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**DRAFT HYDROLOGICAL STUDY FOR A MINING PERMIT APPLICATION FOR THE MINING
OF IRON ORE AND MANGANESE IN A CERTAIN PART OF PORTION 01 OF THE
FARM GOEDGEDACHT 27 IQ: SITUATED IN THE MAGISTERIAL DISTRICT OF
VENTERDORP.**

**AQUATIC BIODIVERSITY IMPACT ASSESSMENT
REPORT (PHASE 1)**

Report Submitted to:

Gono Africa Mining (Pty) Ltd

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May 2023

PREPARED BY



Specialist Declaration

I, **Blessing Taenzana**, declare that –

- I act as the independent specialist (reviewer) in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the Aquatic biodiversity specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct.

Compiled by:



B. Taenzana (*Pr.Sci.Nat.*)

Date: 11 May 2023

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NAME	INSTITUTION
	Department of Mineral Resources (DMR)

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1 INTRODUCTION

1.1 Background

Murara Environmental Consultants (PYT) LTD has been appointed by Gono Africa Mining (Pty) Ltd to undertake a baseline aquatic biodiversity assessment for a mining permit application for the mining of iron ore and manganese in a certain part of Portion 01 of the farm Goedgedacht 27 IQ: situated in the magisterial district of Venterdorp in the North West Province. This assessment is undertaken to aid in decision makers on approval of the site for a mining permit activities.

The following section details the approach and the methods used in the aquatic biodiversity impact assessment.

1.2 Project Description

The project comprises the following activities.

- Mining of Iron Ore and Manganese. Only five (5) trenches will be opened with the size of 10 m x 10 m. The depth of the trenches will be 10 meters with only one trench to be opened at a given time.
- Furthermore, concurrent rehabilitation will be practiced and monitored by appointed environmental officer on a regular base.
- The existing roads and tracks already traverse the proposed mining site and where practicable, these roads will be used.
- Water will be supplied to the mining operation from Local Municipality.
- Clearance of indigenous vegetation.

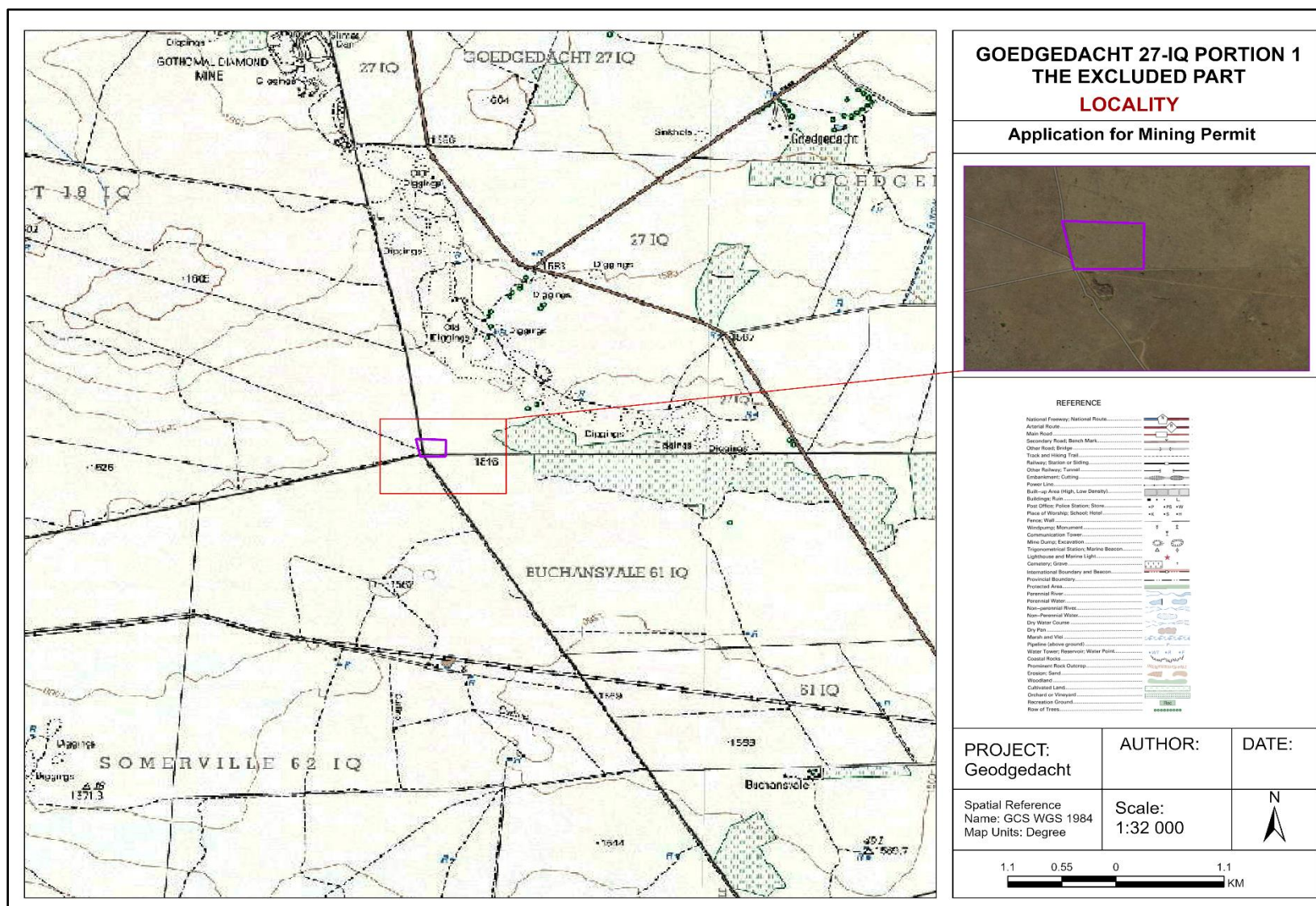


Figure 1-1: Project Location

2 SCOPE OF WORK

The study included the following:

- **Baseline hydrology** - Undertake a detailed desktop assessment which includes, review of all existing information for the project area including, mean annual runoff (MAR), mean annual precipitation (MAP), mean annual evaporation (MAE), catchment areas of interest, topography, identification of surface water resources (rivers, drainage paths etc.) and storm rainfall depths for various recurrence intervals.
- **Aquatic biodiversity impact assessment** – Undertake a surface water impact assessment for the mining activities.
- To assess the risk to aquatic biodiversity of a major catastrophic during mining activities to aquatic resources.
- Recommendation - Recommend mitigation measures associated with the results of the hydraulic analysis and aquatic biodiversity impact assessment.

3 BASELINE HYDROLOGY

3.1 Introduction

To inform the impacts and risk assessments presented by the mining activities, an understanding of baseline hydrology is required. This section presents a comprehensive review of various information sources and defines the baseline climatic and hydrological conditions of the site and surroundings.

3.2 Climatic Conditions

3.2.1 Rainfall and Evaporation

The study area is situated within the summer rainfall region of South Africa and within the medium rainfall band of 600+ mm to 800 mm per annum. The general climate of the study site is similar to that of Pretoria. Climatic registers show that Pretoria normally receives about 573 mm of rain per year, with most rainfall occurring during summer. The area normally receives the lowest rainfall (0 mm) in June and the highest (110 mm) in January. The average midday temperatures for Pretoria range from 18,3 °C in June, to 27,5 °C in January. The region is the coldest during July when temperatures drop on average to around 1,7 °C during the night. Frost is not uncommon in the area of the study site during the cold, winter months, but not frequent (www.saexplorer.co.za). The mining area is situated within the temperate interior climatic zone, but relatively close to the cold interior zone of South Africa.

Table 3-3-1 presents the average monthly rainfall and evaporation adopted for the site.

Table 3-3-1: Average Monthly Rainfall and Evaporation

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (mm)	90	74	57	30	13	5.7	2.6	6.5	17.8	53.9	78.9	89.2	518
Lake Evaporation	198	197	209	198	170	161	129	180	87	97	135	168	1700

3.3 Hydrology Setting

3.3.1 Introduction

The proposed site is located within the Upper Vaal water management area with the major rivers catchment being the Vaal River.

3.3.2 Regional Hydrology

The project site is located in the east of the secondary catchment C2 more specifically within the C23F quaternary catchment drained into Upper Vaal River. The surface water attributes of the C23F quaternary catchment are summarised in Table 3-3-2. This includes the Mean Annual Precipitation (MAP), Mean Annual Runoff (MAR), and Mean Annual Evaporation (MAE) as obtained from the Water Resources of South Africa 2012 Study (WR2012).

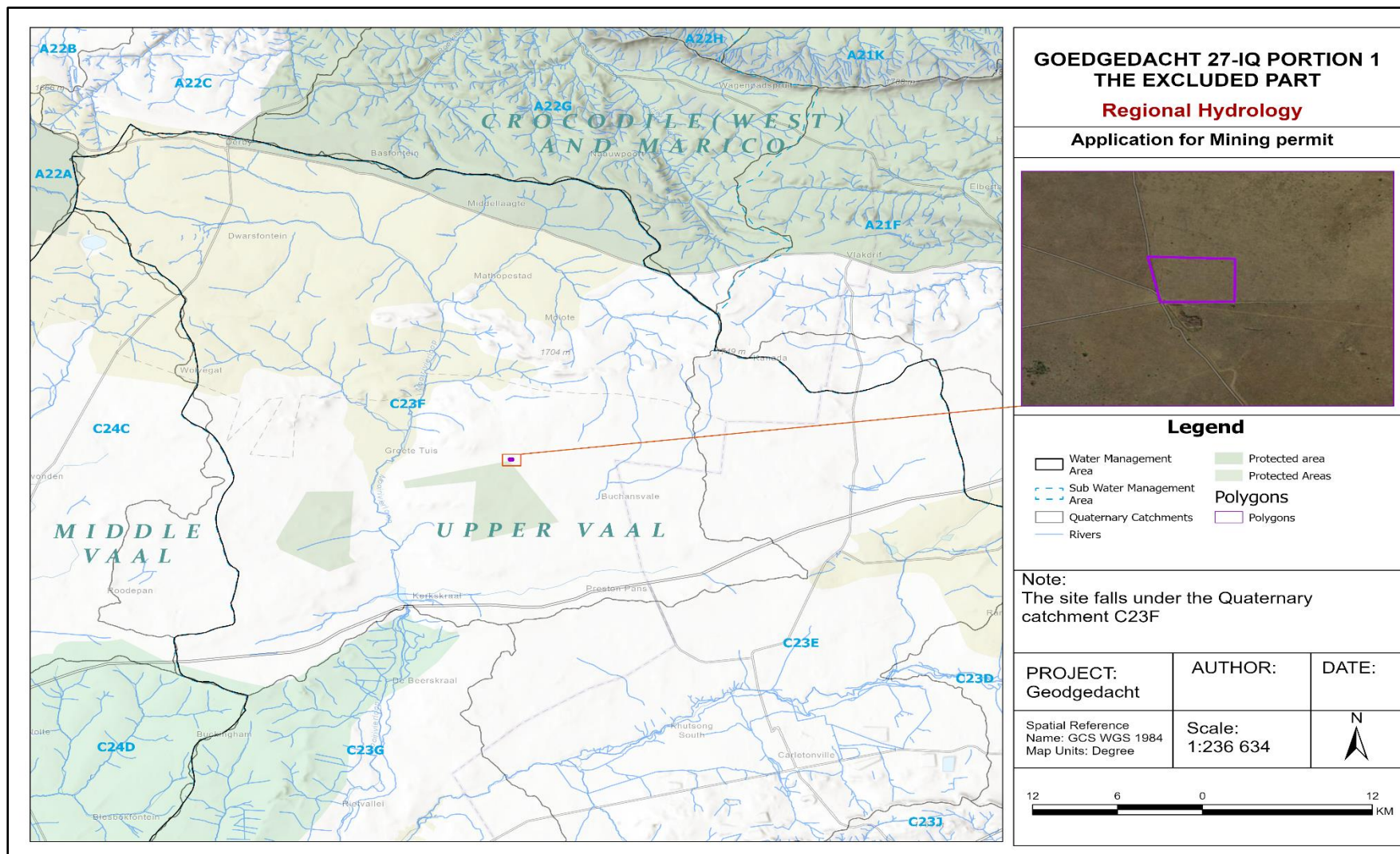


Figure 3-1: Regional Hydrology

Table 3-3-2 : Summary of the Surface Water Attributes of the C23F Quaternary Catchment

Quaternary Catchment	Catchment Area km ²	MAE (mm)	Evaporation Zone	Rainfall Zone	MAP (mm)	MAR (Mm ³)*
C23F	1324	1700	C	C	605	23

*Mm³ refers to a Million cubic metres

The MAP was derived from the Design Rainfall Extraction Utility (Smithers and Schulze, 2002) from an average of closest stations to the site.

3.3.3 Local Hydrology

The proposed site is located within the Upper Vaal WMA with the major rivers catchment being the Vaal River.

3.3.4 Topography and Vegetation

The area is considered vulnerable with target of 24%. The proposed project is adjacent to Somerville private nature reserve. Small extent conserved in statutory reserves (Sterkfontein Caves—part of the Cradle of Humankind World Heritage Site, Oog Van Malmanie, Abe Bailey, Boskop Dam, Schoonspruit, Krugersdorp, Olifantsvlei, Groenkloof) and in at least six private conservation areas. Almost a quarter already transformed for cultivation, by urban sprawl. Erosion very low (84%) and low (15%) (Mucina & Rutherford, 2006).

4 AQUATIC BIODIVERSITY IMPACT ASSESSMENT

4.1 Introduction

Informed by the baseline hydrology and current activities along the proposed mining site, the potential impacts of the current activities which may impact the surface water receptors as well as sensitivity of the aquatic biodiversity resources are discussed in this section.

The Impact Assessment process is not to provide an incontrovertible rating of the significance of various aspects, but rather to provide a structured, traceable and defensible methodology of rating the relative significance of impacts in a specific context. Gono Africa Mining (Pty) Ltd and the Contractors must take greater understanding of the impacts of their activities and the issues which need to be addressed by mitigation and give the regulators and decision makers information on which to base their decisions.

4.1.1 Impact Rating

The impact rating process is designed to provide a numerical rating of the various environmental impacts identified by use of the Input-Output model.

The equations and calculations were derived using Aucamp (2009).

The significance rating process follows the established impact/risk assessment formula:

$$\text{Significance} = \text{Consequence} \times \text{Probability}$$

Where $\text{Consequence} = \text{Severity} + \text{Spatial Scale} + \text{Duration}$

And $\text{Probability} = \text{Likelihood of an impact occurring}$

The matrix calculates the rating out of 147, whereby severity, spatial scale, duration and probability are each rated out of seven. The weighting is then assigned to the various parameters for positive and negative impacts in the formula. Impacts are rated prior to mitigation and again after consideration of the mitigation measure.

4.2 Receptors sensitivity

In 2015, the North West Department: Rural, Environment and Agricultural Development (NWREAD) developed the North West Biodiversity Sector Plan ("NW BSP"). In essence, the NW BSP is a map guiding areas of conservation concern for the North West Province. Two maps have been developed, namely one for terrestrial biodiversity, and the other for freshwater/aquatic biodiversity.

The NW BSP maps the terrestrial ecosystems of the North West under the following categories:

- **Critical Biodiversity Areas ("CBAs")** – areas of high biodiversity value, needed to meet biodiversity targets. These areas should be maintained in natural or near natural state;
- **Ecological Support Areas ("ESAs")** – these areas support CBAs, but are not essential for meeting conservation targets;

- **Other Natural Areas** – these areas have natural characteristics but have not been earmarked as priority areas for conservation. They perform a range of biological as well as ecological functions; and
- **Heavily Modified Areas** – areas which have been impacted and have had a significant or complete loss of natural habitat and ecological function.

According to the terrestrial NWBSP and Figure 4.1, the study area is classified as Ecological Support Areas (ESA) 1- Aquatic areas. ESAs are terrestrial and aquatic areas not critical in terms of meeting biodiversity targets but are important for maintaining Critical Biodiversity Areas and/or delivering ecosystem services. They can be aquatic features, e.g. Specific River reaches which feed into aquatic Critical Biodiversity Areas; or terrestrial features, e.g. the riparian habitat surrounding and supporting aquatic Critical Biodiversity Areas and are often vital for delivering ecosystem services.

The site where open cast mine activities will be done is declared as Ecological Support Areas (ESA) 1- Aquatic areas and as per NWBSP the site is deemed ***actively discouraged for open cast mine activities***.

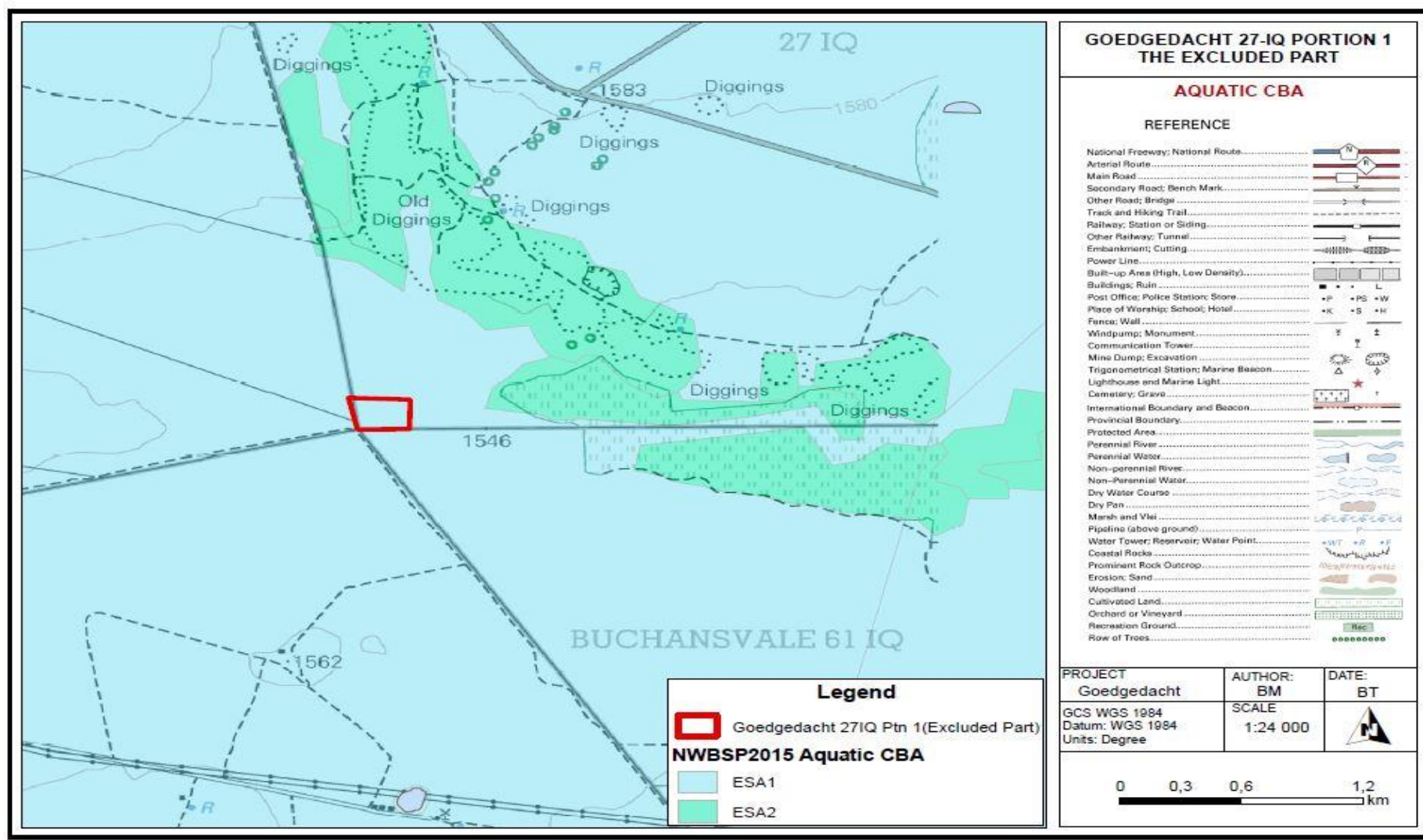


Figure 4-1: Aquatic sensitivity map

4.3 Impact Assessment and Mitigation measures

The impacts of the proposed mining activities are assessed based on the impact's magnitude, as well as the receptor's sensitivity, culminating in impact significance for the most important impacts that require management.

Based on a review of the project description and activities, the project will have additional land clearings during the drilling and bulk sampling. The following project activities are likely to cause an impact to aquatic biodiversity during the mining phases:

- Excavation of five (5) trenches; site camp established with mobile ablution facility, mobile site office and waste storage facilities will also be established;
- Out of 4.79 ha only 0.9 ha will be disturbed and general surface rehabilitation will be conducted concurrently;
- Concurrent rehabilitation will be practiced and monitored by appointed environmental officer on a regular base.
- Existing roads and tracks already traverse the proposed mining site and where practicable, these roads will be used.
- Water will be supplied to the mining operation from Local Municipality.

The proposed mining project design must include various mitigation by design measures- in terms of aquatic biodiversity preservation. Theoretically without these measures the impacts on the aquatic environment would be much higher. Proper storm water management and drainage is paramount on the proposed site.

There are significant pressures on the aquatic biodiversity resources from mining activities and judicious planning and management is required to ensure that the aquatic life is not depleted by the proposed activities.

Water quality however remains at risk of impacts during mining phases of the project. In terms of potential surface water quality, oil spills, aggregate and cement disposal and illegal waste disposal could prove catastrophic as the site declared as Ecological Support Area 1 based on National Freshwater Ecosystem Priority Areas (NFEPA) fish Catchment since the catchment supports NFEPA Fish Rivers. In general, the proposed activity will pose *medium* impacts to the existing aquatic life if improper management practices are implemented.

The potential unmitigated impacts (unrealistic worst-case scenario), and residual water impacts of the project after considering the design mitigation measures proposed are qualitatively assessed in this section and presented together with proposed mitigation in **Table 5-4-1**.

All measures implemented for the mitigation of impacts, should be regularly reviewed as best practice and as compliance with various licences issued on site by authorities.

The impacts of the current activities are assessed based on the impact's magnitude, as well as the receptor's sensitivity, culminating in impact significance for the most important impacts that require management.

Table 5-4-1: Rating of the Potential Impacts during the Mining Phase

Impact	Pre-mitigation:					Recommended mitigation	Post-mitigation:				
	Duration	Extent	Intensity	Likelihood	Significance		Duration	Extent	Intensity	Probability	Significance
Water pollution from mobilised sediment material during mining activities, by disturbances of the surface	Short term	Local	Moderate - negative	Likely	Moderately - negative	<ul style="list-style-type: none"> - Ensure erosion control measures are in place and collect eroded water for settling from the mining sites by ensuring the use of silt traps - Prevent water from flowing through the areas under mining by temporary diversion as well as undertaking the work in the dry season if possible 	Short term	Limited	Low - negative	Improbable	Negligible - negative
Hydrocarbon contamination on aquatic biodiversity during mining	Beyond project life	Local Area	High - negative	Likely	Moderate - negative	<ul style="list-style-type: none"> - The mining vehicles should regularly undergo maintenance 	Project Life	Limited	Moderate - negative	Unlikely	Negligible - negative

Impact	Pre-mitigation:					Recommended mitigation	Post-mitigation:				
	Duration	Extent	Intensity	Likelihood	Significance		Duration	Extent	Intensity	Probability	Significance
Contamination of the water resources with sediments from mining activities thereby destroying the National Freshwater Ecosystem Priority Areas (NFEPA)	Beyond project life	Municipal Area	High - negative	Likely	Moderate - negative	- Mining activities should be conducted in the best practicable way that will minimise loss of aquatic habitat to the Fish.	Project Life	Limited	Moderate - negative	Unlikely	Negligible - negative
Temporary impedance of surface water flow during site establishment	Short term	Local	Moderate - negative	Highly probable	Moderately-negative	- Ensure that the identified drainage and water channels are not blocked by any waste generated. -Ensure that even small drainage channels are identified and managed.	Short term	Local	Moderate - negative	Highly probable	Minor - negative

Impact	Pre-mitigation:					Recommended mitigation	Post-mitigation:				
	Duration	Extent	Intensity	Likelihood	Significance		Duration	Extent	Intensity	Probability	Significance
Water pollution from contaminated storm water and possible leaks	Project lifetime	Local	Moderate - negative	Likely	Moderately - negative	- Proper storm water management must be installed.	Project life	Limited	Low - negative	Improbable	Negligible - negative

4.4 Cumulative Impacts

Negative water quality impacts can result in the deterioration of aquatic biodiversity resources and loss of habitat thereof. All runoffs must be properly managed.

5 MONITORING PROGRAMME

5.1 Monitoring Program

A monitoring programme is essential as a tool to identify any risks of potential impacts as they arise and to assist in impact management plans by assessing if mitigation measures are operating effectively. Monitoring should be implemented throughout the mining activities. This monitoring must be a collective effort for all role players and not only to the applicant.

5.1.1 Monitoring

Recommendations on surface water monitoring are presented in Table 7-5-1.

Table 7-5-1 : Surface Water Monitoring Programme

Monitoring Element	Description	Frequency
Pollutants	Site walkovers to determine the condition of the tributary and identify any leaks or overflows, blockages, overflows and system malfunctions for immediate remedial action	Before, during and after the mining activities.
Aquatic biodiversity	All aquatic biodiversity on the proposed mining site must be carefully returned to their habitats with no harm on them.	Always

5.1.2 Reporting

Reporting on the above monitoring should be as follows:

- Internal Reporting – Monthly
 - Drainage Inspections
 - Pollutant Inspections
- External Reporting –Once off:
 - Discharges/ Spillages / Emissions

Accidental spillages and discharges should be reported as when they occur to the relevant authorities.

6 CONCLUSION

Although the proposed mining activities are located in Ecological Support Area 1, the proposed mining activities pose a **moderate** risks to local surface water resources and aquatic life since the mining activities are not going to cover a wider spread area. Though the site is located under Ecological Support Areas (ESA) 1- Aquatic areas as per North West Biodiversity Sector Plan (NW BSP) (2015) in which *Surface mining activities are actively discouraged*, the proposed mining activities will not significantly affect the aquatic biodiversity of the area since there are no National Freshwater Ecosystem Priority Areas (NFEPA) wetlands and rivers on the site. Out of 4.79 ha only 0.9 ha will be disturbed and general surface rehabilitation will be conducted concurrently. The mining area to be affected is not large area relative to the area extend of the site, that could affect the aquatic biodiversity of the site. Mining activities must only be restricted to the positions mapped on Figure 1-2 and appropriate measures as discussed in this phase 1 report, must be implemented to ensure that surface water quality of the entire catchment area is not deteriorated by the proposed mining activities. The mining footprint and clearing of vegetation for the proposed mining activities must be kept to a minimum. Careful planning must take place to limit the removal of indigenous vegetation.

Rehabilitation must be seen as an ongoing process and not defined to one specific phase. Concurrent rehabilitation will be practiced and monitored by appointed environmental officer on a regular base. Rehabilitation will include the re-vegetation of any disturbed area and the creation of a stable land surface that is not subject to erosion or inundation of water. Re-vegetation should aim to accelerate the natural succession processes so that a healthy plant/riparian community develops.

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