pipeline traverses HGM 2. Direct and indirect impact to this wetland is therefore expected and has been classified as “At Risk”.
HGM 1 **HGM 3** **HGM 4** **Artificial watercourses** **Preferential flow paths**	Not at Risk	These features have been assessed as not being at risk, as they are situated outside the boundaries of any proposed infrastructure and activities. Additionally, their distance from the proposed infrastructure and activities further ensures that they are classified as "Not at Risk" for the proposed project.

4.4 GROUNDWATER

4.4.1 HYDROGEOLOGICAL SETTING

The Rietfontein Plant is situated within the Bushveld Complex near Rustenburg, underlain by fractured and intergranular aquifers associated with mafic rocks of the Rustenburg Layered Suite. The aquifer system comprises:

- Shallow saprolitic aquifer (unsaturated zone): Recharge occurs via rainfall infiltration. Hydraulic conductivity ranges from 10^{-8} to 20 m/day depending on sediment type.

- Fractured bedrock aquifer (saturated zone): Groundwater movement is controlled by secondary structures (fractures, faults, dykes). Hydraulic conductivity is low (~10^{-5} m/day), with borehole yields typically <2 L/s.

The area is characterised by low permeability black turf soils, which limit recharge under natural conditions. However, mining activities have increased permeability locally, enhancing recharge and flow.

4.4.2 GROUNDWATER USE AND MONITORING

Three boreholes (RP01, RP02, RP03) are currently used for industrial abstraction, the licensed Borehole 1 is no longer utilised as an abstraction borehole since it has become inaccessible. . The approved annual abstraction volume is 2,059 m³. Monitoring of abstraction volumes and water levels is currently limited and requires improvement.

A hydrocensus conducted in February 2025 identified 26 boreholes within a 2 km radius, including private water supply boreholes. The average static water level was 17.24 mbgl. The Sandspruit, a tributary of the Hex River, is a key receptor located ~1 km south of the plant.

4.4.3 HYDROCENSUS

A hydrocensus was conducted on the 11th, 12th and 13th of February 2025. Boreholes were identified within a radius of 2 km of the Rustenburg Chrome Mine (RCM) site and a radius of 2 km around the Rietfontein Plant Operation. Information collected from the hydrocensus included verification of existing boreholes, location of private boreholes, current use, type of pump, groundwater level and the identification of any sensitive receptors.

During the hydrocensus conducted around the Rietfontein Plant Operation site, a total of 26 boreholes were included which was a combination of open/un-equipped boreholes, on-site production boreholes and privately owned water supply boreholes. The key hydrogeological information is summarised as follows:

- Of the 26 boreholes, the static water levels of 15 boreholes were measured with an average static water level of 17.24 mbgl.
- 14 of the 26 boreholes identified are privately owned water supply boreholes.
- The Rietfontein Plant Operation site is situated approximately 1 km north of the Sandspruit, which acts as a divide between the site and the private users situated to the south of the Sandspruit.

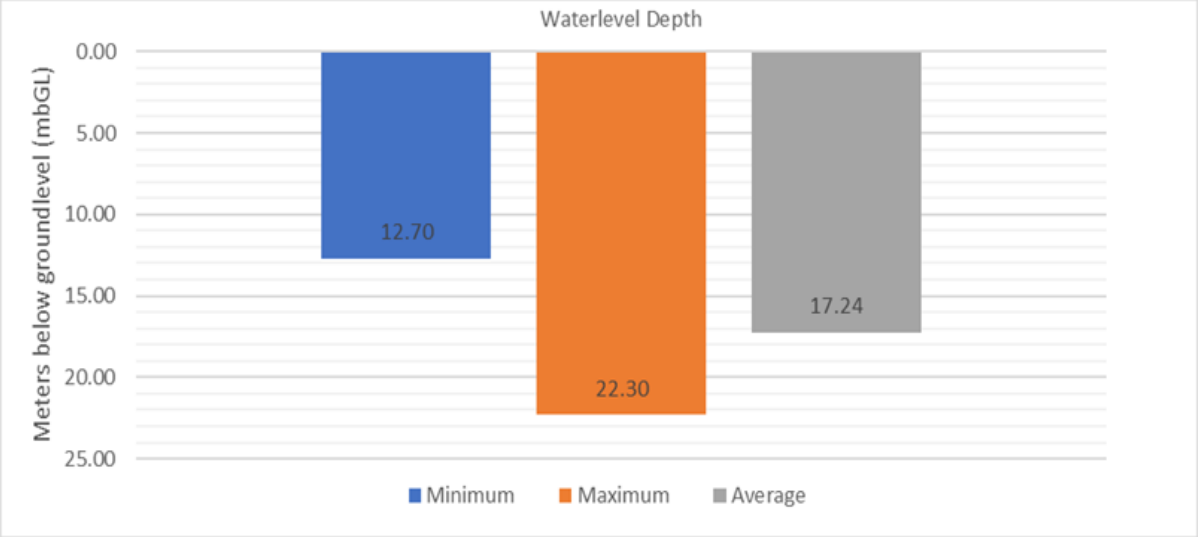


Figure 15: Water level statistic graph for Rietfontein Plant Operation hydrocensus

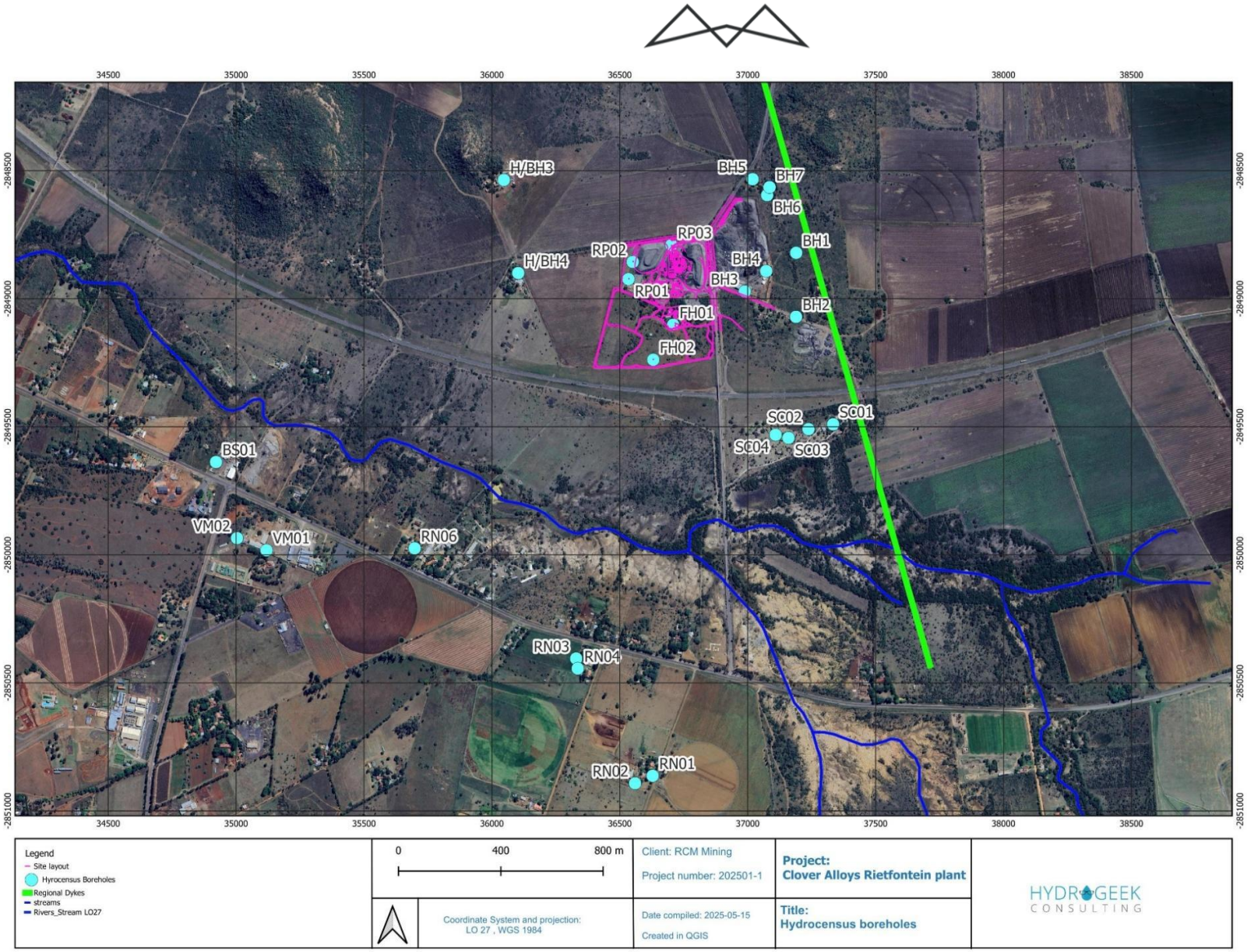


Figure 16: Hydrocensus locations

4.4.4 PUMP TESTING AND AQUIFER CHARACTERISTICS

Pump testing was conducted on the production boreholes at the Rietfontein Plant to characterise the hydraulic properties of the underlying fractured aquifer and to determine sustainable abstraction rates in support of ongoing operations and the proposed Water Use Licence amendment. The results provide site-specific information on aquifer transmissivity, storativity, borehole performance, and drawdown behaviour, and form a critical component of the groundwater assessment by informing abstraction management, impact evaluation, and the design of appropriate monitoring and mitigation measures.

4.4.4.1 PURPOSE OF PUMP TESTING

Aquifer pump testing was undertaken on the three production boreholes at the Rietfontein Plant (RP01, RP02 and RP03) to characterise the hydraulic properties of the fractured bedrock aquifer, determine sustainable abstraction yields, and inform groundwater management and licensing decisions. The outcomes of the pump testing support the assessment of groundwater availability, abstraction impacts, borehole interference, and long-term sustainability in accordance with the National Water Act (Act 36 of 1998) and DWS best-practice guidelines.

4.4.4.2 METHODOLOGY

Each borehole was subjected to a standard field-testing programme comprising:

- A step drawdown test (SDT) to assess well efficiency and determine appropriate abstraction rates;
- A constant discharge test (CDT) to evaluate aquifer response under sustained pumping; and
- Recovery monitoring to assess aquifer rebound and boundary effects.

Pump test data were analysed using the Cooper–Jacob straight-line approximation, which is appropriate for fractured aquifers with predominantly radial flow behaviour. Time–drawdown and recovery responses were evaluated to derive aquifer transmissivity (T), storativity (S), and sustainable abstraction rates.

4.4.4.3 PUMP TEST RESULTS AND AQUIFER PARAMETERS

The pump test results indicate that groundwater occurrence at the site is controlled by discrete fracture networks within the mafic rocks of the Rustenburg Layered Suite, with variable transmissivity and storage characteristics across the three boreholes. The result of the pump tests are summarised in Table 11 below. Table 11: Summary of Pump Test Results and Borehole Abstraction Parameters

Borehole	Borehole Depth (m)	Static Water Level (mbgl)	Transmissivity (m^2/day)	Recommended Yield (L/s)	Duty Cycle (hrs/day)	Pump Inlet Depth (m)	Dynamic Water Level (m)	Critical Water Level (m)	Daily Abstraction (L/day)	Monthly Abstraction (L/month)
RP01	48.43	14.18	4.8	0.5	12	46	18	26	21,600	648,000
RP02	27.08	15.79	9.9	0.6	12	24	18	22	25,920	777,600
RP03	75.79	17.93	3.8	0.4	12	64	28	34	17,280	518,400
Total	—	—	—	1.5	—	—	—	—	64,800	1,944,000

4.4.4.4 INTERPRETATION OF RESULTS

RP02 exhibited the highest transmissivity (9.9 m^2/day) and storativity, indicating intersection with a more productive fracture network and improved aquifer storage. This borehole demonstrates stable drawdown behaviour, rapid recovery, and good resilience to sustained abstraction, and is considered the most robust production borehole on site.

RP01 shows moderate transmissivity (4.8 m^2/day) and consistent recovery behaviour, indicating a stable groundwater source suitable for routine abstraction under controlled operating conditions.

RP03 displays the lowest transmissivity (3.8 m^2/day) and low storativity, suggesting a more limited fracture-controlled groundwater source. While operationally viable, this borehole is more sensitive to sustained abstraction and should be managed conservatively, with abstraction rates maintained within the recommended operational limits.

Overall, the pump test results confirm that groundwater abstraction at the Rietfontein Plant is feasible, provided abstraction is cyclic, monitored, and managed adaptively.

4.4.4.5 SUSTAINABLE ABSTRACTION AND BOREHOLE INTERFERENCE

Average sustainable abstraction rates derived from the Cooper–Jacob analysis indicate that combined abstraction across all three boreholes must be managed to avoid cumulative drawdown impacts. The spatial separation of the boreholes reduces the likelihood of significant borehole interference; however, abstraction sustainability remains contingent on adherence to duty cycles, abstraction limits, and ongoing monitoring.

Total planned abstraction of approximately 64.8 m^3/day (≈1.94 ML/month) is considered conditionally sustainable, subject to the implementation of a groundwater monitoring network and adaptive management measures.

4.4.5 GROUNDWATER QUALITY

Water quality monitoring indicates:

- Elevated electrical conductivity (EC) and chromium (Cr) concentrations in borehole FH02, located downgradient of the plant.
- Nitrate and sulphate exceedances in some boreholes, suggesting contamination from mining activities.

A Piper diagram analysis indicates magnesium-bicarbonate water types, typical of recently recharged groundwater.

4.4.6 NUMERICAL MODELLING AND IMPACT ASSESSMENT

A 3D finite element groundwater flow and contaminant transport model was developed using FEFLOW. Key findings include:

- The abstraction boreholes create a cone of depression that captures the pollution plume from existing and future stockpiles.
- The pollution plume remains within the site boundary under current and future scenarios (2023–2036).
- The lined Pollution Control Dam (PCD) shows negligible impact on groundwater quality.

The model was calibrated using observed water levels and showed good correlation (R^2 = 89.94%). A steady-state water balance confirmed zero net error, indicating model reliability.

4.4.7 RISK ASSESSMENT

The groundwater risk assessment identified the following:

- Current risks: Chrome contamination (FH02), potential drawdown impacts on private users.
- Future risks: Seepage from waste rock dumps and abstraction-induced drawdown.

- Mitigation measures reduce significance from “High-Medium” to “Medium-Low”.

4.4.8 MONITORING AND MANAGEMENT MEASURES

The following actions are recommended:

- Install calibrated flow meters on all abstraction boreholes.
- Conduct 48–72-hour aquifer tests on RP01–RP03 to determine sustainable yields.
- Expand the monitoring network to include:
    - Existing boreholes: FH01, FH02, H/BH4
    - New boreholes: RP04–RP09 (strategically located upgradient, downgradient, and near infrastructure)
- Quarterly water quality monitoring for:
    - Physical parameters: pH, EC, TDS, hardness
    - Macro-elements: SO_4, NO_3, Cl, F, Ca, Mg, K, Na
    - Micro-elements: Al, Fe, Mn, Cd, Cr, Cu, Ni, Pb, Co, Zn
- Monthly water level monitoring and reporting to DWS as per WUL conditions.

4.5 POTENTIAL POLLUTION SOURCE IDENTIFICATION

The Rietfontein Chrome Plant, located within the A22H catchment, presents several potential sources of pollution that may impact both groundwater and surface water resources in the surrounding environment. These sources have been identified through hydrocensus data, water quality analyses, and numerical modelling exercises.

4.5.1 CHROME PROCESSING ACTIVITIES

The plant’s core operations involve crushing, screening, and washing of chrome-bearing ore. These activities generate tailings and process water that contain elevated concentrations of Total Dissolved Solids (TDS), Electrical Conductivity (EC), and Chromium (Cr). Improper handling or containment of these materials can lead to seepage into the shallow aquifer and surface runoff into nearby watercourses.

4.5.2 STOCKPILE AREAS

Two existing stockpile areas (east and west of the plant) have been identified as significant contributors to potential pollution. Numerical modelling indicates that pollution plumes originating from these stockpiles have already reached abstraction boreholes, with elevated TDS levels observed. Future expansion of these stockpiles may exacerbate the risk if not properly managed.

4.5.3 STORMWATER RUNOFF

The plant is situated approximately 1 km from the Sandspruit, a tributary of the Hex River. During high rainfall events, contaminated surface runoff from operational areas may enter the Sandspruit, posing a risk to downstream water quality. Borehole FH02, located downgradient of the plant, has shown elevated Chrome concentrations (0.4 mg/L), exceeding the SANS 241:2015 acute health limit of 0.05 mg/L.

4.5.4 HYDROCARBON STORAGE AND HANDLING

The storage and handling of hydrocarbons on-site, including diesel and lubricants, presents a risk of soil and groundwater contamination through accidental spills or leaks. Although mitigation measures are in place, past poor stormwater management practices have increased the vulnerability of the aquifer to such incidents.

4.5.5 WASTEWATER SUMP AND TAILINGS CONTAINMENT TANKS

The plant includes a sump and tailings containment tanks that collect wastewater from processing activities. These structures, if inadequately lined or maintained, may allow seepage of contaminated water into the subsurface, contributing to aquifer degradation.

4.5.6 POLLUTION CONTROL DAM (PCD)

A lined Pollution Control Dam has been proposed to manage dirty water runoff. While modelling suggests minimal impact from the PCD itself, its effectiveness depends on proper design, maintenance, and integration with clean and dirty water separation systems.

4.6 SOCIO-ECONOMIC ENVIRONMENT

The plant is located in Ward 32, and directly adjacent to Ward 35 and 33 of the Rustenburg Local Municipality (RLM) which falls under the Bojanala Platinum District Municipality (BPDM) of the North West Province.

4.6.1 BOJANALA PLATINUM DISTRICT MUNICIPALITY

The Bojanala Platinum District Municipality forms one of the four District Municipalities of the North West Province, and covers an area of approximately 18 300km^2. The neighbouring municipalities include Waterberg District Municipality in Limpopo, the West Rand District and Tshwane Metropolitan Municipalities in Gauteng, as well as the Ngaka Molema and Dr. Kenneth Kaunda District Municipalities of the North West Province. Five Local Municipalities fall within the BPDM including Madibeng, Rustenburg, Kgetlengrivier and Moses Kotane Local Municipalities. The seat of the BPDM is the city of Rustenburg in the Rustenburg Local Municipality. Due to the BPDM's rich source of mining minerals, especially the platinum group metals, mining is a large contributor to the BPDM's economy, as well as other industries such as agriculture and tourism.

4.6.2 RUSTENBURG LOCAL MUNICIPALITY

The Rustenburg Local Municipality (RLM) covers an area of 3 423km2 within the Bojanala Platinum District Municipality. The Royal Bafokeng Nation is the traditional tribal community of the northern region of the RLM and covers an area of 1 500km2. Rustenburg is situated approximately 120km from Johannesburg and Thswane, linked by the R24 and the N4 Freeway. Most of the BPDM's platinum mining activities are located in the RLM, mainly within the 'N4 Platinum Development Corridor' that runs from the east of the RLM to the west. The platinum mining belt extends along the northern region of the Magalies Mountain range, from the Pilanesburg area to the City of Tshwane. The urban settlement pattern has been largely controlled by the Platinum mines and a number of informal settlements have been established in this mining region. Rural villages and small towns (mostly under traditional leadership) are located in more northern regions of the municipality (RLM IDP Review 2024/2025, 2024). Settlements such as Tlaseng, Thekwane, Photsaneng, Luka, Phokeng, Chaneng, and Rankelenyane fall under the Bafokeng tribal land (RLM IDP Review 2024/2025, 2024).Land-use

4.6.3 DEMOGRAPHICS

North West has a growing population of 3 804 547. Rustenburg Local Municipality has the highest population density in the North West with a population of 562 315. The working age population (aged between 15 and 64 years old) comprises 71.3% of the population in RLM (Stats SA, 2022).

The most common language spoken in the North West is Setswana (72.8%) followed by Sesotho (5.9%) and Afrikaans (5.2%) (Stats SA, 2022).

Table 12: Population growth rate estimates (sources: Census 2011, Census 2022)

Area	Population (2011)	Population (2022)	Population Growth (% p.a.)
North West Province	3 509 953	3 804 547	0.8

Area	Population (2011)	Population (2022)	Population Growth (% p.a.)
Bojanala Platinum District Municipality	1 507 505	1 624 428	0.7
Rustenburg Local Municipality	549 575	562 315	0.2

4.6.4 ECONOMY

The mining sector is generally the main contributor to economic growth in the North West Province. Figure 17 represents the Gross Value Added (GVA) by Broad Economic Sector for the year 2021 as per the BPDM 2024/2025 Reviewed IDP. The GVA is an indicator of the sectors' contribution to the overall economy. The mining sector in 2021 contributed the most to the economies for the North West, the BPDM and RLM.

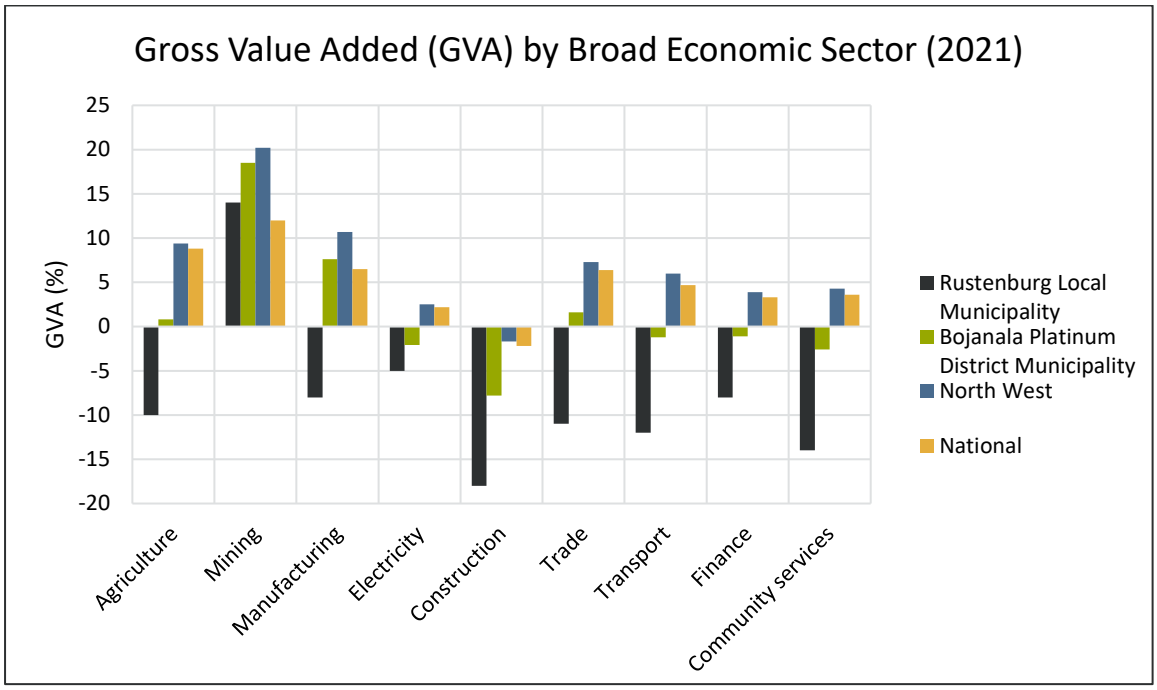


Figure 17: Gross Value Added (GVA) by Broad Economic Sector for the year 2021 (*Data source*: BPDM - 2024/2025 Reviewed IDP, p. 41 - 42)

The Rustenburg Local Municipality contributed 36.30% towards the Bojanala Platinum District Municipality's Gross Domestic Product (GDP) (R158 billion) in 2020 and is forecasted to have an annual GDP growth rate of 3.68% from 2020 to 2025. The GDP of RLM experienced an increase from R38.2 billion in 2010 to R57.3 billion in 2020. The Rustenburg Local Municipality's economy is heavily reliant on the mining sector which contributed to 80.5% (R43.7 billion) of the total Gross Value Added (GVA) of the RLM in 2020, this was followed by the finance (6.2%) and community services (5.0%) sectors. The lowest contributor to the RLM GVA was the agricultural sector (below 1%) in 2020 (RLM IDP Review 2024/2025, 2024).

Key contributors to the inhibition of economic development in the Bojanala Platinum District Municipality include factors such as high rates of unemployment and poverty, social inequality (mainly amongst women, youth and people with disability), limited integration between stakeholders, poor roads infrastructure, shortages of energy and water, among others (BPDM - 2024/2025 Reviewed IDP).

4.6.5 EMPLOYMENT

Rustenburg Local Municipality has shown an increasing trend in unemployment with an unemployment rate of 56.6% recorded for 2021 (BPDM - 2024/2025 Reviewed IDP). Unemployment of the economically active youth population (142,219) was calculated to be at a rate of 34.7% (Stats SA, 2011). In 2020, it was estimated that

12.95% of households in the RLM received an annual income of R30 000 or less (RLM IDP Review 2024/2025, 2024). According to the RLM IDP Review 2024/2025 (2024), 49.1% of the Rustenburg Local Municipality's population is living in poverty.

A key challenge that is experienced by the RLM is that the main economic contributor is the mining sector, leading to a lack of diversity in the economic space, thereby limiting alternative job opportunities (RLM IDP Review 2024/2025, 2024).

4.6.6 INFRASTRUCTURE AND PUBLIC SERVICES

The Rustenburg Local Municipality is currently facing challenges with housing and development of settlements, according to the RLM IDP Review 2024/2025 (2024), there are approximately 400 000 families in Rustenburg that do not have adequate shelter. Of the total 203,658 households in the RLM, 53% of households have access to piped water, and 94.5% of households have access to electricity for lighting (Stats SA, 2022). Local authorities remove refuse from 75.6% of households at least once a week, and 1.6% of households less frequently. 72.8% of households have access to flushing toilets which is followed by 24% of households making use of pit toilets (Stats SA, 2022).

4.6.7 EDUCATION

According to Census 2022, over 31% of the population aged between 5 and 24 years old in the RLM did not attend an educational institution. 3.9% of the population over the age of 20 did not receive schooling, while 42.1% received a matric (Stats SA, 2022).

5 ANALYSIS AND CHARACTERIZATION OF THE WATER USE ACTIVITY

This section provides a detailed analysis of the water use activities associated with the Rietfontein Chrome Plant, situated within the A22H quaternary catchment. The assessment considers both existing and proposed infrastructure, including abstraction boreholes, stormwater management systems, and process water handling. The characterization is based on site-specific hydrocensus data, water use licence conditions, and observed operational practices. Particular attention is given to the nature, volume, and purpose of water use, as well as the potential impacts on surrounding water resources. This analysis forms the basis for evaluating compliance with the National Water Act (Act 36 of 1998) and informs the development of appropriate mitigation and monitoring strategies.

5.1 SITE DELINEATION FOR CHARACTERISATION

The Rietfontein plant is located on Portion 23 and Portion 24 of the Farm Rietfontein 338JQ as indicated in Section 1 of this report The layout and locality are shown in Figure 1, Figure 2 and Figure 3. The site is located in an area dominated by mining and agricultural activities.

5.2 WATER AND WASTE MANAGEMENT

To improve environmental performance and rectify historical non-compliance, Clover Alloys SA (Pty) Ltd proposes a comprehensive water and waste management system for the Rietfontein Chrome Mine Beneficiation Plant. This system is designed to align with the requirements of the National Water Act (Act 36 of 1998) and forms part of the Section 24G rectification application.

The proposed infrastructure includes:

- Dirty water channels and culverts to collect and convey contaminated surface runoff from operational areas.
- A clean water diversion channel to redirect uncontaminated stormwater away from mining and processing zones.
- A Pollution Control Dam (PCD) with a design capacity of 8,000 m^3, intended to contain all dirty water generated on-site for controlled treatment, reuse, or regulated discharge.
- Designated waste storage areas, constructed with impermeable surfaces and bunding, to safely contain solid and hazardous waste and prevent leachate migration.
- A 2.5 km pipeline linking the Rietfontein plant to the main mine, facilitating the transfer of process water and materials. This pipeline will operate as part of an integrated water circuit, reducing reliance on external water sources and improving water reuse efficiency.

The pipeline is of particular importance due to its proximity to HGM 2, a moderately sensitive unchannelled valley-bottom wetland identified as at risk. The pipeline will be constructed above ground where it crosses watercourses.

These interventions are informed by geohydrological assessments, which highlight the site's overlap with a Strategic Groundwater Source Area, and by the Wetland Assessment, which recommends buffers and ecological management objectives to protect sensitive receptors.

Once implemented, the system will enhance water quality protection, reduce sedimentation and erosion risks, and support the long-term ecological integrity of the surrounding aquatic environment. Ongoing monitoring, maintenance, and adaptive management will be essential to ensure effectiveness and compliance with water use licence conditions.

5.3 PROCESS WATER

The Rietfontein Chrome Beneficiation Plant sources its process water primarily from Rand Water, which supplies treated municipal water to the site. This supply is supplemented by groundwater abstraction from three

boreholes located on-site. These boreholes are used to support operational demands, particularly during periods of increased water usage or reduced municipal supply.

Process water is used in the washing and drying of chrome fines and concentrates. The beneficiation process involves a three-stage crushing and screening system, followed by washing to produce high-grade chrome products. Water used in the process is collected in sumps and tailings containment tanks, and is recycled where feasible to reduce consumption.

To improve water management and ensure environmental compliance, the applicant has proposed the construction of a 2.5 km pipeline to transfer tailings and process water from the Rietfontein Plant to the main Rustenburg Chrome Mine. This infrastructure is currently under application and has not yet been constructed.

Additionally, a Pollution Control Dam (PCD) with a design capacity of 8,000 m^3 is proposed to contain dirty water generated during operations. The PCD will receive runoff and process water from operational areas, ensuring that contaminated water is retained and treated before any potential reuse or disposal.

Water quality monitoring and abstraction volume tracking should be undertaken as part of the water management strategy. These measures include quarterly water quality sampling and the installation of flow meters on all abstraction boreholes to ensure accurate monitoring and compliance with water use licence conditions.

5.4 STORMWATER

Stormwater management at the Rietfontein Chrome Beneficiation Plant is designed to prevent contamination of surrounding water resources and ensure compliance with environmental legislation. The system separates clean and dirty water flows to reduce the risk of pollution and improve operational control.

The proposed infrastructure includes a lined Pollution Control Dam (PCD) with a design capacity of 8 000 m^3. This dam will collect all dirty water generated on-site, including runoff from stockpile areas, processing zones, and other operational surfaces. The PCD is designed to retain contaminated water for controlled treatment or reuse, thereby preventing uncontrolled discharge into the environment.

Stormwater will be managed through a network of clean and dirty water channels and culverts. Clean water is diverted away from operational areas to prevent mixing with contaminated flows, while dirty water is directed to the PCD. This separation ensures that uncontaminated stormwater can be safely discharged or reused, while dirty water is contained and managed appropriately.

The system will significantly improve the site's environmental performance by ensuring that runoff is properly managed and that nearby watercourses and wetlands are protected from contamination.

5.5 GROUNDWATER

5.5.1.1 AQUIFERS AND GROUNDWATER OCCURRENCE

The area of interest is located on a fractured and intergranular aquifer, with a successful borehole yield of between 0.5 l/s and 2.0 l/s. According to Barnard (2000), the rocks of the Rustenburg layered suite are characterized by a well-developed igneous layering. The mainly mafic rocks include norite, gabbro, magnetite gabbro anorthosite an pyroxenite. Groundwater occurrence is associated mainly with deeply weathered and fractured mafic rocks. Some of the norite zones weather more easily than other rock types. This characteristic in association with north-south striking dykes that cut through and across the norite, has formed groundwater compartments especially in the area between Rustenburg and Pretoria. The groundwater yield potential is classified as poor as the majority of the boreholes on record produce less than 2l/s. The mafic rocks weather to a clay rich soil that is represented by the well-known black turf. The very low permeability of this soil (in the order of 10-3m/d) is considered to reduce recharge to underlying aquifers. In most cases the hydraulic conductivity of the subsurface would be increased due to mining actives and this would in term mean higher yielding aquifers relating to old and current mine workings.

5.5.1.2 UNSATURATED ZONE – SHALLOW, SAPROLITIC AQUIFER

The main source of recharge into the shallow aquifer is rainfall that infiltrates the aquifer through the unsaturated (vadose) zone. Vertical movement of water is faster than lateral movement in this system as water moves predominantly under the influence of gravity. This aquifer may contain coarse, anorthositic sediment or turf clay sediment when underlain by anorthosite or gabbro-norite respectively. The hydraulic conductivity of this aquifer ranges between 10^{-8} and 10^{-2}m.day^{-1} and porosity ranges between 0.4 and 0.7 for turf clay sediments. The hydraulic conductivity of the coarse, anorthositic sediment can reach up to 20m/day with porosities ranging between values of 0.25 to 0.5.

5.5.1.3 SATURATED ZONE – FRACTURED BEDROCK AQUIFER

Groundwater movement is predominantly associated with secondary structures in this aquifer (fractures, faults, dykes, etc.). The average water level depth in the area ranges between 5 and 40 mbgl. Borehole yields in the Rustenburg Layered Suite fractured aquifers are generally low and can be expected to be between 0.1 and 2 l/s with regional flow resembling flow in the porous medium (i.e. obeying Darcy's law). These formations contain limited quantities of water resources due to the poor storage capacity of the igneous rock. Groundwater quality in the area is also expected to be intermediate to poor with EC values ranging from 4.4 to 120 mS/m and possibly elevated Ca, Mg, Cl, and SO4 as well as carbonate alkalinity concentrations. Both the porosity and the hydraulic conductivity of the Rustenburg Layered Suite fractured aquifers are known to be low. The commonly expected values of porosity and permeability for igneous rock types, similar to those present in the Rustenburg Layered Suite, are 0.05 (porosity) and 10-5 m.d^{-1} (hydraulic conductivity) respectively (Kruseman & de Ridder, 1994). Movement of groundwater in this aquifer will be preferential in secondary structures such as joints, faults and fractures. Dolerite intrusions in the form of dykes and sills are often encountered in this area. The dykes are found to run in a north-northeast / south-southwest direction and pg.

can serve both as aquifers and aquifuges. Thick, unbroken dykes inhibit the flow of water, while the baked and cracked contact zones can be highly conductive. These structures thus tend to dominate the flow of groundwater. Unfortunately, their location and properties are rather unpredictable. Their influence on the flow of groundwater is incorporated by using higher than usual flow parameters for the rocks of the aquifer. According to the groundwater study done by Future Flow (2010) in the direct vicinity of the dyke the weathering depth tends to be more than that of the general valley area due to the effect of fracturing and subsequent higher groundwater recharge and flows associated with the intrusion of the dolerite dyke.

5.5.1.4 WATER STRIKE DEPTHS

Three boreholes were drilled as part of a study in 2023. The findings of the study provide some information on the water strikes and yields encountered. The water strikes ranges from 20- 34 mbgl, at blow yields of 0.1 to 1.2 l/s

5.5.2 WATER QUALITY

Based on previous work in 2017 by Digby Wells Borehole 1 indicates exceedances for magnesium, sulphate and fluoride concentrations based on the IWUL 2017. Additionally, no exceedances based on the SANS Drinking Water Standards or SAWQG for Industrial Use are seen. Potential impact on the groundwater is attributed to activities at Clover Alloys Rietfontein. The Borehole 2 indicate exceedances for conductivity, calcium, magnesium, chloride and sulphate concentrations based on the IWUL for 2017. Additionally for conductivity, total dissolved solids, total hardness and nitrate concentrations based on either the SANS 241:2014 Drinking Water Standards or SAWQG for Industrial Use are exceeded. The exceedance indicates potential impacts associated with the activities at the Rietfontein Plant.

The surface water localities, Sink, Settling and Cement Dam indicate exceedances for conductivity, total dissolved solids, total hardness, ammonium and nitrate concentrations based on either the SANS 241:2014 Drinking Water Standards or SAWQG for Industrial Use. The Settling and Cement Dam shows exceedances for nickel concentrations based on the SANS 241:2014 Drinking Water Standards.

The programme involves monitoring of two abstraction boreholes at the Rietfontein operations for only quality based on this report. The most recent water quality analysis results obtained from Clover Alloys Quarterly

Ground Water Monitoring Report (Fourth Quarter of 2023) are summarised in Table 13 below. No parameters exceeded the SANS guidelines, and the water quality is deemed good.

Table 13: Water quality results obtained during the geohydrology assessment

Variable	Unit	Limit	Borehole ID's	
			RT01	RT02
pH	pH units	7-9	8.01	7.91
Al	mg/l	<0.15	<0.01	<0.01
Ca	mg/l	40-60	37.4	29.9
Cl	mg/l	100	42.95	35.8502
Fe	mg/l	0.1	<0.005	<0.005
Mg	mg/l	30-40	27.38	24.48
Na	mg/l	<100	18.62	17.21
SO4	mg/l	<200	40.07	34.51
NO3	mg/l	<6	30.4	23.2F
F	mg/l	<1	0.143	0.174

5.6 WASTE

The waste management philosophy at the Rietfontein Chrome Plant is based on the hierarchy of prevention, minimisation, reuse, recycling, recovery, and responsible disposal, which underpins the site's approach to managing waste streams in an environmentally sound and legally compliant manner. The facility generates limited waste as part of its beneficiation operations, with waste streams primarily comprising domestic wastewater, general waste, and process-related residuals.

No hazardous waste requiring specialised storage or lined containment facilities is stored on-site. All tailings produced during the chrome beneficiation process are transported to the main Rustenburg Chrome Mine for deposition at licensed waste management facilities, with a proposed pipeline intended to replace the current trucking method. As such, the Rietfontein Plant does not operate any tailings storage facilities or waste disposal infrastructure requiring classification under NEMWA. Stockpiles present on site consist of product material and are not classified as waste.

Domestic wastewater generated from ablution facilities, offices, and staff accommodation is managed through an existing septic tank system located within the plant footprint. The septic tank has an approximate capacity of 517.44 m³ and is authorised as part of the site's water use activities. The system functions as a containment structure for sewage and greywater, preventing direct discharge to the environment. Wastewater is retained within the system to allow for settlement and partial treatment, after which accumulated sludge is periodically removed by a licensed service provider for disposal at an approved facility.

The septic tank system forms part of the broader wastewater management framework at the site, which also includes settling dams and stormwater control infrastructure designed to separate clean and contaminated water. The system is operated and maintained to ensure structural integrity and adequate capacity, with routine inspections undertaken to prevent leakage, overflow, or system failure. The management of the septic system

is aligned with the conditions of the Water Use Licence and is supported by the site's monitoring programme to ensure that no contamination of surrounding soils or groundwater occurs.

General waste generated on-site is limited in volume and is collected and removed by licensed waste contractors for disposal at authorised municipal landfill facilities. Waste handling practices are implemented to ensure that waste is stored, handled, and transported in a manner that prevents pollution, nuisance, and environmental degradation.

Overall, waste generation at the Rietfontein Plant is limited, and the management approach is focused on off-site disposal of process waste, containment of domestic wastewater within the septic system, and the implementation of appropriate handling and disposal practices for general waste, ensuring compliance with applicable environmental legislation and minimising potential impacts on the receiving environment.

5.7 OPERATIONAL & ORGANISATIONAL MANAGEMENT

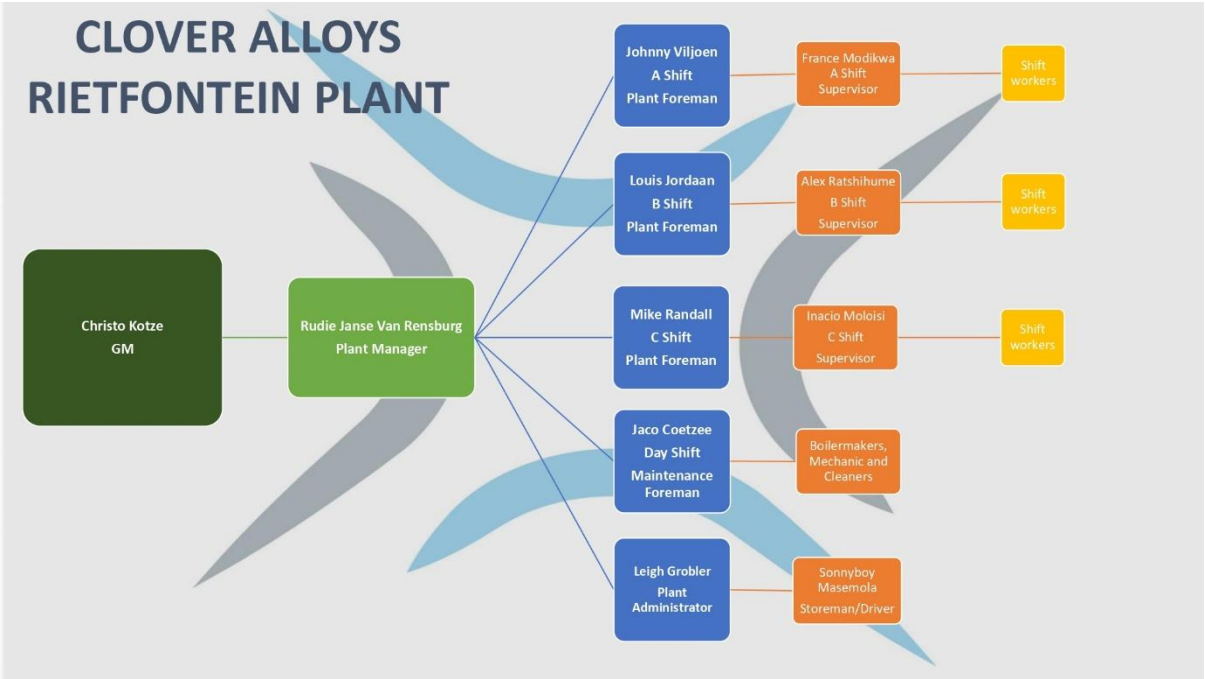
Rietfontein plant has a Safety, Health and Environmental Policy (SHE). The Management of the plant believes it is the fundamental right of each employee, as well as persons who are not employees but who may be directly affected by the activities at the plant, to have their Health and Safety protected.

The commitment of the HSE policy for the plant commits to the following:

- Identify and manage SHE risks and impacts associated with their operations;
- Setting and defining SHE objectives and targets and providing the necessary resourced to support these;
- Establish competence and awareness regarding SHE matters to all employees and contractors through training and communication;
- Strive to eliminate incidents and prevent pollution through proper maintenance of company property, safeguarding of the work environment and continual monitoring; and
- Conserve natural resources and reduce impacts associated with waste generation, effluent discharge and water quality.

The communication structure for the plant is shown in Figure 18 below.

Figure 18: Organisational structure of the Rietfontein plant.



5.8 ENVIRONMENTAL AWARENESS PLAN

Clover Alloys has developed Environmental, Health and Safety Policies which are implemented at the Rietfontein plant. The Environmental Policy will be communicated to all personnel, whether they are contractors or permanent staff, and the policy will be erected at the mining site. Employees will receive general environmental awareness training on specific items contained in this EMPr, as well as on Best Possible Environmental Practices (BPEP).

5.8.1 MECHANISM FOR RAISING AWARENESS OF ENVIRONMENTAL ISSUES.

Environmental Awareness Training will be undertaken to make employees and contractors aware of the following:

- The significant social and environmental impacts of their work activities and the environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirements of the environmental management system;
- The potential consequences of departure from specified operating procedures; and
- Possible archaeological finds action steps for mitigation measures, surface collections, excavations and communication routes to follow in the case of a discovery.
- The guidelines for training are summarised below (Table 14), which are in line with the ISO 14001:2004 guidelines with regards to training and awareness creation.

Table 14: Skills development guidelines

Types of Training	Audience	Purpose
Raising awareness of the strategic importance of environmental management	Senior management	To gain commitment and alignment to the organisation's environmental policy.
Raising general environmental awareness	All employees	To gain commitment to the environmental policy and objectives and to instil a sense of individual responsibility.
Skill enhancement	Employees with environmental responsibilities	To improve performance in specific tasks.
Compliance	Employees whose actions can affect compliance	To ensure that regulatory and internal requirements for training are met.

The training programme will consist of the following elements:

- Identification of employee training needs;
- Development of a training plan to address defined needs;
- Verification of conformance of the training programme to regulatory or organisational requirements and standards;
- Training of target employee groups;
- Documentation of training received; and

- Evaluation of training received.

It is also recommended that a copy of the EMPr and EA be kept on site at all times. This forms an integral part of awareness raising. Furthermore, the conditions contained in both the EA and EMPr should be included in induction of any new staff or contractors on site to ensure that all work is carried out with environmental considerations and legal requirements.

This training will be undertaken on an annual basis for all personnel, together with the annual required induction programmes. The training material provided will be subject to annual review, based on issues such as incidents, accidents, new legislative requirements, modified processes and environmental and social aspects identified from time to time. This training is to be carried out and coordinated internally by Clover Alloys will, therefore, develop the capabilities and support mechanisms necessary to achieve its environmental policy, objectives and targets. In addition, an Emergency Preparedness Plan will be communicated and trained to all site personnel during the induction process.

5.8.2 MANNER IN WHICH RISKS WILL BE DEALT WITH

Unplanned events may occur during the project that may have potential impacts, which will need mitigation and management measures to be implemented. The unplanned events that may happen at the Project site and the proposed mitigation plan are listed in Table 15. An Emergency Response Plan has been developed and is the approach used by Clover Alloys to respond to risks that may pollute or degrade the environment during operational and closure and rehabilitation phases.

Table 15: Unplanned Events, Risks and their Management Measures

Unplanned event	Potential Impact	Mitigation/ Management/ Monitoring
Spillage from moving machinery.	Water and soil contamination	Machines must be checked and maintained regularly and serviced at designated service bays; Access roads and haul roads must be maintained regularly; Ensure emergency clean-up response plans are in place and that hydrocarbon spill kits must be available on-site at all locations where hydrocarbon spills could take place; If a spill occurs, it is to be cleaned up immediately (spill kits) and for major spills should be reported to the authorities; Contractors must ensure that all employees are aware of the procedure for dealing with spills and undergo training on site; and Contaminated soils must be disposed in a registered and licensed waste facility.
Erosion, sedimentation and loss of soil due to flash floods		Implement concurrent rehabilitation; Rip rehabilitated areas to 300 mm to increase infiltration rate and improve soil aeration before reseeding; Re-seed and re-vegetate the area directly after topsoil has been replaced and landscaped; and Make use of sediment traps to prevent sediment entering watercourses.

Unplanned event	Potential Impact	Mitigation/ Management/ Monitoring
Hazardous material spillage		An emergency response plan; and spill kits should be in place and accessible to the responsible monitoring team in case of pipeline bursts. The Material Safety Data Sheets (MSDS) should be kept on site for the Life of Mine for anytime reference in terms of best practice guidelines for handling, storage and disposal of materials.
Hydrocarbon spillage from vehicles		If leak occurs from vehicle, place drip trays below the leak; All vehicles are to be serviced on concrete areas and off site; and Machines must be parked upon hard parking surfaces and checked daily for leaks.
Infrastructure malfunction leading towards dirty water spillage or spontaneous combustion	Habitat destruction and contamination	All infrastructure, machinery and associated setups are to be serviced and checked throughout the project life cycle; All staff are to be informed about potential hazards and consequently prepared for malfunctioning; Protocols are to be induced at every phase of the project life cycle; and If such hazards were to incur, the appropriate authorities are to be notified and the incident recorded.
Excess dust pollution	Poor air quality	Excess dust in mining areas is mitigated via various methods and are site specific. The recommended methods for this site would be spraying of water, tackifiers and soil stabilisers that do not harden the soils.
Extreme wind erosion event		Minimise exposed areas prone to erosions to avoided source(s) during such episode. Conduct mining and concurrent rehabilitation in phases
Increased antisocial behaviours associated with presence of mine followers such as prostitution, illegal gambling, illegal shebeens, drug uses, etc.	Social issues	Collaborate with the relevant government offices and partners to manage the increase in antisocial behaviours.

Unplanned event	Potential Impact	Mitigation/ Management/ Monitoring
Hazardous material spillage	Accidental Spillages	An emergency response plan and spill kits should be in place and accessible to the responsible monitoring team in case of pipeline bursts. The Material Safety Data Sheets (MSDS) should be kept on site for the Life of Mine for anytime reference in terms of best practice guidelines for handling, storage and disposal of materials.
Hydrocarbon spillage from vehicles		If leak occurs from vehicle, place drip trays below the leak; All vehicles are to be serviced on concrete areas and off site; and Machines must be parked upon hard parking surfaces and checked daily for leaks.
Infrastructure malfunction leading towards dirty water spillage or spontaneous combustion	Habitat destruction and contamination	All infrastructure, machinery and associated setups are to be serviced and checked throughout the project life cycle; All staff are to be informed about potential hazards and consequently prepared for malfunctioning; Protocols are to be induced at every phase of the project life cycle; and If such hazards were to incur, the appropriate authorities are to be notified and the incident recorded.
Excess dust pollution	Poor air quality	Excess dust in mining areas is mitigated via various methods and are site specific. The recommended methods for this site would be spraying of water, tackifiers and soil stabilisers that do not harden the soils.
Extreme wind erosion event		Minimise exposed areas prone to erosions to avoided source(s) during such episode. Conduct mining and concurrent rehabilitation in phases
Increased antisocial behaviours associated with presence of mine followers such as prostitution, illegal gambling, illegal shebeens, drug uses, etc.	Social issues	Collaborate with the relevant government offices and partners to manage the increase in antisocial behaviours.

5.9 INTERNAL AND EXTERNAL COMMUNICATION

5.9.1 INTERNAL COMMUNICATION

Water targets should be reported on a monthly basis by the Rietfontein Plant Environmental Manager. The results from the monitoring and comparison of actual water use to the targets should be included in monthly water reports, which are distributed to all the responsible environmental personnel.

Surface and groundwater monitoring reports should be compiled based on the requirements of the EMP/WUL to assess their impacts on the natural water resources.

Environmental improvements, monthly inspection findings and incidents should be included in monthly environmental management reports, which are distributed to all responsible environmental personnel. The internal communication process for environmental issues should be implemented as per the communication structure shown in Figure 18. The success of the communication strategy is dependant on the suitable training and education of staff in environmental awareness and therefore communication and awareness raising are integrally linked.

5.9.2 EXTERNAL COMMUNICATION

The reporting of incidents that have the potential to cause or have caused water pollution or pollution to the environment, health risks are undertaken. Records of all incidents and system malfunctions which may result in the pollution of the water resources are reported to DWS. The incidents are recorded by the individual business units and a summary report of all incidents is compiled and submitted to the Environmental Management Department on a monthly basis.

The external communication process for environmental issues is presented in Figure 18.

5.10 AWARENESS RAISING

The purpose of the Environmental Awareness Plan is to outline the methodology that are used to inform Clover Alloy staff of environmental risks that may result from the working environment, and the manner in which these risks will be dealt with in order to reduce the potential degradation of the environment.

5.10.1 COMMUNICATION STRATEGY

The communication of the environmental risks for each phase of the project will take place at local training centres with personnel from both the administrative and mine worker sectors of the mine. Environmental communications such as monthly talk topics are displayed on notice boards on surface and underground.

5.10.2 EVALUATION OF THE ENVIRONMENTAL AWARENESS PLAN

The evaluation of the Environmental Awareness Plan will be conducted by either the management or qualified sub-contractors sourced by the plant. This evaluation will entail the auditing of the operation in both the construction and operation phases once activity has commenced.

The proponent described above will make all those involved with the project aware of the risks that may occur, as well as the necessary mitigation required to minimise these risks. This awareness plan displays that Clover Alloys is serious about the environment's wellbeing, empowerment of the local people and returning the land to the appropriate use in the future. Environmental issues will be highlighted at regular meetings scheduled at the mine through monthly talk topics.

6 MONITORING AND CONTROL

This section will discuss measures to be implemented for the monitoring and control where necessary to ensure that the project does not prove detrimental to the baseline environment. Monitoring requirements should be refined to satisfy the conditions of the IWWMP, WUL and EMPr.

6.1 SURFACE WATER MONITORING

6.1.1 PURPOSE AND OBJECTIVES

The purpose of surface water monitoring at the Rietfontein Plant is to:

- Detect and manage potential contamination from operational activities.
- Assess the effectiveness of stormwater management infrastructure (e.g. Pollution Control Dam, dirty and clean water channels).
- Ensure compliance with the National Water Act (Act 36 of 1998) and relevant water use licence conditions.
- Protect downstream water resources, including wetlands and valley bottom systems, from sedimentation, erosion, and pollution.

6.1.2 MONITORING RATIONALE

The Hydropedological and soil assessments identified several hydropedological flow paths (recharge, interflow, and responsive saturated zones) that are sensitive to surface disturbances. The terrestrial biodiversity assessment further confirmed the presence of water resource habitats and wetland features within the project area. These systems are vulnerable to:

- Increased overland flow and erosion from compacted or sealed surfaces.
- Disruption of lateral and return flows due to infrastructure placement.
- Potential contamination from hydrocarbons, sediment, and process water.

6.1.3 MONITORING LOCATIONS

Surface water monitoring points should be established at the following strategic locations:

- Upstream and downstream of the Pollution Control Dam (PCD) where feasible.
- Discharge points of clean and dirty water channels.
- Inflow and outflow points of any identified wetlands or valley bottom systems.
- Runoff collection points near stockpiles, haul roads, and the beneficiation plant.

6.1.4 MONITORING PARAMETERS

The following parameters should be monitored at each surface water point:

- Physio-chemical: pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Temperature, Turbidity.
- Nutrients: Nitrate, Ammonia, Phosphate.
- Metals: Chromium (total and hexavalent), Iron, Manganese.
- Microbiological: E. coli (if sewage infrastructure is present).
- Sediment load: Total Suspended Solids (TSS).

6.1.5 MONITORING FREQUENCY

- Baseline monitoring: Monthly for a minimum of three months prior to construction or expansion activities.
- Construction phase: Monthly.
- Operational phase: Quarterly, or as stipulated in the Water Use Licence.
- Post-decommissioning: Bi-annually for at least two years to assess rehabilitation success.

6.1.6 DATA MANAGEMENT AND REPORTING

- All monitoring data must be recorded in a central database and compared against applicable South African Water Quality Guidelines and licence limits.
- Any exceedances must trigger an internal investigation and corrective action.
- Results must be included in the annual IWWMP performance report and submitted to the Department of Water and Sanitation (DWS) as required.

6.1.7 ADAPTIVE MANAGEMENT

- Monitoring results should inform adaptive management of stormwater infrastructure, erosion control measures, and rehabilitation plans.
- If significant changes in flow patterns or water quality are detected, additional mitigation (e.g. constructed wetlands, infiltration basins) may be required.

6.2 GROUNDWATER MONITORING

Groundwater monitoring remains a central component of the environmental management strategy at the Rietfontein Plant due to the site's location within a fractured and intergranular aquifer system of the Rustenburg Layered Suite and its proximity to sensitive receptors, most notably the Sandspruit, a tributary of the Hex River. The aquifer has been classified as a minor aquifer system with medium vulnerability, characterised by shallow groundwater levels and low storage capacity.

The updated geohydrological assessment and numerical groundwater modelling (Appendix 4, April 2026) confirm that historical and current mining-related activities have resulted in localized groundwater quality impacts, particularly downgradient of the plant. However, modelling results indicate that the existing abstraction regime at boreholes RP01, RP02 and RP03 creates a cone of depression that effectively captures and contains the contaminant plume within the plant footprint, thereby limiting off-site migration under current and proposed operating conditions.

This section is informed by the updated conceptual and numerical groundwater model and associated field investigations, including the 2025 hydrocensus, geophysical surveys, drilling programme, aquifer testing, and contaminant transport modelling.

6.2.1 MONITORING OBJECTIVES

The primary objectives of the groundwater monitoring programme are to:

- Track groundwater abstraction volumes and water level responses to confirm sustainable use of the fractured aquifer system;
- Detect and quantify changes in groundwater quality, with specific focus on identified constituents of concern, including Electrical Conductivity (EC), Total Dissolved Solids (TDS), nitrates, sulphates, and chromium;
- Verify the effectiveness of mitigation measures, particularly the lined Pollution Control Dam (PCD), clean/dirty water separation infrastructure, and improved stormwater management;

- Confirm model predictions that indicate containment of contaminant plumes within the abstraction capture zone;
- Provide data to support regulatory compliance with Water Use Licence (WUL) conditions and enable adaptive groundwater management; and
- Refine and validate the numerical groundwater model through ongoing integration of monitoring data.

6.2.2 CURRENT STATUS

Groundwater abstraction is currently undertaken from three operational production boreholes: RP01, RP02 and RP03, which supply water for industrial processes at the plant. Aquifer testing has confirmed sustainable abstraction yields ranging between 0.4 and 0.6 ℓ/s per borehole, subject to controlled duty cycles.

A hydrocensus conducted in February 2025 identified several boreholes downgradient of the plant, including FH01 and FH02, with elevated total chromium concentrations recorded at FH02, confirming historical groundwater quality impacts. Groundwater flow has been shown to broadly mimic surface topography, with flow directed south to south-east toward the Sandspruit.

Since the previous assessment, the groundwater monitoring network has been significantly expanded (Figure 19). Four dedicated monitoring boreholes (RM04, RM05, RM06 and RM07) were drilled in April 2026 based on targeted electrical resistivity tomography (ERT) surveys. These boreholes provide improved upgradient, on-site and downgradient coverage relative to the plant, stockpiles and PCD.

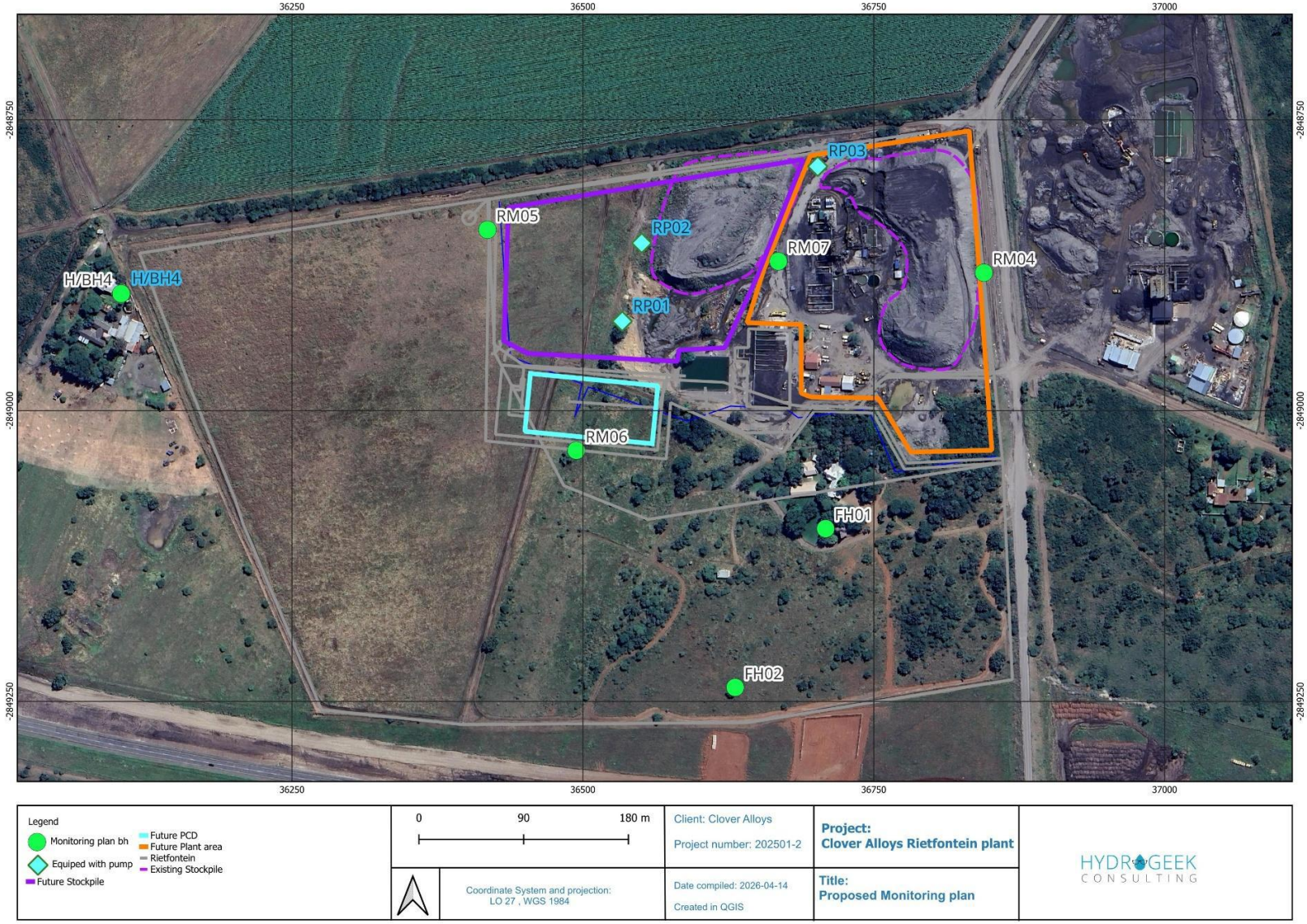


Figure 19: Groundwater monitoring plan.

6.2.3 PROPOSED MONITORING MEASURES

Based on the updated geohydrological assessment and numerical modelling, the following monitoring measures shall be implemented and maintained:

- Monthly monitoring of abstraction volumes and groundwater levels at all abstraction boreholes (RP01–RP03) and monitoring boreholes (RM04–RM07, FH01, FH02, and H/BH4), using calibrated flow meters and water level loggers where practicable.
- Quarterly groundwater quality sampling at abstraction and monitoring boreholes for the following parameter groups:
    - Physical and Aesthetic: pH, EC, TDS, Total Hardness
    - Macro Elements: Alkalinity, Sulphate, Nitrate, Chloride, Fluoride, Calcium, Magnesium, Sodium, Potassium
    - Trace Elements: Chromium (total and Cr(VI)), Nickel, Iron, Manganese, Lead, Cadmium, Zinc and associated metals.
- Maintenance of the expanded monitoring network, including:
    - Abstraction boreholes: RP01, RP02, RP03
    - Monitoring boreholes: RM04, RM05, RM06, RM07
    - Off-site/down-gradient reference boreholes: FH01, FH02 and H/BH4.
- Aquifer testing of newly drilled monitoring boreholes (12-hour tests) to refine hydraulic parameters and improve confidence in numerical model calibration.
- Ongoing review and interpretation of monitoring data to validate contaminant transport predictions and confirm plume containment assumptions.
- Integration of monitoring data into periodic updates of the groundwater flow and contaminant transport model to support adaptive management.
- Preparation and submission of compliance monitoring reports to the Department of Water and Sanitation, in accordance with WUL requirements.

6.2.4 RISK CONTEXT

Numerical modelling conducted as part of the groundwater impact assessment confirms that the pollution plume from existing and future stockpiles can be contained through current abstraction practices. However, the presence of contaminants in downgradient boreholes highlights the need for continuous monitoring and adaptive management.

6.2.5 INTEGRATION WITH SITE MANAGEMENT

Groundwater monitoring results should be integrated into environmental management meetings and used to inform operational decisions, infrastructure upgrades, and stakeholder reporting. The programme will also support compliance with the National Water Act (NWA) and the conditions of any amended water use licence.

6.3 BIO MONITORING

Bio monitoring at the Rietfontein Chrome Beneficiation Plant is focused on assessing the health, functionality, and ecological integrity of aquatic and wetland ecosystems within and surrounding the site. The plant is situated in a sensitive ecological landscape that includes delineated wetlands, drainage features, and strategic water source areas, all of which provide essential ecosystem services and are vulnerable to mining-related impacts.

6.3.1 ASSESSMENT TOOLS AND METHODOLOGIES

Specialist studies conducted as part of the current applications included detailed wetland delineation, classification, and ecological assessments. The following tools and methodologies were applied:

- WET-EcoServices methodology (Kotze et al., 2008): Used to evaluate ecosystem services such as sediment trapping, nutrient assimilation (phosphate and nitrate), toxicant assimilation, erosion control, and biodiversity support.
- Present Ecological State (PES) scoring: Wetlands were classified between "D – Largely Modified" and "E – Seriously Modified", indicating significant historical and current impacts.
- Ecological Importance and Sensitivity (EIS) assessment: Wetlands were rated from moderate to high importance, with overlaps into Strategic Water Source Areas (SWSAs), Ecological Support Areas (ESAs), and Critical Biodiversity Areas (CBAs).

6.3.2 MONITORING OBJECTIVES

The bio monitoring programme aims to:

- Track changes in wetland health and ecological function over time.
- Evaluate the effectiveness of mitigation measures such as buffer zones and stormwater controls.
- Inform adaptive management and rehabilitation planning.
- Support compliance with the National Environmental Management Biodiversity Act (NEMBA) and water use licence conditions.

6.3.3 PROPOSED MONITORING MEASURES

Although no formal bio monitoring programme is currently in place, the following measures are proposed:

- Seasonal wetland health assessments using PES and EIS scoring.
- Monitoring of aquatic biodiversity indicators, including vegetation composition, habitat condition, and presence of invasive species.
- Verification of buffer zone integrity and effectiveness in protecting wetland features.
- Integration of bio monitoring results into monthly environmental management meetings and annual reporting.

These measures will ensure that the ecological integrity of the site is maintained and that any degradation is identified and addressed promptly. Bio monitoring supports broader sustainability goals and demonstrates Clover Alloys' commitment to responsible environmental stewardship.

6.4 RISK ASSESSMENT / BEST PRACTICE ASSESSMENT

A formal risk assessment was conducted for the Rietfontein Plant using the Department of Water and Sanitation (DWS) Risk Assessment Matrix (RAM), as part of the wetland specialist study supporting the Section 24G application. This assessment evaluated the potential impacts of existing and proposed infrastructure on freshwater ecosystems, particularly wetlands and drainage features within the Project Area of Influence (PAOI). The RISK matrix is included as Appendix 3

6.4.1 DWS RISK ASSESSMENT MATRIX

The RAM evaluates risk based on two dimensions: consequence and likelihood of impact. The resulting significance score is classified into three risk categories:

Table 16: Risk categories

Rating	Class	Management Description
1–29	Low (L)	Acceptable as is or with proposed mitigation. Impacts are small and easily mitigated.
30–60	Moderate (M)	Notable impacts requiring specialist input and higher-level mitigation. Licence required.
61–100	High (H)	Long-term, large-scale impacts that threaten watercourse integrity. Licence required.

6.4.2 FINDINGS

The risk assessment applied to the proposed infrastructure—including the Pollution Control Dam (PCD), clean and dirty water channels, and pipeline crossings—indicated that:

- Most wetland features are located outside the direct footprint of proposed infrastructure and were assessed as Low Risk.
- One wetland unit (HGM 2), which will be traversed by the proposed pipeline, was classified as At Risk, requiring mitigation and licensing.
- Artificial features and preferential flow paths were not considered ecologically functional and were excluded from risk scoring.

These findings support the conclusion that, with appropriate mitigation, the proposed infrastructure poses a low to moderate risk to freshwater ecosystems.

6.4.3 BEST PRACTICE MEASURES

To ensure risks remain within acceptable limits, the following best practice measures are recommended:

- Implementation of buffer zones around delineated wetlands, adjusted based on pre- and post-mitigation scenarios.
- Construction of a lined PCD to contain dirty water and prevent seepage into adjacent wetlands and groundwater.
- Design of clean and dirty water separation infrastructure to manage stormwater effectively.
- Avoidance of direct infrastructure placement within sensitive wetland areas where feasible.
- Monitoring of wetland health using PES and EIS scoring to track ecological changes over time.
- Inclusion of wetland sensitivity and risk findings in the Environmental Management Programme (EMPr) and Water Use Licence Application (WULA).

These measures align with the mitigation hierarchy and ensure that the plant operates in a manner that is environmentally responsible and compliant with DWS requirements.

7 PUBLIC PARTICIPATION

7.1 OBJECTIVES OF THE PUBLIC PARTICIPATION

South Africa, being one of the countries with the most progressive constitutions, enshrined the public's right to be involved in decisions that may affect them in its Constitution. Section 57(1) of the new Constitution that provides: "*The National Assembly may (b) make rules and orders concerning its business, with due regard to representative and participatory democracy, accountability, transparency and public involvement".* This provision, along with several others gave rise to many new trends in South African legislation. In environmental legislation, the idea of public participation (or stakeholder engagement) features strongly and especially the National Environmental Management Act (Act 107 of 1998, NEMA) and the recent regulations passed under the auspices of this Act makes very strict provisions for public participation in environmental decision-making.

Public participation can be defined as..."*a process leading to a joint effort by stakeholders, technical specialists, the authorities and the proponent who work together to produce better decisions than if they had acted independently*"[1]. From this definition, it can be seen that the input of the public is regarded as very important indeed.

The Public Participation Process (PPP) is designed to provide sufficient and accessible information to Interested and Affected Parties (I&APs) in an objective manner to assist them to:

During the Environmental Authorisation:

- Verify that their issues have been recorded;
- Comment on the findings of the environmental assessments; and
- Provide relevant local information and knowledge to the environmental assessment.

The PPP is a requirement of several pieces of South African Legislation and aims to ensure that all relevant I&APs are consulted, involved and their opinions are taken into account and a record included in the reports submitted to Authorities. The process ensures that all stakeholders are provided this opportunity as part of a transparent process which allows for a robust and comprehensive environmental study. The PPP for the necessary authorisation required for the project needs to be managed sensitively and according to best practises in order to ensure and promote:

- Compliance with international best practice options;
- Compliance with national legislation;
- Establishment and management of relationships with key stakeholder groups; and
- Encouragement of involvement and participation in the environmental study and authorisation/approval process.

As such, the purpose of the PPP and stakeholder engagement process is to:

- Introduce the proposed project and process for the authorisation project;
- Explain the environmental authorisation;
- Determine and record issues, concerns, suggestions, and objections to the project;
- Provide opportunity for input and gathering of local knowledge;
- Establish and formalise lines of communication between the I&APs and the project team;
- Identify all significant issues for the project; and

- Identify possible mitigation measures or environmental management plans to minimise and/or prevent negative environmental impacts and maximise and/or promote positive environmental impacts associated with the project.

This Public Participation Report (PPR) lists all verbal and written issues raised by I&APs during the call to register period from the 17th of March to date. A breakdown of the PPP is given within the remaining sections of this PPR.

7.2 LEGAL COMPLIANCE

The PPP must comply with all environmental legislation that requires public participation as part of an application for authorisation or approval; namely, the National Environmental Management Act (NEMA, Act No. 107 of 1998).

Adherence to the requirements of the above-mentioned Act will allow for an Integrated PPP to be conducted, and in so doing, satisfy the requirements for public participation referenced in the Act. The details of the Integrated PPP are provided below.

7.3 IDENTIFICATION OF INTERRESTED AND AFFECTED PARTIES (I&APS)

An initial I&AP database has been compiled from historic projects in the area, and Windeed searches were conducted to obtain the contact details of the surrounding landowners. The I&APs referred to in the PPR include:

- Pre-identified and registered landowners and surrounding landowners;
- Pre-identified and registered key stakeholders;
- Regulatory authorities;
- Specialist interest groups; and
- All I&APs who responded to the initial notifications and requested to be registered.

Efforts to pre-identify key I&APs involved various avenues such as consultation with the proponent and known landowners within the study area, review of related previously conducted studies, and identification of key interest groups and authorities within the vicinity of the study area and municipality. Refer to Appendix 8 for the Key Stakeholder/I&AP Database.

7.3.1 LIST OF ORGANS OF STATE IDENTIFIED AND NOTIFIED

The following key I&APs, but not limited to, were notified of the proposed project and invited to participate in the public participation process:

- Agricultural Research Council
- Bojanala Platinum District Municipality
- Eskom Soc Ltd
- National Department of Agriculture Land Reform and Rural Development
- National Department of Co-operative Governance and Traditional Affairs
- National Department of Forestry, Fisheries, and the Environment
- National Department of Human Settlements
- National Department of Mineral Resources and Energy (DMRE)
- National Department of Rural Development and Land Affairs
- National Department of Rural Development and Land Reform
- National Department of Tourism
- National Department of Transport
- National Department of Water and Sanitation
- National Energy Regulator of South Africa (NERSA)
- National House of Traditional Leaders
- National Transmission Company of South Africa
- North West Department of Community Safety and Management
- North West Department of Community Safety and Transport Management
- North West Department of Conservation and Tourism
- North West Department of Cooperative Governance and Traditional Affairs
- North West Department of Economic Development
- North West Department of Environment
- North West Department of Human Settlements
- North West Department of Minerals and Energy
- North West Department of Social Development
- North West Department of Water and Sanitation
- North West Department Public Works and Roads
- North West Development Corporation Soc Ltd
- North West Parks Board
- North West Provincial Heritage Resources Authority
- North West Wetland Forum
- Rustenburg Local Municipality
- South African Civil Aviation Authority (SACAA)
- South African Heritage Resources Agency (SAHRA)
- South African National Biodiversity Institute (SANBI)
- South African National Parks (SANPARKs)
- South African National Roads Agency
- South African National Roads Agency (SANRAL)
- Transnet Soc Ltd
- Ward Councillors

7.3.2 LIST OF KEY I&APS IDENTIFIED AND NOTIFIED

Pre-identified and registered landowners and surrounding landowners.

- AgriCulture South Africa (AgriSA).
- BirdLife South Africa
- Botanical Society

- Centre for Environmental Rights
- Conservation South Africa (CSA)
- Council of Geoscience
- Earth Life Africa
- Endangered Wildlife Trust
- Federation for a Sustainable Environment (FSE)
- GroundWork SA
- Mining Affected Communities United in Action (MACUA)
- Mining and Environmental Justice Community Network of South Africa (MEJCNSA)
- Natural Justice
- Wildlife and Environment Society of South Africa (WESSA)

7.4 NOTIFICATION OF INTERRESTED AND AFFECTED PARTIES

This section provides details on the notifications that were distributed as part of the consultation process to date.

7.4.1 INITIAL NOTIFICATION OF KEY I&APS

The PPP commenced between the 24th April 2025 to 1st May 2025 with an initial call to register notification. Notification during this initial consultation was given in the manner described below.

7.4.1.1 EMAILS, REGISTERED MAIL AND FAXES

Notification letters (in English and Afrikaans) were distributed to pre-identified I&APS through either faxes, SMSs, registered mail, and/or emails on the 25th, 26th, 29th April 2025 and the 1st May 2025.

The notification documents included the following information:

- Authorisations required;
- Sufficient detail of the proposed development to enable I&APs to assess/surmise what impact the development will have on them or the use of their land;
- The purpose of the proposed project;
- Details of the application processes associated with proposed activities;
- Details of the affected properties;
- Details of the South African environmental legislation that must be adhered to;
- Contact details of the EAP.

Please refer to Appendix 8 for initial notification and proofs.

7.4.1.2 NEWSPAPER AND GAZETTE ADVERTISEMENTS

Advertisements (in English and Afrikaans) describing the proposed project and Environmental Impact Assessment process were placed in the Rustenburg Herald Newspaper with circulation in the vicinity of the study area on the 25th of April 2025. The Gazette Notice was placed in the North West Provincial Gazette on the 29th of April 2025. The newspaper and Gazette Notice adverts included the following information:

- Project name;
- Applicant name;
- Project location;
- Nature of the activity;
- Legislative requirements; and
- Relevant EIMS contact person for the project.

Please refer to Appendix 8 for proof of the advert and gazette notice placed.

7.4.1.3 SITE NOTICE PLACEMENT

Four (4) A1 correx board site notices (in English and Afrikaans) were placed at four (4) locations around the proposed project study area on the 24th of April 2025. The on-site notices included the following information:

- Project name;
- Applicant name;
- Project location;
- Map of proposed project area;
- Project description;
- Legislative requirements; and
- Relevant EIMS contact person for the project.

Please refer to Appendix 8for proof of site notice and site notice distribution.

7.4.2 NOTIFICATION OF I&APS OF IWWMP AVAILABILITY

Notification (in English and Afrikaans) regarding the availability of the IWWMP for public review and comment will be provided to pre-identified and registered I&APs. The notifications will be distributed through either email, registered mail, fax, and/or SMS, where contact details are available.

Contact details will be provided to I&APs should they require assistance accessing the information or require copies of the reports.

A hard copy of the Report will be made available for public comment at a date to be confirmed for a period of 60 days at the Rustenburg Public Library.

7.4.3 SUMMARY OF PUBLIC PARTICIPATION OPPORTUNITIES

The table below provides a summary of the opportunities provided to I&APs for participation in the public participation process to date.

Table 17: Summary of Public Participation Opportunities

Action	Description	Publication/Place	Date
Initial Call to Register	Notification of landowners, occupiers, and other key I&APs.	Affected landowners and key I&APs were notified via email, fax, SMSs and/or post.	29th April 2025 To 1st May 2025
	Placement of site notices.	Four (4) A1 correx board site notices (in English, and Afrikaans) were placed at four (4) locations along the proposed project study area.	24th April 2025
	Newspaper advertisement and Gazette Notice.	Advertisements (in English, and Afrikaans) describing the project and WULA process were placed in the Rustenburg Herald Newspaper. The Gazette Notice was placed in the	25th April 2025 (Newspaper) 29th April 2025

Action	Description	Publication/Place	Date
		North West Provincial Gazette.	(Gazette)

7.4.4 RECORD OF ISSUES RAISED

Comments on the proposed project were solicited from pre-identified and registered I&APs and key stakeholders. To date, the following comments have been received:

- Registration;
- South African Heritage Resources Agency request for an application to be made;
- Eskom request for map files;
- Transnet wayleave application outcome - Transnet Pipelines not affected by the proposed project; and
- Request for project background.

All comments and/or queries received to date are included in this report and presented in Appendix 8. Please refer to Appendix 8 for proof of correspondence.

8 MATTERS REQUIRING ATTENTION

The IWWMP is a living document which should be frequently update and audited to ensure its applicability and efficiency in ensuring that waste is responsibly handles on site.

Presently, it is recommended that pump testing be implemented on site as recommended in the geohydrology impact assessment. Furthermore, monitoring wells should be sited and drilled on site to ensure that the plant is not having a negative impact on either the water quality or quantity.

8.1 ASSESSMENT OF LEVEL AND CONFIDENCE OF INFORMATION

This section provides an overview of the sources of information used in the compilation of the IWWMP and assesses the level of confidence associated with each dataset or study. The purpose is to ensure transparency regarding the reliability, accuracy, and completeness of the information that underpins the findings and recommendations of this report.

8.1.1 INFORMATION SOURCES

The following sources of information were utilised in the development of this IWWMP:

- Site-specific specialist studies including:
    - Wetland Delineation Report;
    - Geohydrology Assessment;
    - Hydropedology Assessment;
    - Soil and Agriculture Assessment; and
    - Terrestrial Biodiversity Assessment.
- Civil Design Report.

8.1.2 CONFIDENCE ASSESSMENT

The confidence level of each information source was assessed based on its origin, date of collection, verification status, and relevance to the site-specific context. Table 18 below summarises the confidence levels assigned to key datasets.

Table 18: Confidence Assessment of Key Information Sources

Information Source	Date	Confidence Level	Notes
Wetland Delineation Report	2025	High	Field-verified; aligned with SANBI guidelines
Geohydrology Assessment	2025	High	Includes hydrocensus, modelling, and water quality analysis
Hydropedology Assessment	2025	High	Site-specific soil-water interaction study
Civil Design Report	2025	High	Engineering design verified; supports infrastructure planning

8.1.3 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations relating to this assessment should be considered in evaluating and decision-making on this assessment:

- Unless specifically noted, the environmental attributes for the receiving environment have been obtained from best available spatial and scientific data sources. Whilst reasonable effort has been taken to obtain the most recent and relevant data, there may be gaps in baseline data, leading to uncertainties in impact predictions. Where uncertainty exists efforts are made to indicate this in the assessment.
- This study is based on activity information provided by the applicant (including engineering designs, specifications, services reports, etc). The accuracy of this information has not been verified, and it is assumed that no significant changes or deviations to the final designs will occur. Should such occur the significance of the potential impacts may require reassessment and where relevant formal amendment processes.
- The information presented in this report is based on the information available at the time of compilation of the report.
- Whilst reasonable effort has been made to identify all potential environmental impacts, some impacts may not be reasonably foreseeable or may emerge only after project implementation.
- In determining the significance of impacts, with mitigation, it is assumed that mitigation measures proposed in the report are correctly and effectively implemented and managed throughout the life of the project.

The remaining sub-sections present the assumptions and limitations applicable to the respective specialist assessments.

8.1.3.1 GEOHYDROLOGY

- The activation and concentrations of source terms were based on monitoring data and historic Google Earth images.
- The geology was based on the 1:250 000 published geological maps as well as 1:50 000 topographical maps.
- QGIS online aerial imagery was used in the layout of the various maps compiled for the current report. The imagery may well be dated and has been used for reference only.
- The model is used for decision making and should be applied accordingly. Modelled impacts may vary at any point and on-going monitoring is required to actively manage the proposed mining activities and possible impacts.
- No site characterization boreholes were drilled for this investigation; aquifer parameters and hydro stratigraphic units were assumed based on historical data and similar studies.
- The investigation utilized data from field surveys and existing monitoring as a snapshot, with further trends to be verified through ongoing monitoring as outlined in the monitoring program
- The numerical groundwater flow model was developed using site-specific information, excluding influences from neighbouring mining developments.

8.1.3.2 HYDROPEDOLOGY

The following aspects were considered as limitations;

- Only the slopes affected by the proposed development have been assessed;

- It has been assumed that the extent of the development area provided by the responsible party is accurate; and
- The GPS used for ground truthing is accurate to within five meters. Therefore, the wetland and the observation site's delineation plotted digitally may be offset by at up to five meters to either side.

8.1.3.3 SOILS AND AGRICULTURE

The following aspects were considered as limitations;

- Only the slopes affected by the proposed development have been assessed;
- It has been assumed that the extent of the development area provided by the responsible party is accurate;
- The GPS used for ground truthing is accurate to within five meters. Therefore, the soil and the observation site's delineation plotted digitally may be offset by up to five meters to either side; and
- No heavy metals have been assessed, nor fertility been analysed for the relevant classified soils.

8.1.3.4 TERRESTRIAL AND BIODIVERSITY

The following assumptions and limitations are applicable for this assessment:

- The Global Positioning System (GPS) used in the assessment has an accuracy of 5 m and consequently any spatial features may be offset by up to 5 m;
- Information relating to project activities, spatial data and infrastructure locations for the proposed development was obtained from information provided by the client. The potential impacts and recommendations described in this report apply specifically to the provided information;
- The PAOI has been modified from its original state due to the nature of the development. Field data collected is thus considered to be distorted and the specialist may only make educated assumptions as to the pre-developmental ecological conditions;
- Assumptions were guided in part by the current habitat surrounding the PAOI;
- Although considerable time has been spent to ensure that information utilised in this report is verified. It is assumed that all third-party information utilised in the compilation of this report is correct at the time of compilation (e.g., spatial data, online databases, and species lists);
- This assessment was conducted from a terrestrial perspective only and must be considered in conjunction with the accompanying freshwater and soil reports (TBC, 2025); and
- The TBC fieldwork component of the assessment comprised a one one-day survey in the early dry season (14th of April 2025), which is considered sufficient under the circumstances.

8.1.3.5 WETLANDS

The following aspects were considered as limitations:

- It has been assumed that all information provided to the specialist is accurate;
- The Project Area has been modified from its original state due to the nature of the development. Field data collected is thus considered to be distorted and the specialist may only make educated assumptions as to the pre-developmental ecological conditions
- Assumptions were guided in part by the current habitat surrounding the Project Area;
- Where inaccessible, freshwater features within the larger 500m PAOI were delineated and assessed via desktop;

- Areas characterised by external wetland attributes were the focus for this assessment;
- Only natural features were considered for the delineation and ecological components of this assessment; 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.

8.1.4 IMPLICATIONS FOR DECISION-MAKING

The overall confidence in the information used to compile this IWWMP is considered adequate, with key environmental and engineering datasets being recent, site-specific, and verified. Where moderate confidence levels exist, conservative assumptions and precautionary approaches have been applied to ensure that risks are not underestimated.

The findings and recommendations of this IWWMP are therefore deemed robust and suitable to inform regulatory decision-making, infrastructure planning, and environmental management at the Rietfontein Plant.

9 WATER AND WASTE MANAGEMENT

9.1 WATER AND WASTE MANAGEMENT PHILOSOPHY (PROCESS WATER, STORMWATER, GROUNDWATER AND WASTE)

The plant operates with the philosophy to maximise affected water re-use, to minimise raw water intake and to prevent spillages to the environment. They are committed to keep their dirty water management areas separate from their clean water management areas, thereby ensuring compliance with Regulation 6 and 7 of GN 704 of 4 June 1999.

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 re-use 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 re-used in the mining process and plant, thus reducing the quantity of water extracted from the water resources.

It is advised that the plant implements the following waste management strategy.

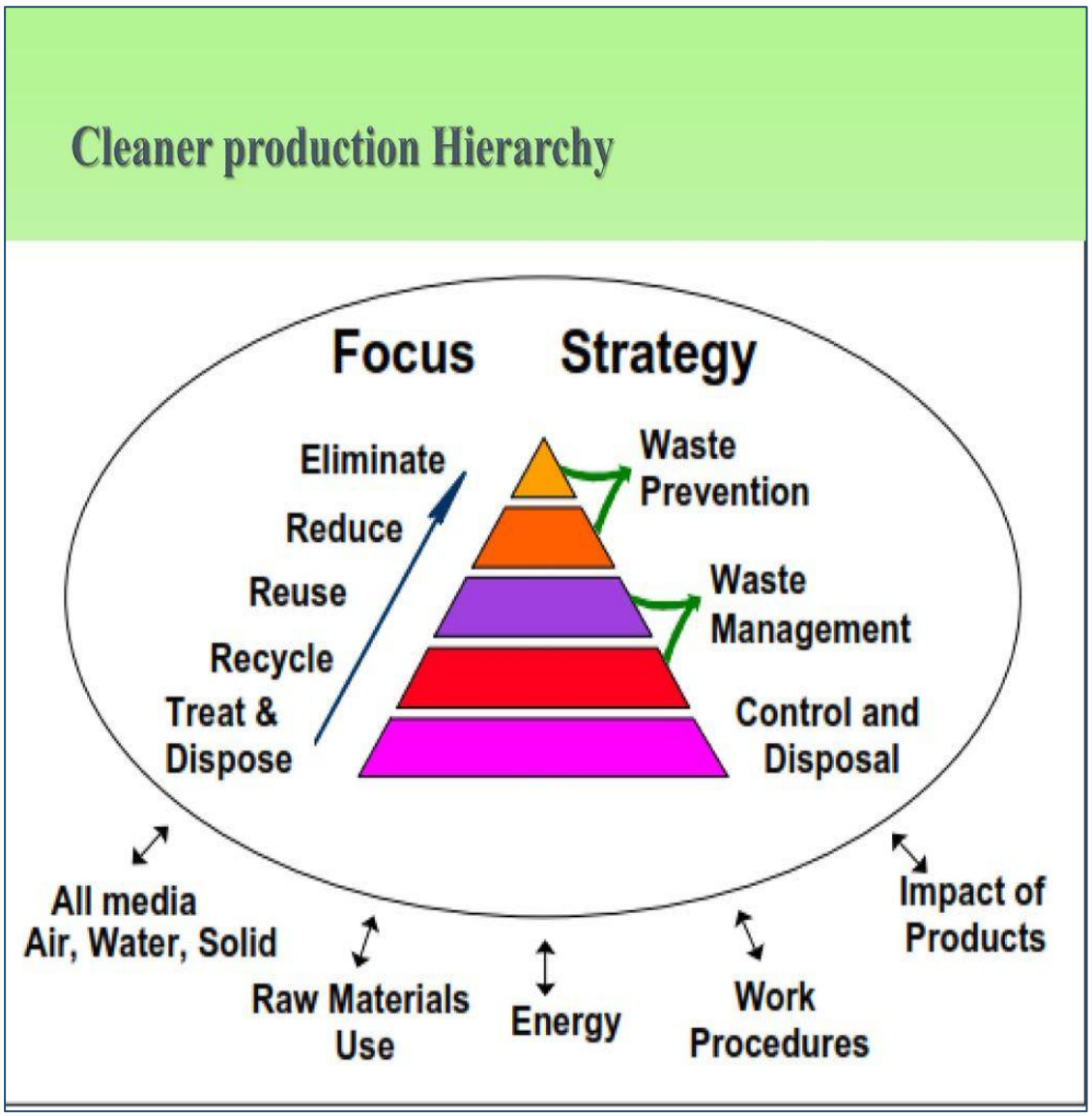


Figure 20: Proposed waste management philosophy

9.2 STRATEGIES (PROCESS WATER, STORMWATER, GROUNDWATER AND WASTE)

9.2.1 SURFACE AND GROUNDWATER

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 licensee 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 chrome to industry. The following objectives are therefore set for the project:

- Water conservation by minimising water use. Water is reused wherever possible and losses are minimised;
- Prevention of water pollution where possible;
- Minimise impacts on water resources and receiving water environment; and
- Achieve and maintain legal compliance.

In order to achieve the above objectives, the licensee 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;
- 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 quantity or water extracted;
- Monitoring points to be put in place to monitor the drawdown from groundwater abstraction; and
- Groundwater quality monitoring must be continuously implemented around the plant to monitor changes in the water quality, especially downstream of the beneficiation activities.

All the relevant principles contained in DWA's Best Practice Guidelines (BPG) will be utilised to guide design and management practices. The Applicant will also ensure compliance with GN 704 of the NWA.

9.2.2 PROCESS WATER

The Rietfontein Plant's process water strategy is designed to ensure responsible water use, minimise environmental risks, and comply with regulatory requirements. It integrates site-specific hydrogeological data, environmental assessments, and infrastructure planning to support sustainable operations.

- Aligns with Integrated Water Resource Management (IWRM) principles and the National Water Act (NWA); and
- Supports legal compliance, operational efficiency, and long-term sustainability.

9.2.2.1 OBJECTIVES

This strategy aims to reduce the plant's water footprint while safeguarding water resources and ensuring compliance with the Water Use Licence and GN 704 regulations.

- Minimise abstraction from groundwater and external sources;

- Maximise reuse and recycling of process water;
- Prevent contamination of surface and groundwater resources;
- Ensure compliance with GN 704 and other applicable regulations; and
- Support long-term sustainability and operational efficiency.

9.2.2.2 INFRASTRUCTURE SUPPORTING PROCESS WATER MANAGEMENT

The plant's water management infrastructure includes both existing systems and proposed upgrades to improve water capture, containment, and reuse.

9.2.2.2.1 EXISTING INFRASTRUCTURE:

- Chrome mud processing plant;
- Two tailings containment tanks;
- Sump for wastewater collection;
- Jojo tanks for domestic and operational water supply; and
- Stockpile drying pad.

9.2.2.2.2 PROPOSED INFRASTRUCTURE:

- Pollution Control Dam (PCD) with 8,000 m^3 capacity, lined to prevent seepage;
- Clean and dirty water separation channels; and
- Pipeline (~2.5 km) connecting Rietfontein Plant to Rustenburg Chrome Mine for tailings and return water transfer.

9.2.2.3 WATER SOURCES AND USE

Water is sourced from both groundwater and municipal supply, with abstraction governed by the site's Water Use Licence.

- The plant operates in a closed loop system where process water is re-used as much as [possible;
- Rand Water supply used as supplementary water source;
- Groundwater abstraction from boreholes is also used to supplement where needed and for domestic use;
- Dirty water reused for dust suppression and processing; and
- Abstraction volumes should be monitored to ensure sustainability.

9.2.2.4 WATER BALANCE AND REUSE

A closed-loop water system is implemented to reduce reliance on fresh water and prevent environmental contamination. The new stormwater management infrastructure will strengthen the plants ability to capture and separate clean and dirty water sources.

- Dirty water captured and reused in processing and dust suppression;
- Clean water diverted away from operational areas;
- Water balance model guides reuse and recycling practices; and
- Reduces raw water intake and supports zero-discharge objectives.

9.2.2.5 MONITORING AND COMPLIANCE

Monitoring programmes ensure that water use remains within legal and environmental limits, and support adaptive management.

- Quarterly groundwater sampling for physical, macro, and micro parameters;
- Monthly water level measurements to assess aquifer drawdown;
- Automated flow meters to track abstraction volumes;
- Numerical modelling used to predict and manage long-term impacts; and
- Annual reporting to DWS and updates to groundwater model.

9.2.2.6 RISK MANAGEMENT AND MITIGATION

Risks related to water contamination and infrastructure failure are addressed through proactive design and monitoring.

- Pollution plume containment confirmed via numerical modelling;
- PCD and channels designed for 1:50-year storm events;
- Additional monitoring boreholes planned for comprehensive coverage; and
- Geophysical surveys should guide borehole placement and model refinement.

9.2.2.7 PERFORMANCE INDICATORS

Key performance indicators are used to measure the effectiveness of the strategy and guide continuous improvement.

- Zero discharge of contaminated water to the environment;
- Compliance with IWUL and GN 704 requirements;
- Reduction in water abstraction volumes over time;
- Stable or improving groundwater quality indicators; and
- Effective containment of pollution plumes within site boundaries.

9.3 PERFORMANCE OBJECTIVES AND GOALS

The performance objectives and goals for the Rietfontein Plant are designed to guide the implementation of effective water and waste management practices. These objectives reflect the legal obligations of the plant, the environmental sensitivities of the site, and the findings of supporting technical studies, including hydropedology, wetland ecology, and geohydrology. Each goal is supported by measurable indicators and management actions to ensure continuous improvement and compliance.

9.3.1 LEGAL COMPLIANCE

Legal compliance forms the foundation of the IWWMP. The plant must operate in accordance with the conditions of its Integrated Water Use Licence (IWUL), the National Water Act (NWA), and other applicable environmental legislation. These objectives ensure that all water and waste-related activities are authorised, monitored, and reported appropriately.

- Ensure full compliance with the National Water Act (Act 36 of 1998), GN 704, NEMA, and IWUL conditions;
- Conduct annual internal and external audits to assess adherence to licence conditions and environmental authorisations; and

- Submit audit reports to the Department of Water and Sanitation (DWS) and other relevant authorities.

9.3.2 POLLUTION PREVENTION

Preventing pollution is a key priority for the Rietfontein Plant, given its proximity to sensitive water resources and the presence of vulnerable aquifers and wetlands. These objectives aim to eliminate the release of contaminated water and ensure that all dirty water is properly contained and reused.

- Prevent the release of contaminated water into surface or groundwater resources;
- Maintain zero-discharge status for process water and stormwater unless authorised under emergency conditions; and
- Implement infrastructure (e.g. lined Pollution Control Dam, clean/dirty water separation) to contain and manage dirty water.

9.3.3 GROUNDWATER PROTECTION

Groundwater protection is critical due to the fractured nature of the aquifer system and the potential for contamination. These objectives are informed by the geohydrological assessment and numerical modelling, which highlight the need for careful abstraction and monitoring.

- Monitor groundwater quarterly and levels to detect changes and ensure sustainable abstraction;
- Maintain abstraction volumes within licensed limits and avoid drawdown impacts on neighbouring users; and
- Contain pollution plumes through strategic abstraction and infrastructure design, as confirmed by numerical modelling.

9.3.4 WATER USE EFFICIENCY

Efficient use of water resources supports both environmental sustainability and operational resilience. These objectives promote the reuse of process water, reduction of raw water intake, and optimisation of water use across the plant.

- Minimise raw water intake by maximising reuse and recycling of process water;
- Maintain and update a site-wide water balance to optimise water use and identify losses; and
- Use recycled water for dust suppression and other operational needs.

9.3.5 WASTE MANAGEMENT

Effective waste management ensures that all waste generated on site is handled in a manner that protects human health and the environment. These objectives align with the principles of the waste hierarchy and the requirements of the National Environmental Management: Waste Act (NEMWA).

- Implement the waste hierarchy: prevent, reduce, reuse, recycle, and dispose;
- Ensure all waste is handled in accordance with NEMWA and site-specific waste management protocols; and
- Maintain waste disposal certificates and records for audit purposes.

9.3.6 STORMWATER MANAGEMENT

Stormwater management is essential to prevent erosion, sedimentation, and contamination of water resources. These objectives focus on infrastructure design, catchment separation, and rehabilitation of disturbed areas.

- Design and maintain stormwater infrastructure to handle a 1:50-year flood event;

- Separate clean and dirty water catchments to prevent cross-contamination; and
- Rehabilitate disturbed areas to restore natural drainage and reduce erosion.

9.3.7 ENVIRONMENTAL AWARENESS AND TRAINING

Building environmental awareness among staff and contractors is vital for the successful implementation of the IWWMP. These objectives promote education, communication, and accountability across all levels of the operation.

- Conduct regular toolbox talks and awareness campaigns on water and waste management;
- Train staff and contractors on pollution prevention, emergency response, and compliance requirements; and
- Display environmental communication materials on site notice boards.

9.3.8 STAKEHOLDER ENGAGEMENT

Engaging with stakeholders ensures transparency, builds trust, and supports the plant's social licence to operate. These objectives promote open communication and responsiveness to community concerns.

- Maintain open communication with surrounding communities and stakeholders;
- Address grievances through a formal mechanism and document responses; and
- Provide water access to neighbouring communities where feasible and authorised.

9.3.9 CONTINUOUS IMPROVEMENT

Continuous improvement ensures that the IWWMP remains relevant, effective, and responsive to changing conditions. These objectives support adaptive management and the integration of new technologies and practices.

- Review and update the IWWMP annually to reflect operational changes and new risks;
- Incorporate findings from audits, monitoring, and stakeholder feedback into management practices; and
- Explore and implement best practice technologies for water treatment and waste minimisation.

9.3.10 HYDROPEDOLOGICAL INTEGRITY

Hydropedology examines the interaction between soil and water, which is critical for maintaining recharge, lateral flows, and erosion control. These objectives aim to preserve natural hydrological functions and prevent degradation of soil-water systems.

- Preserve natural hydrological regimes through careful infrastructure placement;
- Minimise soil compaction and erosion during construction and operation;
- Maintain lateral subsurface flows to support groundwater recharge;
- Monitor and manage runoff to prevent concentration and flood damage; and
- Implement attenuation ponds and stormwater diversion systems to reduce flow velocity and sediment transport.

9.3.11 WETLAND PROTECTION AND REHABILITATION

Wetlands provide essential ecosystem services, including water filtration, biodiversity support, and hydrological balance. These objectives ensure that wetlands are protected from direct and indirect impacts and rehabilitated where necessary.

- Avoid direct disturbance of wetland areas during construction and operation;
- Implement buffer zones and limit infrastructure footprint near wetlands;
- Prevent contamination from hydrocarbons, sewage, and sedimentation;
- Rehabilitate disturbed wetlands post-construction to restore ecological function;
- Monitor wetland vegetation and water quality to detect degradation; and
- Implement an Alien Invasive Plant (AIP) management plan to protect native species.

9.3.12 LANDSCAPE AND DRAINAGE FUNCTION

The site's topography and soil types influence drainage and erosion potential. Maintaining natural drainage and restoring disturbed areas are essential for long-term sustainability and compliance with hydropedological recommendations.

- Design infrastructure to preserve downstream drainage functions;
- Rehabilitate previously disturbed areas to reduce erosion and siltation;
- Restore soil profiles and hydrological connectivity during closure; and
- Monitor sediment loads and implement erosion control structures where needed.

9.4 MEASURES TO ACHIEVE AND SUSTAIN PERFORMANCE OBJECTIVES

To ensure the long-term effectiveness of the performance objectives outlined in Section 9.3, a suite of integrated measures has been developed. These measures are informed by site-specific assessments, including hydropedological, wetland, and groundwater studies, and are aligned with national regulatory frameworks such as the National Water Act (NWA), GN 704, and the Integrated Water Use Licence (IWUL). The implementation of these measures will support pollution prevention, resource conservation, legal compliance, and continuous improvement across all operational phases. Some of the measures below are to be implemented as part of the stormwater management upgrades to the site.

9.4.1 INFRASTRUCTURE AND OPERATIONAL CONTROLS

Infrastructure upgrades and operational protocols are central to achieving water and waste management goals. Therefore it is important to define the measure which will contribute to the sustainable long term operation of the plant. Infrastructure an operational consideration in this respect are as follows:

- Construct and maintain a lined Pollution Control Dam (PCD) with 8,000 m^3 capacity to contain dirty water;
- Install clean and dirty water separation channels to prevent cross-contamination;
- Implement a 2.5 km pipeline to transfer tailings and return water to the main Rustenburg Chrome Mine, reducing trucking risks;
- Maintain bunded areas for hydrocarbon storage with 110% containment capacity;
- Use water sprays and dust suppression systems on haul roads and stockpiles; and
- Ensure all infrastructure complies with GN 704 flood design standards.

9.4.2 GROUNDWATER PROTECTION AND MONITORING

Groundwater protection is achieved through abstraction control, pollution containment, and a robust monitoring programme.

- Monitor groundwater quality quarterly for physical, macro, and micro parameters;
- Record groundwater levels monthly;
- Install automated flow meters on abstraction boreholes to track volumes;
- Conduct 48–72-hour aquifer testing to determine sustainable yields;
- Expand the monitoring network to allow for more comprehensive monitoring; and
- Drill additional monitoring boreholes to improve spatial coverage.

9.4.3 STORMWATER AND HYDROPEDOLOGICAL MANAGEMENT

Stormwater management is essential to prevent erosion, protect wetlands, and maintain hydropedological integrity.

- Design stormwater systems to handle 1:50-year flood events;
- Divert clean water away from operational areas using berms and channels;
- Contain dirty water runoff and reuse it in processing and dust suppression;
- Implement attenuation ponds to reduce flow velocity and sediment transport;
- Minimise soil compaction and preserve lateral subsurface flows; and
- Rehabilitate disturbed areas to restore natural drainage and prevent erosion.

9.4.4 WETLAND AND BIODIVERSITY CONSERVATION

Wetlands and sensitive habitats require targeted protection and rehabilitation measures.

- Avoid direct disturbance of wetlands during construction and operation;
- Establish buffer zones around wetland areas and sensitive receptors;
- Implement an Alien Invasive Plant (AIP) management plan;
- Rehabilitate wetlands post-construction to restore ecological function;
- Monitor wetland vegetation and water quality for signs of degradation; and
- Apply offsets where development affects Critical Biodiversity Areas (CBAs).

9.4.5 WASTE MANAGEMENT AND POLLUTION PREVENTION

Waste management measures are designed to prevent pollution and support the waste hierarchy.

- Separate general and hazardous waste at source and in the salvage yard;
- Reuse and recycle waste streams where feasible;
- Dispose of non-recyclable waste at licensed facilities with disposal certificates;
- Maintain impermeable surfaces and containment for hazardous waste storage;
- Prevent hydrocarbon spills through training, spill kits, and bunded refuelling areas; and

- Monitor and record waste volumes for audit and reporting purposes.

9.4.6 COMPLIANCE, AUDITING, AND CONTINUOUS IMPROVEMENT

Regular auditing and adaptive management ensure sustained performance and legal compliance.

- Conduct annual internal and external audits of IWUL and GN 704 compliance;
- Submit audit reports to DWS and relevant authorities;
- Review and update the IWWMP annually to reflect operational changes;
- Evaluate the effectiveness of mitigation measures and adjust as needed;
- Maintain a grievance mechanism and stakeholder engagement process; and
- Integrate findings from monitoring and audits into future planning.

10 IMPACT ASSESSMENT

This section will indicate the impacts assessed as part of the assessment process. The methodology for assessing impacts will follow the EIMS impact assessment methodology as describer in the sections below. Appropriate mitigation measures are also included as identified by specialists.

10.1 IMPACT ASSESSMENT METHODOLOGY

The impact significance rating methodology, as provided by EIMS, is guided by the requirements of the NEMA EIA Regulations 2014 (as amended). The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence I of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/ likelihood (P) of the impact occurring. This determines the environmental risk. In addition, other factors, including cumulative impacts and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the ER to determine the overall significance (S). The impact assessment will be applied to all identified alternatives. Where possible, mitigation measures will be recommended for impacts identified.

10.1.1 DETERMINATION OF ENVIRONMENTAL RISK

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER). The environmental risk is dependent on the consequence I of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent I, Duration (D), Magnitude (M), and reversibility I applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$\boldsymbol{C = \frac{(E + D + M + R) * N}{4}}$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 19 below.

Table 19: Criteria for Determining Impact Consequence.

Aspect	Score	Definition
Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact
Extent	1	Activity (i.e. limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property boundary),
	3	Local (i.e. the area within 5 km of the site),
	4	Regional (i.e. extends between 5 and 50 km from the site
	5	Provincial / National (i.e. extends beyond 50 km from the site)
Duration	1	Immediate (<1 year)
	2	Short term (1-5 years),
	3	Medium term (6-15 years),

Aspect	Score	Definition
	4	Long term (the impact will cease after the operational life span of the project),
	5	Permanent (no mitigation measure of natural process will reduce the impact after construction).
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected),
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected),
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way),
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease), or
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease).
Reversibility	1	Impact is reversible without any time and cost.
	2	Impact is reversible without incurring significant time and cost.
	3	Impact is reversible only by incurring significant time and cost.
	4	Impact is reversible only by incurring prohibitively high time and cost.
	5	Irreversible Impact

Once the C has been determined the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/ scored as per Table 20.

Table 20: Probability Scoring.

Probability	**1**	**Improbable (Rare, the event may occur only in exceptional circumstances, the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <5% chance).**
	2	Low probability (Unlikely, impact could occur but not realistically expected; >5% and <20% chance).
	3	Medium probability (Possible, the impact may occur; >20% and <50% chance).
	4	High probability (Likely, it is most probable that the impact will occur- > 50 and <90% chance).
	5	Definite (Almost certain, the impact is expected to, or will, occur, >90% chance).

The result is a qualitative representation of relative ER associated with the impact. ER is therefore calculated as follows:

ER= C x P

Table 21: Determination of Environmental Risk.

Consequence						
	5- Very High	5	10	15	20	25
	4- High	4	8	12	16	20
	3- Medium	3	6	9	12	15
	2- Low	2	4	6	8	10
	1- Very low	1	2	3	4	5
		1- Improbable	2- Low	3- Medium/ Possible	4- High/ Probable	5- Highly likely/ Definite
	Probability					

The outcome of the environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in Table 22.

Table 22: Significance Classes.

Risk Score	Description
< 10	Low (i.e. where this impact is unlikely to be a significant environmental risk).
≥ 10; < 20	Medium (i.e. where the impact could have a significant environmental risk),
≥ 20	High (i.e. where the impact will have a significant environmental risk).

The impact ER will be determined for each impact without relevant management and mitigation measures (pre-mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed/mitigated.

10.1.2 IMPACT PRIORITISATION

Further to the assessment criteria presented in the section above, it is necessary to assess each potentially significant impact in terms of:

1. Cumulative impacts; and
2. The degree to which the impact may cause irreplaceable loss of resources.

To ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impact ER (post-mitigation). This prioritisation factor does not aim to detract from the risk ratings but rather to focus the attention of the decision-making authority on the higher priority/significance issues and impacts. The PF will be applied to the ER score based on the assumption that relevant suggested management/mitigation impacts are implemented.

Table 23: Criteria for Determining Prioritisation.

Cumulative Impact (CI)	**Low (1)**	**Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.**
	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.
	High (3)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/ definite that the impact will result in spatial and temporal cumulative change.
Irreplaceable Loss of Resources (LR)	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources.
	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited.
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions).

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 23. The impact priority is therefore determined as follows:

Priority = CI + LR

The result is a priority score which ranges from 2 to 6 and a consequent PF ranging from 1 to 1.5 (Refer to Table 24).

Table 24: Determination of Prioritisation Factor.

Priority	Ranking	Prioritisation Factor
2	Low	1

Priority	Ranking	Prioritisation Factor
3	Medium	1.125
4	Medium	1.25
5	Medium	1.375
6	High	1.5

In order to determine the final impact significance, the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is an attempt to increase the post mitigation environmental risk rating by a full ranking class, if all the priority attributes are high (i.e. if an impact comes out with a medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a high significance).

Table 25: Environmental Significance Rating.

Value	Description
< -10	Low negative (i.e. where this impact would not have a direct influence on the decision to develop in the area).
≥ -10 < -20	Medium negative (i.e. where the impact could influence the decision to develop in the area).
≥ -20	High negative (i.e. where the impact must have an influence on the decision process to develop in the area).
0	No impact
< 10	Low positive (i.e. where this impact would not have a direct influence on the decision to develop in the area).
≥ 10 < 20	Medium positive (i.e. where the impact could influence the decision to develop in the area).
≥ 20	High positive (i.e. where the impact must have an influence on the decision process to develop in the area).

The significance ratings and additional considerations applied to each impact will be used to provide a quantitative comparative assessment of the alternatives being considered. In addition, professional expertise and opinion of the specialists and the environmental consultants will be applied to provide a qualitative comparison of the alternatives under consideration. This process will identify the best alternative for the proposed project.

10.1.3 DESCRIPTION AND ASSESSMENT OF IMPACTS

This section describes each identified environmental impact in the context of the activity and associated aspect and provides mitigation measures to be implemented which justify why specific ranking/ rating of the component attributes of the impact assessment are given.

10.1.4 TERRESTRIAL BIODIVERSITY

Table 26 shows the significance of potential impacts associated with the proposed infrastructure on biodiversity before and after the implementation of mitigation measures, as well as cumulative and irreplaceable loss. The impacts associated with the existing new infrastructure is presented in Table 27. The precautionary principal has been applied here as an impact assessment was not performed prior to the unlawful vegetation clearing and the site has already undergone impacts associated with the construction phase and the plant is currently in operation.

Table 26: Summary assessment of significance of potential impacts on terrestrial biodiversity associated with the project for the proposed infrastructure

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching).	Construction	Medium to high -	Medium to high -	Medium to high -
Mitigation Measures				
• Clearing and disturbance activities must be conducted in a progressive linear manner, always outwards and away from the centre of the PAOI and over several days, so as to provide an easy escape route for all small mammals and herpetofauna. • The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. • The duration of the activities should be minimised to as short a term as possible, to reduce the period of disturbance on fauna. • Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals. • No trapping, killing, or poisoning of any wildlife is to be permitted and must be made a punishable offense. • Outside lighting should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited. • Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons. In this case, activities should take place during the day. • Any holes/deep excavations must be dug in a progressive manner and should not be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in. Holes must be subsequently inspected for fauna prior to backfilling. • If fencing is required: wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area.				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Clearing of vegetation leading to soil erosion and loss of topsoil.	Construction	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion. • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. • Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds where relevant. • Only existing access routes and walking paths may be made use of.				
Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.	Construction	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. The water resources must to be protected and all activities that could result in a spill should occur away from them. • Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. • No servicing of equipment on site unless necessary. • All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment. • All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the PAOI. • All construction waste must be removed from site at the closure of the construction phase. • Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site.				
Introduction of alien species, especially plants	Construction	Medium to high -	Low -	Low -
Mitigation Measures				
• An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual changed in AIP composition. • It must be made an offence for any staff member to remove any indigenous plant species from the PAOI or bring any alien species in. This is to prevent the spread of exotic or alien species or the illegal collection of plants. • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by alien invasive plant species. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests.				
Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Operational	Medium to high -	Medium to low -	Medium to high -
Mitigation Measures				
• Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals. • Outside lighting should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. • Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all areas of construction or bare ground. This includes wetting of exposed soft soil surfaces. • Outside lighting should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.				
Environmental pollution due to water/ mine drainage runoff.	Operational	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• **A stormwater management plan must be compiled and implemented.** • **A pipe leak spill management plan must be put in place to ensure that should there be any pipe leaks, bursts or overflow that it does not run into the surrounding areas. This includes the installation of leak warning and detection systems. Precautions must be taken against the erosion damage that would be caused by unplanned pipe leaks, such as the planting of dense indigenous pioneer grass seeds across all bare earth areas surrounding the pipes. Monitoring of the pipeline must be undertaken to detect leaks and monitoring should be undertaken at least once a week. Water monitoring must also be undertaken to ensure that there has been no runoff into the nearby water sources.**				
Continuous stripping of topsoil for beneficiation plant, leading to ongoing land degradation, including erosion	Operational	Medium to high -	Medium to high -	Medium to high -
Mitigation Measures				
• **A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion.** • **Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat.** • **Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds where relevant.**				
Continued encroachment by alien and invasive plant species	Operational	High -	Low -	Low -

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Mitigation Measures				
• **An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual change in AIP composition.** • **Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by alien invasive plant species.** • **It must be made an offence for any staff member to remove any indigenous plant species from the PAOI or bring any alien species in. This is to prevent the spread of exotic or alien species or the illegal collection of plants.**				
Increased risk of soil erosion and instability due to removal of infrastructure.	Decommissioning	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• **A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion.** • **Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat.** • **Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds where relevant.**				
Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Decommissioning	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• **Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals.** • **Outside lighting should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.** • **Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all areas of construction or bare ground. This includes wetting of exposed soft soil surfaces.** • **A dust management plan must be compiled and implemented.**				
Slow regrowth of natural vegetation and potential further spread of alien and invasive species.	Rehab and Closure	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• **Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat.** • **This will also reduce the likelihood of encroachment by alien invasive plant species.** • **An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual changed in AIP composition.** • **A habitat rehabilitation plan must be compiled and implemented for all areas that must be rehabilitated back to Thornveld.**				

Table 27: Summary assessment of significance of potential impacts on terrestrial biodiversity associated with the project for the existing infrastructure

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching).	Construction	Medium to high -	Medium to high -	Medium to high -
Mitigation Measures				
• **The duration of the activities should be minimised to as short a term as possible, to reduce the period of disturbance on fauna.** • **Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals.** • **No trapping, killing, or poisoning of any wildlife is to be permitted and must be made a punishable offense.** • **Outside lighting should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.** • **All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.** • **Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons. In this case, activities should take place during the day.** • **Any holes/deep excavations must be dug in a progressive manner and should not be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in. Holes must be subsequently inspected for fauna prior to backfilling.** • **If fencing is required: wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area.**				
Clearing of vegetation leading to soil erosion and loss of topsoil.	Construction	High -	Medium to low -	Medium to high -
Mitigation Measures				
• **Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat.** • **A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion.** • **Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds where relevant.** • **Only existing access routes and walking paths may be made use of.**				
Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.	Construction	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• **A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. The water resources** must **be protected and all activities that could result in a spill should occur away from them.** • **Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.** • **No servicing of equipment on site unless necessary.** • **All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers.** • **Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment.** • **All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the PAOI.** • **All construction waste must be removed from site at the closure of the construction phase.** • **Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site.**				
Introduction of alien species, especially plants	Construction	Medium to high -	Low -	Low -
Mitigation Measures				
• **An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual changed in AIP composition.** • **It must be made an offence for any staff member to remove any indigenous plant species from the PAOI or bring any alien species in. This is to prevent the spread of exotic or alien species or the illegal collection of plants.** • **Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by alien invasive plant species. All grazing mammals must be kept out of the areas that have recently been re-planted.** • **Assess the state of rehabilitation and encroachment of alien vegetation quarterly for up to two years after the closure.**				
Environmental pollution due to water/ drainage runoff.	Operational	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• **A stormwater management plan must be compiled and implemented.** • **A pipe leak spill management plan must be put in place to ensure that should there be any pipe leaks, bursts or overflow that it does not run into the surrounding areas. This includes the installation of leak warning and detection systems. Precautions must be taken against the erosion damage that would be caused by unplanned pipe leaks, such as the planting of dense indigenous pioneer grass seeds across all bare earth areas surrounding the pipes. Monitoring of the pipeline must be undertaken to detect leaks and monitoring should be undertaken at least once a week. Water monitoring must also be undertaken to ensure that there has been no runoff into the nearby water sources.**				
Continued encroachment by alien and invasive plant species	Operational	High -	Low -	Low -

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Mitigation Measures				
• **An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual changed in AIP composition.** • **Assess the state of rehabilitation and encroachment of alien vegetation twice a year.** • **Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by alien invasive plant species. All grazing mammals must be kept out of the areas that have recently been re-planted.**				
Increased risk of soil erosion and instability due to removal of infrastructure.	Decommissioning	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• **Habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion.** • **Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat.**				
Slow regrowth of natural vegetation and potential further spread of alien and invasive species.	Rehab and Closure	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• **Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by alien invasive plant species. All grazing mammals must be kept out of the areas that have recently been re-planted.** • **Assess the state of rehabilitation and encroachment of alien vegetation quarterly for up to two years after the closure.** • **An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual changed in AIP composition.**				

10.1.5 WETLANDS

The development of the project will result in the modification of watercourse habitats where infrastructure traverses or is placed inside of the wetland. The clearing of topsoil and vegetation will be required for the installation and placement of infrastructure. The development across and/or within wetlands can also cause a disruption to the biotic community structure due to the fragmentation and deterioration of habitat. Thus, the loss, fragmentation and/or deterioration of wetland habitat will reduce the level of ecosystem service benefit provide by the affected systems. The development of the area in proximity of the watercourses would also create erosion hotspots which could contribute to the sedimentation of any receiving watercourses. Infrastructure in proximity to watercourses and located on a suitable slope could create preferential flow paths, causing increased surface run-off volumes and velocities causing erosion to the area.

The impacts associated with the proposed activities, was assessed in the impact matrix provided by EIMS and the results are given in Table 28 and the impacts associated with existing infrastructure is contained in Table 29. The impact assessments presented herein considers the proposed activities and the retrospective impacts for the existing infrastructure. The results obtained indicate that the retrospective impacts for the construction and

operational phases were of low consequence and significance. The mitigation measures proposed for retrospective assessment are primarily aimed at the continuation of operations, as the activities have already commenced and it is not possible to fully mitigate against impacts that have already occurred.

Table 28: Summative results of the Impact Assessment conducted for the proposed project

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Indirect loss, disturbance and degradation of wetlands	Construction	Medium to low -	Low -	Low -
Mitigation Measures				
• **Minimise the construction footprint and restrict vegetation clearing to the designated construction area.** • **Rehabilitate any disturbances within the watercourse by manually tilling the soil and replanting with native vegetation.** • **Limit vehicle and machinery movement near the wetland to designated routes.** • **Limit all other activities in watercourse areas to those explicitly authorised.** • **Install the pipeline above ground when crossing the watercourse, ensuring supports span the entire width wherever feasible.**				
Increased bare surfaces, runoff and potential for erosion	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• **Maintain access roads to prevent erosion and sedimentation.** • **If supports must be constructed within the watercourse, remove and replace soil in the order it was excavated, with topsoil and subsoil stockpiled separately. Store stockpiles on a flat surface outside the watercourse, protected from rain and erosion.** • **Implement and maintain a stormwater management system that diverts clean runoff away from contaminated areas and directs potentially contaminated water to treatment facilities before discharge.**				
Degradation of wetland vegetation and the introduction and spread of alien and invasive vegetation	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• **Monitor and manage invasive species in disturbed areas.** • **Minimise the construction footprint and restrict vegetation clearing to the designated construction area. Rehabilitate any disturbances within the watercourse by manually tilling the soil and replanting with native vegetation.**				
Increased sediment loads to downstream reaches	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• **Maintain access roads to prevent erosion and sedimentation.** • **If supports must be constructed within the watercourse, remove and replace soil in the order it was excavated, with topsoil and subsoil stockpiled separately. Store stockpiles on a flat surface outside the watercourse, protected from rain and erosion.**				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Contamination of wetlands with hydrocarbons due to machinery leaks and eutrophication of wetland systems with human sewerage and other waste	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• **Prohibit mixing of chemicals or concrete within the watercourse. Store all fuels and chemical mixtures in a bunded area, away from the watercourse.** • **Regularly inspect and maintain bunded areas around fuel, chemical, and waste storage.** • **Ensure all solid and hazardous waste is stored in designated, impermeable areas and regularly removed to licensed facilities.** • **Prevent any waste dumping or littering near the wetland.** • **Ensure all dirty water reports to a PCD (Pollution Control Dam).** • **Develop and implement emergency response protocols for potential pipeline leaks.**				
Alteration of hydrological regime	Construction	Medium to low -	Low -	Low -
Mitigation Measures				
• **Install the pipeline above ground when crossing the watercourse, ensuring supports span the entire width wherever feasible.** • **Limit all other activities in watercourse areas to those explicitly authorised.**				
Increased water inputs (clean) to downstream wetlands	Operation	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• **Implement and maintain a stormwater management system that diverts clean runoff away from contaminated areas and directs potentially contaminated water to treatment facilities before discharge.** • **Perform regular maintenance and inspections of the pipeline to ensure its integrity and prevent increased volumes of water (with potential contaminates) from entering the watercourse.** • **Develop and implement emergency response protocols for potential pipeline leaks.**				
Degradation of wetland vegetation and proliferation of alien and invasive species	Decommissioning	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• **Monitor and manage invasive species in disturbed areas.** • **Minimise the construction footprint and restrict vegetation clearing to the designated construction area. Rehabilitate any disturbances within the watercourse by manually tilling the soil and replanting with native vegetation.**				
Disruption of wetland soil profile, hydrological regime and increased sediment loads	Decommissioning	Medium to low -	Low -	Medium to low -
Mitigation Measures				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• If supports must be constructed within the watercourse, remove and replace soil in the order it was excavated, with topsoil and subsoil stockpiled separately. Store stockpiles on a flat surface outside the watercourse, protected from rain and erosion. • Limit vehicle and machinery movement near the wetland to designated routes. • Maintain access roads to prevent erosion and sedimentation.				

Table 29: Summative results of the Impact Assessment conducted for the existing impacts

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Indirect loss, disturbance and degradation of wetlands	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• Rehabilitate any disturbances within the watercourse by manually tilling the soil and replanting with native vegetation. • Limit vehicle and machinery movement near the wetland to designated routes. • Limit all other activities in watercourse areas to those explicitly authorised.				
Increased bare surfaces, runoff and potential for erosion	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• Maintain access roads to prevent erosion and sedimentation. • Implement and maintain a stormwater management system that diverts clean runoff away from contaminated areas and directs potentially contaminated water to treatment facilities before discharge. • Store stockpiles on a flat surface outside the watercourse, protected from rain and erosion.				
Degradation of wetland vegetation and the introduction and spread of alien and invasive vegetation	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• Monitor and manage invasive species in disturbed areas. • Rehabilitate any disturbances within the watercourse by manually tilling the soil and replanting with native vegetation.				
Increased sediment loads to downstream reaches	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• Maintain access roads to prevent erosion and sedimentation. • Store stockpiles on a flat surface outside the watercourse, protected from rain and erosion.				
Contamination of wetlands with hydrocarbons due to machinery leaks and eutrophication of wetland systems with human sewerage and other waste	Construction	Medium to low -	Low -	Medium to low -

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Mitigation Measures				
• **Regularly inspect and maintain bunded areas around fuel, chemical, and waste storage.** • **Ensure all solid and hazardous waste is stored in designated, impermeable areas and regularly removed to licensed facilities.** • **Prevent any waste dumping or littering near the wetland.** • **Ensure all dirty water reports to a PCD (Pollution Control Dam).**				
Alteration of hydrological regime	Construction	Medium to low -	Low -	Low -
Mitigation Measures				
• **Limit all other activities in watercourse areas to those explicitly authorised.** • **Implement and maintain a stormwater management system that diverts clean runoff away from contaminated areas and directs potentially contaminated water to treatment facilities before discharge.**				
Increased water inputs (clean) to downstream wetlands	Operation	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• **Implement and maintain a stormwater management system that diverts clean runoff away from contaminated areas and directs potentially contaminated water to treatment facilities before discharge.**				

10.1.6 SOILS AND AGRICULTURE

In accordance with the requirements for Environmental Authorisation rectification as per NEMA Section 24G, a retrospective assessment must take place to determine the potential state of the environment prior to development taking place as well as the likely impacts that the development has had on the area. The following list provides the identified retrospective impacts which contributed to the loss of land capability:

- Soil erosion: Bare soil surfaces within the proposed project area and along the 2 stockpiles contributed to increased susceptibility to wind and water erosion, leading to loss of topsoil.
- Soil compaction from vehicle traffic: The movement and operation of vehicles within the project footprint resulted in increased soil compaction, which negatively affected soil structure and permeability.
- Soil contamination: Surface flow from dirty water channels, spillages from the chrome wash plant led to soil contamination, impacting soil health and productivity, and
- Soil compaction and degradation from the existing stockpiles: The presence of existing stockpiles caused further soil compaction and land degradation, disturbing soil structure and reducing overall soil quality.

The following table provides the framework for the prospective impacts, albeit limited, for the proposed project (Table 30). Table 31 presents the anticipated impacts for the existing infrastructure.

Table 30: Summative results of the Impact Assessment conducted for the proposed project

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Soil compaction, Soil erosion, Land degradation and Soil contamination	Construction	Medium to low -	Low -	Low -
Mitigation Measures				
• **Avoidance of all high agricultural production land and other actively cultivated areas, where avoidance is not feasible stakeholder engagement should occur to compensate affected landowners;** • **Minimise project footprint as far as possible. Manage location of topsoil stripping stockpiling, demarcation of topsoil stockpiles and prevention of stockpile erosion and contamination. This can protect the topsoil stockpiles to keep it viable for rehabilitation purposes.** • **Make use of existing roads or upgrades tracks before new roads are constructed. The number and width of internal access routes must be kept to a minimum. Usually, areas with sandy soils are avoided as far as possible for heavy vehicles, areas dominated with sandy soils, dust suppressions methods should be implemented to reduce wind erosion during this phase;** • **Implementation of embedded controls such as geotextiles, gabion baskets can effective control soil erosion on-site;** • **Associated infrastructure foundations must be (preferably) located in already disturbed areas where possible;** • **Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas.** • **Reduce the dust generated by operational vehicles and earth moving machinery, through wetting the soil surface (with "dirty water") and putting up signs to enforce speed limits to enforce reduced speeds.** • **No non-environmentally friendly suppressants may be used as this could result in pollution of water sources.** • **A stormwater management plan must be implemented for the development. The plan must provide input into the road network and management measures;** • **Rehabilitation of the area must be initiated from the onset of the project. Soil stripped from infrastructure placement can be used for rehabilitation efforts; and** • **An alien invasive plant species and control programme must be implemented from the onset of the project.**				
Soil compaction, Soil erosion, Land degradation and Soil contamination	Operation	Medium to low -	Low -	Low -
Mitigation Measures				
• **Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas.** • **No non-environmentally friendly suppressants or cleaning agents may be used as this could result in pollution of water sources.**				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• **A stormwater management plan must be implemented for the development. The plan must provide input into the road network and management measures;** • **Rehabilitation of the area must be initiated from the onset of the project. Soil stripped from infrastructure placement can be used for rehabilitation efforts; and** • **An alien invasive plant species and control programme must be implemented from the onset of the project.**				
Soil compaction, Soil erosion, Land degradation and Soil contamination	Decommissioning	Low -	Low -	Medium to low -
Mitigation Measures				
• **Install erosion and sediment control measures (silt fences, sediment basins, straw bales).** • **Remove infrastructure, like racking, inverters, and electrical infrastructure. Remove all above-ground and below-ground cabling, foundations, and concrete pads.** • **Remove hazardous materials (batteries, oils, chemicals) for proper disposal.** • **Remove all construction debris and waste from the site.** • **Decompact soils in areas affected by heavy machinery (use subsoiling or deep ripping).** • **Replace and evenly spread any stockpiled topsoil.** • **Reseed or replant with native or pre-existing vegetation suited to the soil capability.** • **Maintain erosion and sediment controls until vegetation is re-established** • **Conduct post-restoration soil assessments (compaction, fertility, structure).** • **Document and report restoration outcomes to relevant authorities.**				
Soil compaction, Soil erosion, Land degradation and Soil contamination	Rehab and Closure	Low -	Low -	Low -
Mitigation Measure				
• **Install erosion and sediment control measures (silt fences, sediment basins, straw bales).** • **Remove all construction debris and waste from the site.** • **Loosen soils in areas affected by heavy machinery (use subsoiling or deep ripping).** • **Replace and evenly spread any stockpiled topsoil.** • **Reseed or replant with native or pre-existing vegetation suited to the soil capability.** • **Maintain erosion and sediment controls until vegetation is re-established** • **Conduct post-restoration soil assessments (compaction, fertility, structure).** • **Document and report restoration outcomes to relevant authorities.** • **Conduct a final site inspection with stakeholders and authorities.**				

Table 31: Summative results of the Impact Assessment conducted for the existing project

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Soil compaction, Soil erosion, Land degradation and Soil contamination	Construction	Medium to low -	Low -	Low -
Mitigation Measures				
• **Avoidance of all high agricultural production land and other actively cultivated areas, where avoidance is not feasible stakeholder engagement should occur to compensate affected landowners;** • **Minimise project footprint as far as possible. Manage location of topsoil stripping stockpiling, demarcation of topsoil stockpiles and prevention of stockpile erosion and contamination. This can protect the topsoil stockpiles to keep it viable for rehabilitation purposes.** • **Make use of existing roads or upgrades tracks before new roads are constructed. The number and width of internal access routes must be kept to a minimum. Usually, areas with sandy soils are avoided as far as possible for heavy vehicles, areas dominated with sandy soils, dust suppressions methods should be implemented to reduce wind erosion during this phase;** • **Implementation of embedded controls such as geotextiles, gabion baskets can effective control soil erosion on-site;** • **Associated infrastructure foundations must be (preferably) located in already disturbed areas where possible;** • **Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas.** • **Reduce the dust generated by operational vehicles and earth moving machinery, through wetting the soil surface (with "dirty water") and putting up signs to enforce speed limits to enforce reduced speeds.** • **No non-environmentally friendly suppressants may be used as this could result in pollution of water sources.** • **Rehabilitation of the area must be initiated from the onset of the project. Soil stripped from infrastructure placement can be used for rehabilitation efforts; and** • **An alien invasive plant species and control programme must be implemented from the onset of the project.**				
Soil compaction, Soil erosion, Land degradation and Soil contamination	Operation	Medium to low -	Low -	Low -
Mitigation Measures				
• **Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas.** • **No non-environmentally friendly suppressants or cleaning agents may be used as this could result in pollution of water sources.** • **Rehabilitation of the area must be initiated from the onset of the project. Soil stripped from infrastructure placement can be used for rehabilitation efforts; and** • **An alien invasive plant species and control programme must be implemented from the onset of the project.**				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Soil compaction, Soil erosion, Land degradation and Soil contamination	Decommissioning	Low -	Low -	Medium to low -
Mitigation Measures				
• **Install erosion and sediment control measures (silt fences, sediment basins, straw bales).** • **Remove infrastructure, like racking, inverters, and electrical infrastructure. Remove all above-ground and below-ground cabling, foundations, and concrete pads.** • **Remove hazardous materials (batteries, oils, chemicals) for proper disposal.** • **Remove all construction debris and waste from the site.** • **Loosen compacted soils in areas affected by heavy machinery (use subsoiling or deep ripping).** • **Replace and evenly spread any stockpiled topsoil.** • **Reseed or replant with native or pre-existing vegetation suited to the soil capability.** • **Maintain erosion and sediment controls until vegetation is re-established** • **Conduct post-restoration soil assessments (compaction, fertility, structure).** • **Document and report restoration outcomes to relevant authorities.**				
Soil compaction, Soil erosion, Land degradation and Soil contamination	Rehab and Closure	Low -	Low -	Low -
Mitigation Measure				
• **Install erosion and sediment control measures (silt fences, sediment basins, straw bales).** • **Remove all construction debris and waste from the site.** • **Loosen soils in areas compacted by heavy machinery (use subsoiling or deep ripping).** • **Replace and evenly spread any stockpiled topsoil.** • **Reseed or replant with native or pre-existing vegetation suited to the soil capability.** • **Maintain erosion and sediment controls until vegetation is re-established** • **Conduct post-restoration soil assessments (compaction, fertility, structure).** • **Document and report restoration outcomes to relevant authorities.** • **Conduct a final site inspection with stakeholders and authorities.**				

10.1.7 HYDROPEDOLOGY

The expected impacts on the catchment water regimes were assessed following the EIMS (2025) impact matrix methodology. The following existing infrastructure includes, expansion of one of the existing stockpile areas, construction of dirty water channels and culverts, installation of a clean water channel and Pollution Control Dam (PCD). Soil erosion, sedimentation or overland flows can occur due to increased traffic on the surface during the construction phase which can also result in compaction and surface sealing. Overland flow and potential erosion of terrestrial and wetlands soils can occur which can lead to loss of fertile topsoil. Soil erosion can also contribute to water pollution and siltation of rivers. Surface sealing will also promote head cutting instreams

and loss of fertile topsoil. Existing sealed areas can intercept lateral flow paths and remove connectivity between recharge zones and lateral flow zones. Alteration of this flow path will likely change the water regimes negatively, even though the impact should be acceptable. The draw-down effect on the water flows can also occur impacting the water regimes as well. These effects are manageable as the post mitigation for the existing infrastructure has been scored low and low to medium post mitigation for the proposed infrastructure.

The phase will include closure and ceasing of the processing plant, stockpiles and associated infrastructure processing activities. Some of the infrastructure will be removed from the site for decommissioning, this will be done with specialist on the site. Increased traffic will occur on-site, though the effects are expected to be minimal and manageable and mitigation measures will already be implemented. These effects are manageable as the post mitigation has been scored low.

Table 32: Impact assessment of erosion due to increased overland flow and potential decrease in subsurface lateral flow and return flow on the environment for the proposed infrastructure.

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Soil erosion due to increased overland flow	Construction	Medium to low -	Low -	Low -
Mitigation Measures				
• **Minimise soil compaction and keep the soil covered with mulching residue (plant or gravel) and vegetative cover;** • **Infiltration basin or trench only where necessary can minimise surface overflows or runoffs and allow water that runs off from roofs to settle and re-infiltrate;** • **Installation of pre-treatment stormwater practices which remove large sediment and other solids upstream of infiltration practice; and** • **Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.**				
Potential decrease in subsurface lateral flow and return flow	Construction	Medium to high -	Low -	Medium to Low -
Mitigation Measures				
• **Minimise soil compaction and keep the soil covered with mulching residue (plant or gravel) and vegetative cover;** • **Infiltration basin or trench only where necessary can minimise surface overflows or runoffs and allow water that runs off from roofs to settle and re-infiltrate;** • **Installation of pre-treatment stormwater practices which remove large sediment and other solids upstream of infiltration practice; and** • **Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as**				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.				
Soil erosion due to increased overland flow	Operation	Medium to low -	Low -	Low -
Mitigation Measures				
• **Minimise soil compaction and keep the soil covered with mulching residue (plant or gravel) and vegetative cover;** • **Infiltration basin or trench only where necessary can minimise surface overflows or runoffs and allow water that runs off from roofs to settle and re-infiltrate;** • **Installation of pre-treatment stormwater practices which remove large sediment and other solids upstream of infiltration practice; and** • **Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.**				
Potential decrease in subsurface lateral flow and return flow	Operation	Medium to low -	Low -	Medium to Low -
Mitigation Measures				
• **Minimise soil compaction and keep the soil covered with mulching residue (plant or gravel) and vegetative cover;** • **Infiltration basin or trench only where necessary can minimise surface overflows or runoffs and allow water that runs off from roofs to settle and re-infiltrate;** • **Installation of pre-treatment stormwater practices which remove large sediment and other solids upstream of infiltration practice; and** • **Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.**				
Soil erosion due to increased overland flow	Decommissioning and Closure	Low -	Low -	Low -
Mitigation Measures				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• **Minimise soil compaction and keep the soil covered with mulching residue (plant or gravel) and vegetative cover;** • **Infiltration basin or trench only where necessary can minimise surface overflows or runoffs and allow water that runs off from roofs to settle and re-infiltrate;** • **Installation of pre-treatment stormwater practices which remove large sediment and other solids upstream of infiltration practice; and** • **Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.**				
Potential decrease in subsurface lateral flow and return flow	Decommissioning and Closure	Low -	Low -	Low -
Mitigation Measures				
• **Minimise soil compaction and keep the soil covered with mulching residue (plant or gravel) and vegetative cover;** • **Infiltration basin or trench only where necessary can minimise surface overflows or runoffs and allow water that runs off from roofs to settle and re-infiltrate;** • **Installation of pre-treatment stormwater practices which remove large sediment and other solids upstream of infiltration practice; and** • **Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.**				

Table 33: Impact assessment of erosion due to increased overland flow and potential decrease in subsurface lateral flow and return flow on the environment for the existing infrastructure.

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Soil erosion due to increased overland flow	Construction	Medium to low -	Low -	Low -
Mitigation Measures				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• **Minimise soil compaction and keep the soil covered with mulching residue (plant or gravel) and vegetative cover;** • **Infiltration basin or trench only where necessary can minimise surface overflows or runoffs and allow water that runs off from roofs to settle and re-infiltrate;** • **Installation of pre-treatment stormwater practices which remove large sediment and other solids upstream of infiltration practice; and** • **Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.**				
Potential decrease in subsurface lateral flow and return flow	Construction	Medium to low -	Low -	Medium to Low -
Mitigation Measures				
• **Minimise soil compaction and keep the soil covered with mulching residue (plant or gravel) and vegetative cover;** • **Infiltration basin or trench only where necessary can minimise surface overflows or runoffs and allow water that runs off from roofs to settle and re-infiltrate;** • **Installation of pre-treatment stormwater practices which remove large sediment and other solids upstream of infiltration practice; and** • **Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.**				
Soil erosion due to increased overland flow	Operation	Medium to low -	Low -	Low -
Mitigation Measures				
• **Minimise soil compaction and keep the soil covered with mulching residue (plant or gravel) and vegetative cover;** • **Infiltration basin or trench only where necessary can minimise surface overflows or runoffs and allow water that runs off from roofs to settle and re-infiltrate;** • **Installation of pre-treatment stormwater practices which remove large sediment and other solids upstream of infiltration practice; and** • **Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the**				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.				
Potential decrease in subsurface lateral flow and return flow	Operation	Medium to low -	Low -	Low -
Mitigation Measures				
• **Minimise soil compaction and keep the soil covered with mulching residue (plant or gravel) and vegetative cover;** • **Infiltration basin or trench only where necessary can minimise surface overflows or runoffs and allow water that runs off from roofs to settle and re-infiltrate;** • **Installation of pre-treatment stormwater practices which remove large sediment and other solids upstream of infiltration practice; and** • **Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.**				
Soil erosion due to increased overland flow	Decommissioning and Closure	Low -	Low -	Low -
Mitigation Measures				
• **Minimise soil compaction and keep the soil covered with mulching residue (plant or gravel) and vegetative cover;** • **Infiltration basin or trench only where necessary can minimise surface overflows or runoffs and allow water that runs off from roofs to settle and re-infiltrate;** • **Installation of pre-treatment stormwater practices which remove large sediment and other solids upstream of infiltration practice; and** • **Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.**				
Potential decrease in subsurface lateral flow and return flow	Decommissioning and Closure	Low -	Low -	Low -
Mitigation Measures				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• **Minimise soil compaction and keep the soil covered with mulching residue (plant or gravel) and vegetative cover;** • **Infiltration basin or trench only where necessary can minimise surface overflows or runoffs and allow water that runs off from roofs to settle and re-infiltrate;** • **Installation of pre-treatment stormwater practices which remove large sediment and other solids upstream of infiltration practice; and** • **Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.**				

10.1.8 GEOHYDROLOGY

The potential environmental impacts associated with the proposed new infrastructure—such as the pollution control dam (PCD), clean and dirty water separation systems, and related channels—have been reviewed in the context of the existing operations assessed under the Section 24G application. Based on the nature, location, and function of the planned infrastructure, the associated impacts are anticipated to be materially similar in type, extent, and significance to those already identified and assessed.

As such, these impacts are considered to be sufficiently addressed by the current impact assessment. Should any deviations or unique site-specific impacts arise during implementation, these will be managed under the existing environmental management framework and mitigation measures already in place.

The project is considered viable from a groundwater perspective, provided that the recommended mitigation measures and supporting studies are implemented to better define water availability and quality on site. The associated risks can be effectively managed through regular monitoring of groundwater quality, water levels, and abstraction volumes from the aquifer.

Table 34: Impact assessment of groundwater impacts associated with the project for existing and proposed infrastructure.

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Impacts on water quality by plant operations	Construction	Medium to High -	Medium to low -	Medium to low -
Mitigation Measures				
• **Currently there are no groundwater monitoring boreholes at the Rietfontein Chrome Plant. Geophysical surveys need to be conducted on site and around the facility to determine the placement of monitoring boreholes in an upgradient position, on-site and down gradient position of the stockpiles, pollution control dam and plant.** Monitoring should be conducted in accordance with the requirements of the existing WUL and any future requirements relatered yto the formal amendment of the WUL.				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• **Monitoring of abstraction boreholes water quality to ensure water quality is to standard required by plant.** • **Stormwater management infrastructure through a lined PCD dam will be in place to mitigate the risk to groundwater.**				
Impacts on water quantity by abstraction boreholes. (Pumping from abstraction boreholes)	Construction	Medium to High -	Medium to low -	Medium to low -
Mitigation Measures				
• **48–72-hour aquifer testing of the three boreholes (RP01, RP02 and RP03) to determine a sustainable yield for the aquifer and the effect on each other.** Once determined, authorised volumes should be set as the target and should not be exceeded. • **Monitoring of abstraction volumes and monitoring bore-holes water levels to ensure abstraction rates are sustainable and managed.** • **Stormwater management infrastructure through a lined PCD dam will be in place to mitigate the risk to groundwater.**				

11 IWWMP ACTION PLAN

Table 35: IWWMP Action plan

Mitigation measures	Phase	Frequency	Responsible party for implementation	Monitoring party	Target	Performance indicators (monitoring tool)
Dust Generation						
Regular water sprays on unpaved roads to ensure at least 75% control efficiency. Literature indicates an application rate >2 litre/m²/hour should achieve this. Monthly physical inspection of road surface, daily visual observation of entrained dust emissions from unpaved road surfaces.	Construction Operation Decommissioning	Ongoing for the duration of project phase	Applicant ECO	Contractor (in the event complaints are received)	NAAQS for PM10 and PM2.5 NDCR for dustfall	National ambient air quality standards and dust control regulations are met at all off-site AQSRs SRs
Drop height into haul trucks to be kept at a minimum for ore and product. Tipping onto ROM and product storage piles to be controlled through water sprays. This should result in a 50% control efficiency. Keep material handled by frontend loaders moist to achieve a control efficiency of 50%, especially during dry periods. Regular clean-up at loading areas	Construction Operation Decommissioning	Ongoing for the duration of project phase	Applicant ECO	Contractor (in the event complaints are received)	NAAQS for PM10 and PM2.5 NDCR for dustfall	National ambient air quality standards and dust control regulations are met at all off-site AQSRs
Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all areas of construction or bare ground. This includes wetting of exposed soft soil surfaces.	Construction Operation Decommissioning	Ongoing for the duration of project phase Life of operation Life of Operation	Applicant ECO Project Manager	Contractor (in the event complaints are received)	NAAQS for PM10 and PM2.5 NDCR for dust fall	National ambient air quality standards and dust control regulations are met at all off-site AQSRs

Mitigation measures	Phase	Frequency	Responsible party for implementation	Monitoring party	Target	Performance indicators (monitoring tool)
A dust management plan must be compiled and implemented.	Operation Construction Decommissioning Operation Construction Decommissioning		Contractor Project manager, Environmental Officer & Contractor	As per the air quality report and the dust monitoring program. Dust monitoring program	Apply dust suppression Compile & implement a dust management plan before construction	Dust monitoring results and suppression logs Plan & dustfall monitoring reports
Groundwater						
Currently there are no groundwater monitoring boreholes at the Rietfontein Chrome Plant. Geophysical surveys need to be conducted on site and around the facility to determine the placement of monitoring boreholes in an upgradient position, on-site and down gradient position of the stockpiles, pollution control dam and plant.	Construction Operation	Prior to construction and ongoing throughout lifespan of mine	Applicant	Monthly water levels and quarterly groundwater quality samples	Ensure compliance with relevant legislation	No legal directives Legal compliance audit scores
Monitoring of abstraction boreholes water quality to ensure water quality is to standard required by plant.	Construction Operation	Prior to construction and ongoing throughout lifespan of mine	Applicant	Monthly water levels and quarterly groundwater quality samples	Ensure compliance with relevant legislation	No legal directives Legal compliance audit scores
48–72-hour aquifer testing of the three boreholes (RP01, RP02 and RP03) to determine a sustainable yield for the aquifer and the effect on each other.	Construction Operation	Prior to construction and ongoing throughout lifespan of mine	Applicant	One off	Ensure compliance with relevant legislation	No legal directives Legal compliance audit scores
Monitoring of abstraction volumes and monitoring boreholes water levels to ensure abstraction rates are sustainable and managed.	Construction Operation	Prior to construction and ongoing throughout lifespan of mine	Applicant	Daily measurement of abstractions rates through flow meter on abstraction boreholes	Ensure compliance with relevant legislation	No legal directives Legal compliance audit scores

Mitigation measures	Phase	Frequency	Responsible party for implementation	Monitoring party	Target	Performance indicators (monitoring tool)
Stormwater management infrastructure through a lined PCD dam will be in place to mitigate the risk to groundwater.	Construction Operation	Prior to construction and ongoing throughout lifespan of mine	Applicant	Once off	Ensure compliance with relevant legislation	
Soils and Agriculture						
Cleared areas must be rehabilitated and stabilised to avoid impacts to adjacent areas	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Rehabilitation implemented	Implement a rehabilitation plan
Make use of existing access routes as much as possible before new routes are considered. Any selected "new" route must be authorized, minimizing disturbances to the wetland areas.	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	All routes authorised	Design engineer to consider this for final layout
Keep excavation and soil heaps clear of potential contaminates or waste	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Soil heaps are managed	Separate topsoil and sub-soil
Lightly till any disturbed soil around the development footprint to avoid compaction	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Plan is implemented	Implement a rehabilitation plan
Ensure soil stockpiles sand are sufficiently safeguarded against rain wash	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Plan is implemented	Implement soil management plan
The use of herbicides is not recommended (opt for mechanical removal).	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Avoided buffer area	Demarcate buffer area
Make sure all excess consumables are removed from site and deposited at an appropriate waste facility	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Restricted to demarcated area	Restrict to designated working/storage/service areas
Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g., concrete) in such a way as to prevent them leaking and entering wetlands or buffer areas	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Restricted to demarcated area	Restrict to designated working/storage/service areas
Provide appropriate sanitation facilities for workers during construction and service them regularly	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Ablution facilities provided and serviced	Provide service ablution for contractors/labour

Mitigation measures	Phase	Frequency	Responsible party for implementation	Monitoring party	Target	Performance indicators (monitoring tool)
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected must be disposed of at a licensed disposal facility	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Plan is implemented	Implement waste management plan
The Contractor must be in possession of an emergency spill kit that must be complete and available at all times on site	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Plan is implemented	Implement spill response plan
Any possible contamination of topsoil by hydrocarbons must be avoided. Any contaminated soil must be treated in situ or be placed in containers and removed from the site for disposal in a licensed facility	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Plan is implemented	Implement spill response plan
Implement dust suppression on stockpiles like the gravel roads.	Construction Operational	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Plan is implemented	Implement scheduled dust suppression plan
Implement erosion control methods like mulching, geotextile sheets, reduce soil compaction, chemical spills which can affect soil fertility.	Operational	From operational and ongoing throughout lifespan of mine	Environmental Officer	Throughout phase	Implement an alien vegetation management plan	Implement an alien vegetation management plan
Ensure successful rehabilitation of areas disturbed during construction and these areas are stabilized to avoid impacts to adjacent areas	Operational Decommissioning and rehab	From operational and ongoing throughout lifespan of mine including Rehabilitation and closure Phase	Contractor/ Environmental Officer	Throughout phase	Implement soil re-vegetation, spillage or residual waste contamination rehabilitation plan	Should be assessed once a year for soil compaction, fertility, and erosion.
Rehabilitation of the Project area will be undertaken, including the ripping of the compacted soil surfaces and establishment of vegetation.	Decommissioning and rehab	Rehabilitation and closure Phase	Contractor/ Environmental Officer	Throughout phase	Implement soil compaction rehabilitation	Implement erosion control, revegetation and alien vegetation management plan on disturbed areas
Ensure rehabilitation of contaminated soil by removal of pollutants by implementing methods such as bioremediation and phytoremediation	Decommissioning and rehab	Rehabilitation and closure Phase	Contractor/ Environmental Officer	Throughout phase	Implement soil spillage or residual waste contamination rehabilitation plan	Should be assessed once a year for soil compaction, fertility, and erosion.
Vegetation and Habitats						

Mitigation measures	Phase	Frequency	Responsible party for implementation	Monitoring party	Target	Performance indicators (monitoring tool)
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by alien invasive plant species. All grazing mammals must be kept out of the areas that have recently been re-planted.	Operation	Operational phase	Environmental Officer & Contractor	Quarterly for up to two years after the closure	Revegetation	Rehabilitation progress reports & vegetation monitoring
All activities must make use of existing roads and tracks as far as practically and feasibly possible. No new roads are to be constructed under any circumstance. Parking of vehicles may only occur in already modified areas.	Operation Construction Decommissioning	Life of operation	Project Manager	Ongoing	No construction of new roads	Vehicle movement logs & site maps
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. The water resources must to be protected and all activities that could result in a spill should occur away from them. • Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. • No servicing of equipment on site unless necessary. • All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel	Operation Construction Decommissioning	Life of operation	Environmental Officer & Contractor	Ongoing	Zero hydrocarbon spills	Spill incident logs & equipment inspection records

Mitigation measures	Phase	Frequency	Responsible party for implementation	Monitoring party	Target	Performance indicators (monitoring tool)
etc.) in such a way as to prevent them from leaking and entering the environment. • Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem. All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the PAOI.						
It must be made an offence for any staff member to remove any indigenous plant species from the PAOI or bring any alien species in. This is to prevent the spread of exotic or alien species or the illegal collection of plants.	Operation Construction Decommissioning	Life of operation	Project manager, Environmental Officer	Ongoing	No movement of plants into or out of site (outside of rehab)	Staff induction records & incident reports
A protected plant walkdown must be conducted prior to development activities to confirm the presence and location of any protected plant species that may be found on site. The confirmed protected tree species (*Sclerocarya birrea*) is not to be disturbed in any way without acquiring the relevant permits for its relocation or destruction.	Planning Pre-construction	Planning Phase, Pre-Construction	Project Manager, Environmental Officer & Contractor	Once-off	Protected plant walkdown	Walkdown report & permit records
Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation.	Operation Construction Decommissioning	Life of operation	Project Manager	Ongoing	Revegetation	Rehabilitation records & site inspections
A fire management plan needs to be compiled and implemented to restrict the impact fire would have on the surrounding areas.	Operation Construction Decommissioning	Life of operation	Environmental Officer & Contractor	During Phase	Implementation of fire management plan	Approved plan & fire drill records
All construction waste must be removed from site at the closure of the construction phase.	Construction	Construction phase	Environmental Officer & Contractor	During Phase	Waste removal	Waste removal certificates & site clearance reports
Invasive Alien Plants						
An Alien Invasive Plant Management Plan must be compiled and implemented. This should be	Operation Construction Decommissioning	Life of operation	Project manager, Environmental	Twice a year	Compile, implement, &	Plan document & annual review reports

Mitigation measures	Phase	Frequency	Responsible party for implementation	Monitoring party	Target	Performance indicators (monitoring tool)
regularly updated to reflect the annual changed in AIP composition.			Officer & Contractor		update the plan annually	
The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths.	Operation Construction	Construction/Operational Phase	Project manager, Environmental Officer & Contractor	Life of operation	Keep all construction footprints to the minimum and within demarcated areas	Site maps and inspection reports
A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests.	Operation Construction Decommissioning	Life of operation	Environmental Officer & Health and Safety Officer	Life of operation	Implement pest control plan with no use of poisons	Plan & pest monitoring records
Waste management						
Waste management must be a priority**,** and a Solid Waste Management Plan must be developed and implemented. All waste must be collected and stored effectively. All solid waste collected shall be disposed of at a licensed disposal facility. All lliquid wate produced at infrastructure such as septic tanks must also be operated responsibly and disposal records must be retained.	Operation Construction Decommissioning	Life of operation	Project Manager Contractor	Weekly	All waste collected, stored, and disposed at licensed facilities	Waste manifests & disposal certificates
Litter, spills, fuels, chemical and human waste in and around the PAOI must be minimised and controlled according to the waste management plan.	Construction Closure	Construction/Closure Phase	Environmental Officer & Health and Safety Officer	Daily	Zero visible waste	Daily inspection logs
Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site.	Construction	Construction Phase	Environmental Officer & Contractor	Every occurrence	No cement mixing on ground	Incident logs & site inspections
Toilets at the recommended Health and Safety standards must be provided. These should be emptied regularly and once no longer required, they must be pumped dry to prevent leakage into	Operation Construction Decommissioning	Life of operation	Environmental Officer & Health and Safety Officer	Daily	Toilets per Health and Safety standards	Toilet maintenance logs

Mitigation measures	Phase	Frequency	Responsible party for implementation	Monitoring party	Target	Performance indicators (monitoring tool)
the surrounding environment and removed from site.						
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility within every 10 days at least.	Operation Construction Decommissioning	Life of operation	Environmental Officer & Health and Safety Officer	Ongoing	Waste bins & timeous disposal	Bin logs & waste collection records
Where a registered disposal facility is not available close to the PAOI, the Contractor shall provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site	Operation Construction Decommissioning	Life of operation	Project Manager Health and Safety Officer Contractor	Ongoing	No burning of waste	Method statement & inspection reports
Refuse bins must be emptied and secured. Temporary storage of domestic waste must be in covered waste skips. Maximum domestic waste storage period will be 10 days. Recycling is encouraged.	Operation Construction Decommissioning	Life of operation	Project Manager Health and Safety Officer Contractor	Ongoing	All bins secured & covered	Site inspection & recycling records
Environmental Awareness Training						
All personnel to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the PAOI to inform contractors and site staff of the presence of species, their identification, conservation status and importance, biology, habitat requirements and management requirements within the Environmental Authorisation and the EMPr.	Operation Construction Decommissioning	Life of operation	Project Manager Health and Safety Officer Contractor Environmental Officer	As needed	100% of personnel to complete environmental awareness training before site access	Signed attendance register
Erosion						
A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion.	Operation Closure	Operational Phase and Closure	Project manager, Environmental Officer, Contractor	During Phase	Develop and implement plan	Plan & rehabilitation progress reports

Mitigation measures	Phase	Frequency	Responsible party for implementation	Monitoring party	Target	Performance indicators (monitoring tool)
Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds where relevant.	Operation Construction Decommissioning	Life of operation	Project manager, Environmental Officer	Ongoing	Enforce speed limits & wet soil surfaces as needed	Speed monitoring & dust suppression logs
Only existing access routes and walking paths may be made use of.	Operation Construction Decommissioning	Life of operation	Project manager, Environmental Officer	Ongoing	No new access roads	Route maps & inspection reports
A stormwater management plan must be compiled and implemented.	Operation Construction Decommissioning	Life of operation	Project manager, Environmental Officer	Before construction phase: Ongoing	Compile & implement plan before construction	Plan & stormwater inspection records
A pipe leak spill management plan must be put in place to ensure that should there be any pipe leaks, bursts or overflow that it does not run into the surrounding areas. This includes the installation of leak warning and detection systems. Precautions must be taken against the erosion damage that would be caused by unplanned pipe leaks, such as the planting of dense indigenous pioneer grass seeds across all bare earth areas surrounding the pipes. Monitoring of the pipeline must be undertaken to detect leaks and monitoring should be undertaken at least once a week. Water monitoring must also be undertaken to ensure that there has been no runoff into the nearby water sources.	Operation Construction Decommissioning	Life of operation	Environmental Officer & Contractor	During Phase and Ongoing Monitoring	Zero uncontained pipe leaks	Leak detection logs & water quality monitoring
Wetlands						
Install the pipeline above ground when crossing the watercourse, ensuring supports span the entire width wherever feasible. Limit all other activities in watercourse areas to those explicitly authorised.	Construction	During watercourse crossing	Contractor ECO	Weekly	100% of watercourse crossings use above-ground supports where feasible; no unauthorised	Photographic records of crossings

Mitigation measures	Phase	Frequency	Responsible party for implementation	Monitoring party	Target	Performance indicators (monitoring tool)
					activities in watercourse	
If supports must be constructed within the watercourse, remove and replace soil in the order it was excavated, with topsoil and subsoil stockpiled separately. Store stockpiles on a flat surface outside the watercourse, protected from rain and erosion.	Construction	During excavation and backfilling	Contractor ECO	Daily	Soil horizons reinstated in correct order; no evidence of sedimentation or erosion	Soil profile photographs, soil stockpile checks for erosion and photographic record of any backfilled areas
Minimise the construction footprint and restrict vegetation clearing to the designated construction area. Rehabilitate any disturbances within the watercourse by manually tilling the soil and replanting with native vegetation.	Construction Operation	During and after construction	Contractor ECO	Monthly – Construction Quarterly (1 year) - Operation	No clearing outside demarcated area; 100% of disturbed areas rehabilitated with native species	Vegetation clearance maps; rehabilitation progress reports; native species survival survey data
Monitor and manage invasive species in disturbed areas.	Construction Operation Decommissioning	Throughout all phases	Contractor ECO	Monthly	No new invasive species established; all detected invasives removed within 2 weeks	Survey and removal records; ECO verification
Prohibit mixing of chemicals or concrete within the watercourse. Store all fuels and chemical mixtures in a bunded area, away from the watercourse.	Construction	Throughout construction	Contractor ECO	Weekly	Zero incidents of chemical/concrete mixing in watercourse; all storage areas bunded and compliant	Incident log reviews; Storage area inspection, ECO spot checks
Perform regular maintenance and inspections of the pipeline to ensure its integrity and prevent increased volumes of water (with potential contaminates) from entering the watercourse.	Operation	As per maintenance schedule	Contractor ECO	As per maintenance schedule	100% of scheduled inspections completed; no unreported leaks or failures	Maintenance and inspection records
Develop and implement emergency response protocols for potential pipeline leaks.	Operation	Annual drills; as needed	Contractor ECO	Annual drills; as needed	Emergency response plan in place and tested; response time within 2 hours of incident	Drill and incident records; ECO review

Mitigation measures	Phase	Frequency	Responsible party for implementation	Monitoring party	Target	Performance indicators (monitoring tool)
Implement and maintain a stormwater management system that diverts clean runoff away from contaminated areas and directs potentially contaminated water to treatment facilities before discharge.	Operation	Throughout all phases	Contractor ECO	Monthly	No evidence of contaminated runoff entering watercourse; system operational at all times	Stormwater system inspection logs; water quality analysis reports (turbidity, hydrocarbons, nutrients) at discharge points
Ensure all dirty water reports to a PCD (Pollution Control Dam).	Construction Operation	Throughout all phases	Contractor Environmental Officer ECO	Daily	100% of dirty water directed to PCD; no overflow or bypass events	Capacity and discharge logs
Regularly inspect and maintain bunded areas around fuel, chemical, and waste storage.	Construction Operation	Throughout all phases	Contractor ECO	Weekly	All bunded areas intact and functional; no leaks or spills detected	Bund inspection checklists; spill incident logs; audit reports
Ensure all solid and hazardous waste is stored in designated, impermeable areas and regularly removed to licensed facilities.	Construction Operation	Throughout all phases	Contractor ECO	Monthly	No waste stored outside designated areas; all waste removed to licensed facilities within 7 days	Waste storage inspection and audit reports
Prevent any waste dumping or littering near the wetland.	Construction Operation	Throughout all phases	Contractor ECO	Daily	Zero incidents of illegal dumping or littering	Waste storage inspection and audit reports
Limit vehicle and machinery movement near the wetland to designated routes.	Construction Operation	Throughout all phases	Contractor ECO	Daily	No evidence of off-route vehicle/machinery movement	Access route inspection and audit reports
Maintain access roads to prevent erosion and sedimentation.	Construction Operation	Throughout all phases	Contractor ECO	Monthly	No visible erosion or sedimentation from access roads	Road condition inspection logs; post-rainfall erosion checklists; maintenance activity logs
Hydropedology						

Mitigation measures	Phase	Frequency	Responsible party for implementation	Monitoring party	Target	Performance indicators (monitoring tool)
Operate and maintain septic tank system in accordance with design specifications and WUL conditions; remove sludge via licensed contractor	Operation	As required (typically quarterly or when capacity is reached)	Site Manager / Maintenance Team	Environmental Officer	No overflow, leakage or system failure	Inspection records; maintenance logs; absence of spills or ponding
Conduct routine inspection of septic tank, pipelines and associated wastewater infrastructure; repair leaks immediately	Operation	Weekly inspections; immediate response to incidents	Maintenance Team	Environmental Officer	All leaks identified and repaired promptly	Inspection checklists; incident reports; maintenance records
Prevent discharge of untreated wastewater to the environment and ensure all sewage is contained within the septic system	Operation	Continuous	Site Manager	Environmental Officer	No untreated wastewater released to environment	Visual inspection; site audits; absence of contamination pathways
Monitor septic system performance and integrate with groundwater monitoring where applicable	Operation	Quarterly (aligned with groundwater monitoring programme)	Environmental Officer	Independent Auditor / Environmental Manager	No deterioration in groundwater quality linked to septic system	Groundwater monitoring results;compliance reports
Minimise soil compaction during construction activities and restrict vehicle movement to designated areas	Construction	Continuous during construction	Contractor	ECO	Soil permeability maintained	Site inspections; photographic records
Maintain soil cover (vegetation, mulch or gravel) on exposed areas to prevent erosion	Construction & Operation	Monthly and after rainfall events	Contractor / Site Manager	ECO	No active erosion or sediment loss	Visual inspections; erosion monitoring
Install infiltration measures (e.g. trenches or basins) where required to promote stormwater infiltration	Construction	Once-off during installation; maintained thereafter	Contractor / Engineer	ECO / Environmental Officer	Stormwater infiltrated and not causing runoff impacts	Inspection of infrastructure; functionality checks
Install and maintain silt traps or pre-treatment structures to reduce sediment load in stormwater	Construction & Operation	Monthly inspections and after storm events	Contractor / Site Manager	ECO	Reduced sediment entering stormwater systems	Sediment accumulation checks; inspection records
Maintain minimum buffer zones (≥15 m) around wetlands and drainage lines and rehabilitate disturbed areas	All phases	Continuous	ECO / Site Manager	Environmental Manager	No unauthorised encroachment into sensitive areas	Compliance audits; site inspections; GIS verification
Implement stormwater controls to prevent concentration of runoff and promote infiltration	Construction & Operation	Continuous	Engineer / Site Manager	ECO	Controlled runoff with no erosion or flooding	Visual inspections; stormwater performance checks

Mitigation measures	Phase	Frequency	Responsible party for implementation	Monitoring party	Target	Performance indicators (monitoring tool)
Conduct routine inspection and maintenance of pipelines; implement leak detection and repair programme	Operation	Monthly inspections; immediate repair of leaks	Maintenance Team	Environmental Officer	No uncontrolled leakage from pipelines	Inspection records; leak logs; maintenance reports

12 CONTROL AND MONITORING

Monitoring forms a critical component of the Integrated Water and Waste Management Plan (IWWMP), providing a mechanism to assess the effectiveness of mitigation measures, detect potential impacts early, and ensure ongoing compliance with regulatory requirements. The monitoring programme has been developed to address both abiotic and biotic components of the receiving environment, including groundwater, surface water, and aquatic ecosystems.

The monitoring framework presented in this section has been informed by the findings of the specialist studies, including the Freshwater Specialist Assessment, and is designed to track the key impact pathways identified during the environmental assessment process. These include, inter alia, alterations to hydrology, erosion and sedimentation, water quality deterioration, and impacts to wetland ecosystems.

Monitoring results will be used to inform adaptive management, ensuring that appropriate corrective actions are implemented where required.

12.1 GROUNDWATER MONITORING

Groundwater monitoring is required to assess the potential for contamination arising from site activities, particularly those associated with dirty water storage, processing infrastructure, and stormwater management systems. Monitoring will provide an indication of whether pollutants are migrating into the subsurface environment and affecting groundwater quality.

Groundwater monitoring will focus on the following aspects:

- Groundwater levels, to assess changes in aquifer conditions;
- Physio-chemical parameters, including pH, electrical conductivity (EC), and total dissolved solids (TDS)';
- Major ions and nutrients; and
- Metals, including chromium and other site-specific contaminants.

Monitoring will be undertaken on a quarterly basis, unless otherwise specified by licence conditions. Results will be compared against baseline data and relevant water quality guidelines to identify any trends or exceedances.

12.2 SURFACE WATER MONITORING

Surface water monitoring will be undertaken to assess the quality of runoff and any potential impacts on downstream receiving environments, including wetlands and drainage features associated with the Sandspruit system.

The monitoring programme will include:

- Measurement of physicochemical parameters (pH, EC, turbidity);
- Analysis of nutrients (nitrates and phosphates);
- Monitoring of metals, particularly chromium; and
- Visual inspections for evidence of pollution, erosion, or sedimentation.

Monitoring will be undertaken at key discharge points and downstream receptor locations on a quarterly basis, with additional inspections following major rainfall events.

12.3 WETLAND MONITORING PROGRAMME

The presence of delineated wetlands within the Project Area of Influence (PAOI), including Hydrogeomorphic (HGM) units identified during the Freshwater Specialist Assessment, necessitates the implementation of a structured wetland monitoring programme. Particular emphasis is placed on HGM 2, which was identified as being "At Risk" due to infrastructure crossing and associated activities.

The wetland monitoring programme has been developed in accordance with the findings of the specialist assessment and is designed to track the key risks identified, including altered hydrology, erosion and sedimentation, vegetation disturbance, and potential water quality impacts.

12.3.1 OBJECTIVES OF WETLAND MONITORING

The primary purpose of wetland monitoring is to assess the condition and functioning of wetland systems over time and to ensure that mitigation measures are effective. The objectives of the monitoring programme are as follows:

- To detect changes in wetland hydrology and ecological functioning
- To assess the effectiveness of mitigation measures and buffer zones
- To identify early signs of erosion, sedimentation, or pollution
- To monitor impacts associated with infrastructure, particularly the pipeline crossing
- To ensure compliance with applicable regulatory requirements

12.3.2 MONITORING APPROACH AND METHODOLOGY

Wetland monitoring will be undertaken using recognised South African assessment methodologies to ensure consistency with the specialist study and best practice guidance. The monitoring programme will incorporate both qualitative observations and semi-quantitative assessments.

The following methodologies will be applied:

- WET-Health assessments to evaluate wetland condition and track changes in the Present Ecological State (PES);
- WET-EcoServices assessments to evaluate the provision of ecosystem services;
- Vegetation assessments to evaluate species composition, cover, and disturbance; and
- Hydrological observations to assess flow patterns, saturation, and water distribution.

These methods align with those applied in the specialist assessment and ensure continuity in monitoring and evaluation.

12.3.3 MONITORING INDICATORS

Monitoring will focus on key indicators that reflect the primary impact pathways identified in the specialist assessment. These indicators include:

- Hydrological indicators, such as the extent and duration of saturation, distribution of surface water, and evidence of altered flow paths;
- Vegetation indicators, including species diversity, vegetation cover, and the presence of alien and invasive species;
- Geomorphological indicators, such as erosion features, sediment deposition, and bank stability; and
- Water quality indicators, including pH, EC, turbidity, nutrients, and metals.

These indicators collectively provide a comprehensive assessment of wetland structure and function.

12.3.4 MONITORING FREQUENCY

The frequency of wetland monitoring is aligned with the different phases of the project and the sensitivity of the receiving environment.

Monitoring will be undertaken as follows:

- Monthly inspections during the construction phase in sensitive areas;

- Bi-annual biomonitoring during the operational phase (wet and dry seasons); and
- Annual monitoring following decommissioning for a minimum of two to three years.

12.3.5 TRIGGER LEVELS AND CORRECTIVE ACTIONS

Defined trigger levels will be used to identify when management intervention is required. These triggers include:

- A decline in wetland condition (PES category);
- Increased invasion by alien plant species;
- Evidence of active erosion or sedimentation; and
- Deterioration in water quality.

Where trigger levels are exceeded, corrective measures will be implemented, including erosion control, invasive species removal, rehabilitation, and improvements to stormwater management systems.

12.4 BIOMONITORING PROGRAMME

In addition to physicochemical and hydrological monitoring, a biomonitoring programme will be implemented to assess the ecological integrity of wetland and aquatic ecosystems. Biomonitoring provides an integrated measure of environmental health by evaluating the response of biological communities to environmental conditions over time.

This programme complements the wetland monitoring component and enhances the ability to detect cumulative or long-term impacts that may not be evident from water quality monitoring alone.

12.4.1 OBJECTIVES OF BIOMONITORING

The objectives of the biomonitoring programme are to:

- Assess the ecological integrity of wetlands and associated aquatic habitats;
- Detect cumulative and long-term environmental impacts;
- Evaluate the success of mitigation and rehabilitation measures; and
- Provide data to support adaptive environmental management.

12.4.2 BIOMONITORING METHODS

Biomonitoring will be conducted using established ecological assessment tools commonly applied in South Africa. These include:

- Aquatic macroinvertebrate assessments (e.g. SASS5), where applicable;
- Riparian and wetland vegetation assessments; and
- Habitat integrity assessments to evaluate ecosystem disturbance.

These methods provide complementary insights into ecosystem health and functioning.

12.4.3 MONITORING LOCATIONS AND FREQUENCY

Biomonitoring will be undertaken at representative locations within the PAOI, including:

- Identified wetland systems, with priority given to HGM 2;
- Drainage features and areas potentially affected by development; and
- Downstream receptor environments.

Monitoring will be conducted on an annual basis during the operational phase, with additional assessments undertaken following significant disturbance or rehabilitation activities.

12.4.4 DATA INTERPRETATION AND ADAPTIVE MANAGEMENT

Biomonitoring results will be analysed in relation to baseline conditions and assessed over time to identify trends. Where possible, comparisons will be made with reference conditions to provide context.

Declining trends in ecological condition will trigger further investigation and the implementation of corrective measures. Monitoring results will be incorporated into ongoing environmental management processes and reporting to the relevant authorities.

12.5 INTEGRATION OF MONITORING PROGRAMMES

The monitoring programmes described above are integrated to ensure a comprehensive understanding of both the physical and ecological condition of the receiving environment. Groundwater, surface water, wetland monitoring, and biomonitoring collectively provide a robust framework for detecting impacts and guiding management actions.

This integrated approach supports the principles of adaptive management and ensures that the objectives of the IWWMP, as well as regulatory requirements, are achieved.

13 CONCLUSION

This Integrated Water and Waste Management Plan (IWWMP) has been developed to assess and manage water use, waste generation, and potential environmental impacts associated with the Clover Alloys Rietfontein Plant. The IWWMP integrates the findings of various specialist studies, including freshwater, geohydrological, hydropedological, and biodiversity assessments, to provide a comprehensive and site-specific framework for environmental management.

The conclusions presented in this section are based on the outcomes of these assessments, the identified impact pathways, and the mitigation and monitoring measures proposed throughout this report.

13.1 REGULATORY STATUS OF THE ACTIVITY

The Rietfontein Plant operates under an existing Integrated Water Use Licence (IWUL No. 07/A22H/AG/5292) issued in terms of the National Water Act (Act 36 of 1998). As part of the current application process, the following regulatory processes are being undertaken:

- An application for the amendment of the existing Water Use Licence, to accommodate additional or modified water uses; and
- A Section 24G application in terms of the National Environmental Management Act (Act 107 of 1998), to obtain retrospective environmental authorisation for listed activities already undertaken.

The activities assessed in this report trigger water uses in terms of Section 21 of the National Water Act, including abstraction, watercourse impacts, and the disposal of waste to water resources.

In addition, the project has been assessed against the requirements of the National Environmental Management: Waste Act (Act 59 of 2008), and it has been confirmed that no listed waste management activities requiring a waste management licence are triggered.

13.2 SUMMARY OF KEY FINDINGS

The assessment of the project has identified a number of important findings in relation to water management, groundwater, wetlands, and waste management.

13.2.1 WATER MANAGEMENT

The project incorporates a clean and dirty water separation system, which is designed to minimise the risk of contamination of clean water resources. Dirty water generated on site is captured and contained within a Pollution Control Dam (PCD), with sufficient capacity to accommodate operational requirements and storm events.

The implementation of water reuse and recycling measures contributes to improved water use efficiency, reducing reliance on external water sources and supporting sustainable operation.

13.2.2 GROUNDWATER

The geohydrological assessment indicates that groundwater abstraction associated with the site is sustainable under current operating conditions, provided that abstraction rates are managed in accordance with licence conditions.

Groundwater monitoring and numerical modelling have demonstrated that:

- Contaminant plumes are largely contained within the site boundary;
- Localised impacts may occur in specific areas and require continued monitoring; and
- No significant regional groundwater impacts are expected.

The ongoing implementation of the groundwater monitoring programme is essential to verify these findings and ensure that conditions remain acceptable.

13.2.3 WETLANDS AND AQUATIC ECOSYSTEMS

The freshwater assessment identified several wetland systems within the Project Area of Influence, classified according to hydrogeomorphic (HGM) units. Of these, the HGM 2 wetland has been identified as being “At Risk”, primarily due to the presence of infrastructure crossing and associated disturbances.

Potential impacts to wetlands include:

- Alteration of hydrological regimes;
- Erosion and sedimentation;
- Vegetation disturbance and invasion by alien species; and
- Deterioration in water quality.

However, the assessment concludes that, with the implementation of appropriate mitigation measures and the proposed monitoring programmes, these impacts can be reduced to acceptable levels. The inclusion of both wetland monitoring and biomonitoring programmes ensures that the ecological integrity of these systems will be tracked over time and that any emerging impacts will be identified and addressed.

13.3 MONITORING AND ADAPTIVE MANAGEMENT

A key outcome of this IWWMP is the development of an integrated monitoring programme, which includes groundwater, surface water, wetland, and biomonitoring components. This monitoring framework provides the basis for ongoing environmental management and compliance verification.

Monitoring results will be:

- Regularly reviewed to identify trends and potential issues
- Used to inform adaptive management decisions
- Reported to the relevant authorities in accordance with licence conditions

The IWWMP is intended to function as a living document, which will be updated periodically to reflect monitoring outcomes, audit findings, and any changes to site operations or regulatory requirements.

13.4 OVERALL ENVIRONMENTAL ACCEPTABILITY

Based on the findings of the specialist studies, the impact assessment, and the proposed mitigation and monitoring measures, the project is considered to be environmentally acceptable, subject to the implementation of the recommendations contained in this report.

The assessment indicates that:

- Impacts on water resources can be effectively mitigated
- Wetland and aquatic ecosystem integrity can be maintained
- Groundwater resources can be protected through appropriate management
- Waste management practices are adequate to prevent pollution

Accordingly, the project is considered suitable for authorisation and licensing, subject to compliance with all applicable conditions.

13.5 KEY COMMITMENTS

Clover Alloys commits to the following:

- Full implementation of the IWWMP and associated Action Plan
- Ongoing compliance with Water Use Licence conditions

- Implementation of the prescribed monitoring programmes
- Protection of groundwater, surface water, and wetland systems
- Continuous improvement through monitoring, auditing, and adaptive management

These commitments are essential to ensuring responsible environmental management and long-term sustainability.

With the effective implementation of the proposed mitigation measures, monitoring programmes, and management actions, the project is expected to minimise environmental impacts and maintain the integrity of surrounding water resources and ecosystems.

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15 APPENDICES

Appendix 1: Civil design Report

Appendix 2: Wetland Delineation Report

Appendix 3: DWS Risk Matrix

Appendix 4: Geohydrology Assessment

Appendix 5: Hydropedology Assessment

Appendix 6: Soil and Agriculture Assessment

Appendix 7: Terrestrial Biodiversity Assessment

Appendix 8: Public Participation Report