

ZAMA MINING RESOURCES (PTY) LTD

Zama Mining Project

(MaCarthy-Zama)

DRAFT SCOPING REPORT

**DRAFT SCOPING REPORT IN SUPPORT OF AN APPLICATION FOR ENVIRONMENTAL
AUTHORISATION FOR OPEN PIT MINING AND PROSPECTING ACTIVITIES**

SEPTEMBER 2022

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(MACARTHY-ZAMA)

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AUTHORISATION FOR OPEN PIT MINING AND PROSPECTING ACTIVITIES**

SEPTEMBER 2022

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Zama Mining Resources (Pty) Ltd

Mining right application reference: NC30/5/1/2/2/10219MR

Zama Mining Project

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Kerry Fairley	Associate Consultant	Environmental Assessment Practitioner Report Author		8 September 2022
Trevor Hallatt	Senior Scientist	Report Reviewer		8 September 2022

EXECUTIVE SUMMARY

Introduction

Zama Mining Resources (Pty) Ltd (Zama Mining) is applying for a mining right for iron ore, manganese and other minerals on the properties listed in Table 1. Application has also been made for Environmental Authorisation in terms of the Environmental Impact Assessment (EIA) Regulations published under the National Environmental Management Act. An integrated water use licence will also be required to support the proposed activities.

The application area is located approximately 24 km south of Kathu, immediately east of Olifantshoek and 35 km north of Postmasburg, Northern Cape in the Gamagara and Tsantsabane Local Municipal areas.

Table: Properties included in mining right application areas

Compass 665 RE**	Dikepeng 661 PT 2	Hartley 573 RE	Lucknow 652 RE	Mamatlun 651 RE	Uys 663 PT 3**
Cox 571 RE	Dikepeng 661 PT 4	Hilliard 664 RE**	MaCarthy 559 RE*	Mamatlun 651 PT 2	Uys 663 PT 4**
Cox 571 PT 1	Gamaliets 659 RE	Hilliard 664 PT 1**	Makala 646 RE	Tomkins 657 RE	Uys 663 PT 6**
Cox 571 PT 2	Gamaliets 659 PT 1	Knapp 658 RE	Makala 646 PT 1	Tomkins 657 PT 1	Knapp 658 PT 4
Cox 571 PT 3	Gaston 650 RE	Knapp 658 PT 1	Mamaghodi 654 RE	Tomkins 657 PT 2	Knapp 658 PT 5
Crossley 660 RE**	Gaston 650 PT 1	Knapp 658 PT 2	Mamaghodi 654 PT 1	Tomkins 657 PT 3	Knapp 658 PT 7
Dikepeng 661 PT 1	Groot Venn 777 RE**	Knapp 658 PT 3	Uys 663 PT 1	Uys 663 PT 2	

*proposed mining activities **prospecting priority areas

The following authorisations are required for the proposed project:

- Section 22 of the Minerals and Petroleum Resources Development Act for a mining right.
- Environmental Impact Assessment Regulations (GNR. 982 of 4 December 2014, as amended) for Activities 1, 9, 10, 14, 14, 17, 27 & 56 of Listing Notice 1 (GNR 983) and Activities 4, 6, 15, 17 & 27 of Listing Notice 2 (GNR 984).
- GNR. 921 as amended by GN. 633 of 24 July 2015 published under National Environmental Management: Waste Act for Activities 7, 10, and 11 under Category B for the development of waste rock dumps and backfilling of mined out pits at MaCarthy, and for the disposal of drill residue originating from prospecting activities.

- Section 2(a), (c&i), (g) and, (j) of the National Water Act (No. 36 of 1998) for water uses associated with the mining activities.

Project Description

The mining right application area has been divided into two sections namely MaCarthy currently designated for mining activities, and the Western Properties with areas prioritised for prospecting activities. As indicated in Table 1, only some of the farms on the Western Properties are currently include in the prospecting works programme. Therefore, only mining activities at MaCarthy and planned prospecting activities are included in the current application for environmental authorisation and will be assessed as part of the Environmental Impact Assessment. Additional mining and prospecting activities in the mining right area would need to be supported by a future application for environmental authorisation.

MaCarthy

Zama Mining is planning to commence with mining at MaCarthy. Iron ore will be extracted from several open pits at a rate of approximately 1 million tonnes per annum. Overburden and waste rock will be dumped in waste rock dumps on surface. Waste rock will also be backfilled into the mined-out areas. The mining at MaCarthy is planned to be contractor mined throughout the life of the mine. No processing will be undertaken at MaCarthy and the iron ore will be trucked/transported for processing elsewhere. Currently the plan is to supply iron ore to Sishen mine. Supporting infrastructure will include workshops, parking, administration areas, roads, water supply infrastructure, explosives magazine and photovoltaic solar facilities.

Access to the site from the regional road (R325) will be gained through the neighbouring Salene mine and options will be considered to minimise impacts on Salene's planned activities as well as to ensure a safe connection to the R325. A Traffic Impact Assessment will be undertaken to inform these decisions. Options for the transport of iron ore to customer/s will also be investigated and informed by the Traffic Impact Assessment.

The water supply options for MaCarthy also still need to be confirmed and are dependent on the outcome of the Groundwater Assessment. This will determine the dewatering requirements as well as the impact on groundwater resources. Provision has been made for a pipeline connection to the Vaal-Gamagara pipeline which will either be used to import or export water from the site in agreement with the Regional Water Supply Authority (currently Bloem Water). Current indications show that water will need to be purchased from the water supply scheme.

The MaCarthy site is divided into two sections by an extensive drainage area formed by an unnamed tributary of the Vaal-Gamogara River. The Transnet Freight railway that links Postmasburg and Hotazel follows the valley of the river through the middle of the site. To reduce the need to cross the river and rail line, the supporting infrastructure has been duplicated in the western and eastern sections of the mine.

The current duration of the MaCarthy section is estimated at 12 years, with construction planned to commence in 2024 and the initial ore being extracted from 2025 to 2034, which will be followed by a year of rehabilitation.

Prospecting Priority Areas

Prospecting within the Priority Prospecting areas will entail diamond and percussion drilling. Infrastructure will be limited to that associated with drilling rigs (wooden hut, portable toilet, safety barricades and waste bins) and site access roads. There will also be the requirement for water supply and the options of trucking/transporting from off-site sources versus sourcing from on-site groundwater supply will be investigated. Similar options for the disposal of mineral residue originating from drilling (drill chips and slimes) will be investigated in terms of the development of an on-site facility versus off-site disposal at an existing facility. Should on-site activities be selected the groundwater impacts will need to be assessed.

Site Sensitivities and Potential Impacts

Based on the initial screening and scoping studies, sensitive terrestrial and freshwater habitats occur at MaCarthy. The tributary of the Ga-Mogara River is classified as a National Freshwater Ecosystem Priority Area and the river thus needs to be protected. There are no Critical Biodiversity Areas located within the MaCarthy property although most of the area is classified as an Ecological Support Area.

The farmstead at MaCarthy has high heritage significance and must also be avoided. The initial layout of MaCarthy has been planned to avoid currently known sensitive ecological and heritage sites. The layout will be updated based on additional findings of specialist studies. Such studies will include a Terrestrial Biodiversity Impact Assessment, Freshwater Impact Assessment, and a Heritage Impact Assessment.

The MaCarthy site is located amongst several other mining sites. The cumulative impact of the MaCarthy activities on air quality, particularly dust, and noise levels will be assessed in an Air Quality and Noise Impact Assessment. The proposed MaCarthy pits also target iron ore on koppies and the mining will result in a permanent alteration of the topography. A Visual Assessment will be undertaken to assess the significance of the impact.

The Prospecting Priority areas also form part of a national freshwater priority area associated with the Soutloop River and the catchment needs to be protected. There are no critical biodiversity areas or ecological support areas identified in the prospecting area. Heritage sites do occur and can be expected to be related to farmsteads that document the history of the area. An onsite screening is required for the sites to document sensitive biodiversity, freshwater sensitive areas as well as heritage sites.

The influx of persons into the Tsantsabane and Gamagara Municipal areas due to mining activities in the area has resulted in an increase in social ills including informal housing, poor living conditions, crime, prostitution and disease (including HIV). There are high levels of youth unemployment and skills amongst the unemployed are limited. Should the Zama Mining Project proceed, a concerted effort should be made on skill development initiatives to maximize opportunities for local persons. A Socio-Economic Impact Assessment will be undertaken and opportunities to improve local employment and procurement opportunities will be investigated and included in social management planning during both the construction and operational phases of MaCarthy as well the planned prospecting activities.

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1. INTRODUCTION

Zama Mining Resources (Pty) Ltd (Zama Mining) is applying for a mining right for iron ore, manganese and other minerals on the properties shown in Figure 4.1. Application has also been made for Environmental Authorisation (EA) in terms of the Environmental Impact Assessment (EIA) Regulations (GNR. 982-985 of 2014, as amended) published under the National Environmental Management Act (NEMA), No. 107 of 1998. An Integrated Water Use Licence (IWUL) will also be required in terms of Section 21 of the National Water Act (No. 36 of 1998) (NWA) for water use activities associated with the project.

The mining right area is extensive and includes properties on which Zama Mining has held the prospecting rights since 2013. For the purposes of the Zama Mining Project, the mining right application area has been divided into 2 sections: MaCarthy and the Western Properties.

Open pit mining activities are planned to take place at MaCarthy supported by the development of workshops, administration areas, roads, sewage treatment and photovoltaic (PV) solar facilities. No processing will be undertaken on site and the ore will be directly trucked for sale to customers. The dewatering requirements and associated water supply options in support of the mining activities as well as the access and ore transport options are still to be investigated and will be further assessed during the EIA. It is envisaged that 300 persons will be involved in the operations of MaCarthy and 100-150 persons during construction.

Prospecting activities are planned on the Prospecting Priority areas as shown in Figure 4.1. which will entail diamond and percussion drilling. Additional infrastructure will include minor tracks/roads to access drill sites and possible options for water supply and the disposal of mineral residue at an onsite facility. There will be approximately 40 persons involved in the prospecting activities.

This report documents the findings of the scoping study undertaken as part of the EIA and elaborated on the way forward in terms of additional work required to document (identify and assess), mitigate and manage any potential impacts of the Zama MaCarthy Project on the environment

2. ENVIRONMENTAL IMPACT ASSESSMENT PRACTITIONER

This section provides details of the Independent Environmental Assessment Practitioner ("EAP") that is responsible to facilitate the EIA and public consultation processes in line with NEMA and GN R. 982.

2.1 The EAP who prepared the report

Table 2-1: Details of EAP

Name of The Practitioner	Kerry Fairley
Affiliation:	Principle Environmental Scientist, EXM Advisory Services
Tel No.	082 871 2959
E-mail address	kerry@exm.co.za

2.2 Qualifications and Experience the EAP

The curriculum vitae and proof of registration of the EAP is provided in Appendix A.

2.2.1 Qualifications and Professional Registration

- BSc Botany Honours (University of the Witwatersrand)
- Registered as Environmental Assessment Practitioner in accordance with the prescribed criteria of Regulation 15(1) of Section 24(H) Registration Authority Regulations Np. 849 of 22 July 2016) of the National Environmental Management Act (No. 107 of 1998, as amended).

EAPASA Registration No. 2019/1702

- Registered as Professional Natural Scientist with the South African Council for Natural and Scientific Professionals (SACNASP)

SACNASP Registration Number: 400054/03

2.2.2 Expertise and Experience


Kerry Fairley has over 20 years of experience in environmental management in the mining industry. Kerry is the author of numerous environmental impact assessment reports for both green fields mining projects as well as for expansions and amendment to existing mining operations in South Africa and as well as other African countries (Namibia, Malawi).

2.3 Declaration of Independence

I, Kerry Fairley, as the independent EAP compiled this report and declare that it correctly

reflects the findings made. I further declare that I,

- Have the necessary expertise in conducting environmental impact assessments, including knowledge of the act, regulations and any other guidelines that have relevance to the activity.
- Will comply with the Act, regulations, and all other applicable legislation.
- Will consider the requirements of the EIA regulations as published in Government Notice R982, as amended as well as other legislation.
- Have no, and will not engage in, conflicting interests in the undertaking of the activity.
- Will ensure that the comments of all interested and affected parties have been considered and are recorded in this report that is submitted to the competent authority in respect of the application.
- Have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.
- Declare that no information provided to the Department was at no stage influenced by the applicant and that we as the appointed Environmental Assessment Practitioners have explained the potential consequences of submitting this application.
- Will perform all other obligations as expected from an EAP in terms of the Regulations; and
- Realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Name	Affiliation	Designation	Signature	Date
Kerry Fairley	EXM Advisory Services (Pty) Ltd	Environmental Assessment Practitioner		8 September 2022

3. DESCRIPTION OF THE PROPERTY

The application areas are situated approximately 24 km south of Kathu, immediately east of Olifantshoek and 35 km north of Postmasburg, Northern Cape. Properties designated for mining and prospecting activities are outlined below.

Table 3-1: Property Details

Farm Name; Farm and Portion Number; 21-digit Surveyor General Code for each farm portion	Mining Right Area		
	Compass 665	Remaining Extent	C0410000000066500000
	Cox 571	Portion 2	C0410000000057100002
	Cox 571	Remaining Extent	C0410000000057100000
	Cox 571	Portion 1	C0410000000057100001
	Cox 571	Portion 3	C0410000000057100003
	Crossley 660	Remaining Extent	C0410000000066000000
	Dikepeng 661	Portion 1	C0410000000066100001
	Dikepeng 661	Portion 2	C0410000000066100002
	Dikepeng 661	Portion 4	C0410000000066100004
	Gamaliets 659	Remaining Extent	C0410000000065900000
	Gamaliets 659	Portion 1	C0410000000065900001
	Gaston 650	Remaining Extent	C0410000000065000000
	Gaston 650	Portion 1	C0410000000065000001
	Groot Venn 777	Remaining Extent	C0410000000077700000
	Hartley 573	Remaining Extent	C0410000000057300000
	Hilliard 664	Remaining Extent	C0410000000066400000
	Hilliard 664	Portion 1	C0410000000066400001
	Knapp 658	Remaining Extent	C0410000000065800000
	Knapp 658	Portion 1	C0410000000065800001
	Knapp 658	Portion 2	C0410000000065800002
	Knapp 658	Portion 3	C0410000000065800003
	Knapp 658	Portion 4	C0410000000065800004
	Knapp 658	Portion 5	C0410000000065800005
	Knapp 658	Portion 7	C0410000000065800007

	Lucknow 652	Remaining Extent	C04100000000065200000
	Makala 646	Remaining Extent	C04100000000064600000
	Makala 646	Portion 1	C04100000000064600001
	Mamaghodi 654	Portion 1	C04100000000065400001
	Mamaghodi 654	Remaining Extent	C04100000000065400000
	Mamatlun 651	Portion 2	C04100000000065100002
	Mamatlun 651	Remaining Extent	C04100000000065100000
	Tomkins 657	Remaining Extent	C04100000000065700000
	Tomkins 657	Portion 1	C04100000000065700001
	Tomkins 657	Portion 2	C04100000000065700002
	Tomkins 657	Portion 3	C04100000000065700003
	Uys 663	Portion 1	C04100000000066300001
	Uys 663	Portion 2	C04100000000066300002
	Uys 663	Portion 3	C04100000000066300003
	Uys 663	Portion 4	C04100000000066300004
	Uys 663	Portion 6	C04100000000066300006
	MaCarthy 559	Remaining Extent	C04100000000055900000
	Access Road and Import/Export Water Pipeline		
	MaCarthy 559	Portion 2	C04100000000055900002
	MaCarthy 559	Portion 3	C04100000000055900003
	MaCarthy 559	Portion 4	C04100000000055900004
Application area (Ha) for each farm portion	Mining Right		
	Compass 665	Remaining Extent	2343.483
	Cox 571	Portion 2	429.718
	Cox 571	Remaining Extent	1101.863
	Cox 571	Portion 1	1320.317
	Cox 571	Portion 3	127.605
	Crossley 660	Remaining Extent	1883.551
	Dikepeng 661	Portion 1	1018.65
	Dikepeng 661	Portion 2	151.49

Dikepeng 661	Portion 4	972.129
Gamaliets 659	Remaining Extent	1314.266
Gamaliets 659	Portion 1	1337.879
Gaston 650	Remaining Extent	1052.748
Gaston 650	Portion 1	1234.104
Groot Venn 777	Remaining Extent	3507.405
Hartley 573	Remaining Extent	2641.604
Hilliard 664	Remaining Extent	1580.437
Hilliard 664	Portion 1	1039.809
Knapp 658	Remaining Extent	723.265
Knapp 658	Portion 1	818.433
Knapp 658	Portion 2	429.45
Knapp 658	Portion 3	420.195
Knapp 658	Portion 4	9.302
Knapp 658	Portion 5	30.035
Knapp 658	Portion 7	2.371
Lucknow 652	Remaining Extent	2422.442
Makala 646	Remaining Extent	1775.93
Makala 646	Portion 1	996.989
Mamaghodi 654	Portion 1	12.391
Mamaghodi 654	Remaining Extent	2617.4
Mamatlun 651	Portion 2	1194.387
Mamatlun 651	Remaining Extent	1185.964
Tomkins 657	Remaining Extent	1194.152
Tomkins 657	Portion 1	641.983
Tomkins 657	Portion 2	677.83
Tomkins 657	Portion 3	150.96
Uys 663	Portion 1	744.056
Uys 663	Portion 2	745.664
Uys 663	Portion 3	1442.121

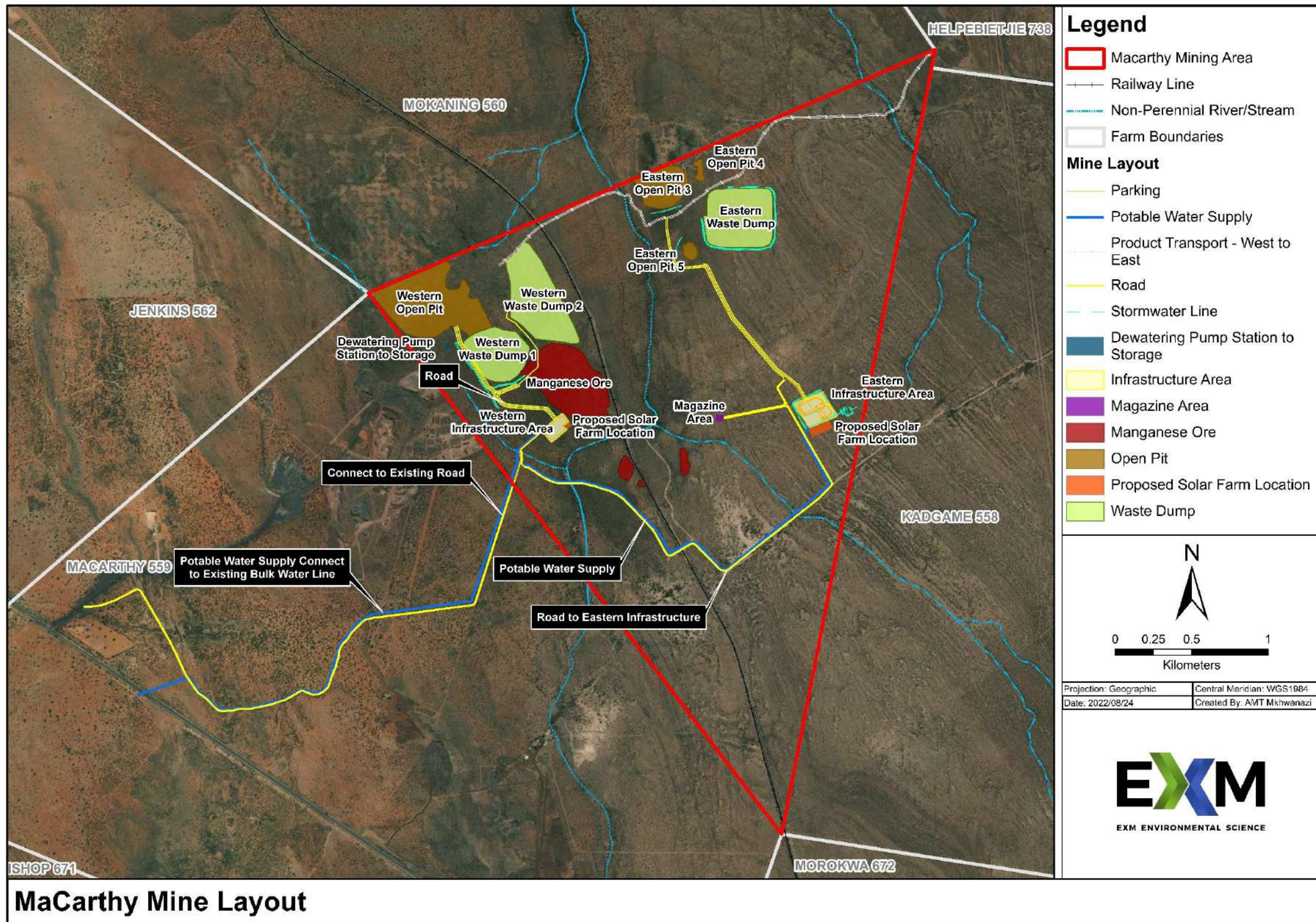
	Uys 663	Portion 4	742.097
	Uys 663	Portion 6	753.537
	MaCarthy 559	Remaining Extent	769.553
	Total Mining Right Area		43 557.57 Ha
	Access Roads and Import /Export Water Pipeline		
	MaCarthy 559	Portion 2	5.3
	MaCarthy 559	Portion 3	1.1
	MaCarthy 559	Portion 4	6.2
	Total Road/Pipeline Servitude Area		12.6 Ha
Magisterial district:	ZF Mgcawu and John Taolo Gaetsewe Magisterial Districts.		
Distance and direction from nearest town	The application area is located within the Tsantsabane and Gamagara Local Municipal areas, 24 km south of Kathu, immediately east of Olifantshoek and 35 km north of Postmasburg.		
21-digit Surveyor General Code for each farm portion	See above under " Farm Name: "		
Locality map	Figure 4-1.		
	<p>Zama Mining is applying for a mining right for the farms listed above.</p> <p>The application include provision for the development of open cast mining operations on the Farm MaCarthy 559 (RE) approximately 24 km south of the town of Kathu (2.7 km north of the R325 regional road) for the extraction of iron ore and manganese. The mining method will entail conventional drilling and blasting, whereafter the ore will be loaded and hauled for off-site processing. Two different sections in the east and west of the property will be developed for mining and infrastructure development purposes. The project will involve the development of the following infrastructure:</p> <p>Open Cast Pits;</p> <ul style="list-style-type: none"> • Waste Rock Dumps; • Haul Roads for Product Transportation; • Light Vehicle Access Roads; • Two (2) Solar Farms to support the Eastern and Western Sections; • Water Management Infrastructure (Pollution Control Dams, Water Storage Tanks, Stormwater etc.); 		

- Sewage Packaging Plant;
- Explosives Magazine;
- Bulk Fuel Storage;
- Parking areas;
- Offices and Staff Quarters; and
- Potential Future Processing Plant.

Prospecting activities are proposed for the remaining farms with the future intention of expanding the mining operations. Prospecting will involve diamond and percussion drilling activities. Priority will be given to prospecting activities on the following farms:

- Compass 665 RE
- Hilliard 664 RE
- Hilliard 664 Portion 1
- Uys 663 Portion 3
- Uys 663 Portion 4
- Uys 663 Portion 6
- Groot Venn 777 RE
- Crossley 660 RE

The prospecting activities will move to additional farms based on the outcome of the initial prospecting works programme. The impacts of the prospecting activities on the initial areas will be assessed in the EIA. Activities include clearance of small areas of vegetation to gain access for drill rig sites, placement of temporary infrastructure (e.g. wooden huts, water tanks etc.) and for the short-term establishment of drill rigs. There will also be a requirement for the disposal of residue (drill chips and drill slimes) originating from the drilling process.



MaCarthy Mine Layout

Figure 3.1: MaCarthy Mine Layout

4. LOCALITY MAP

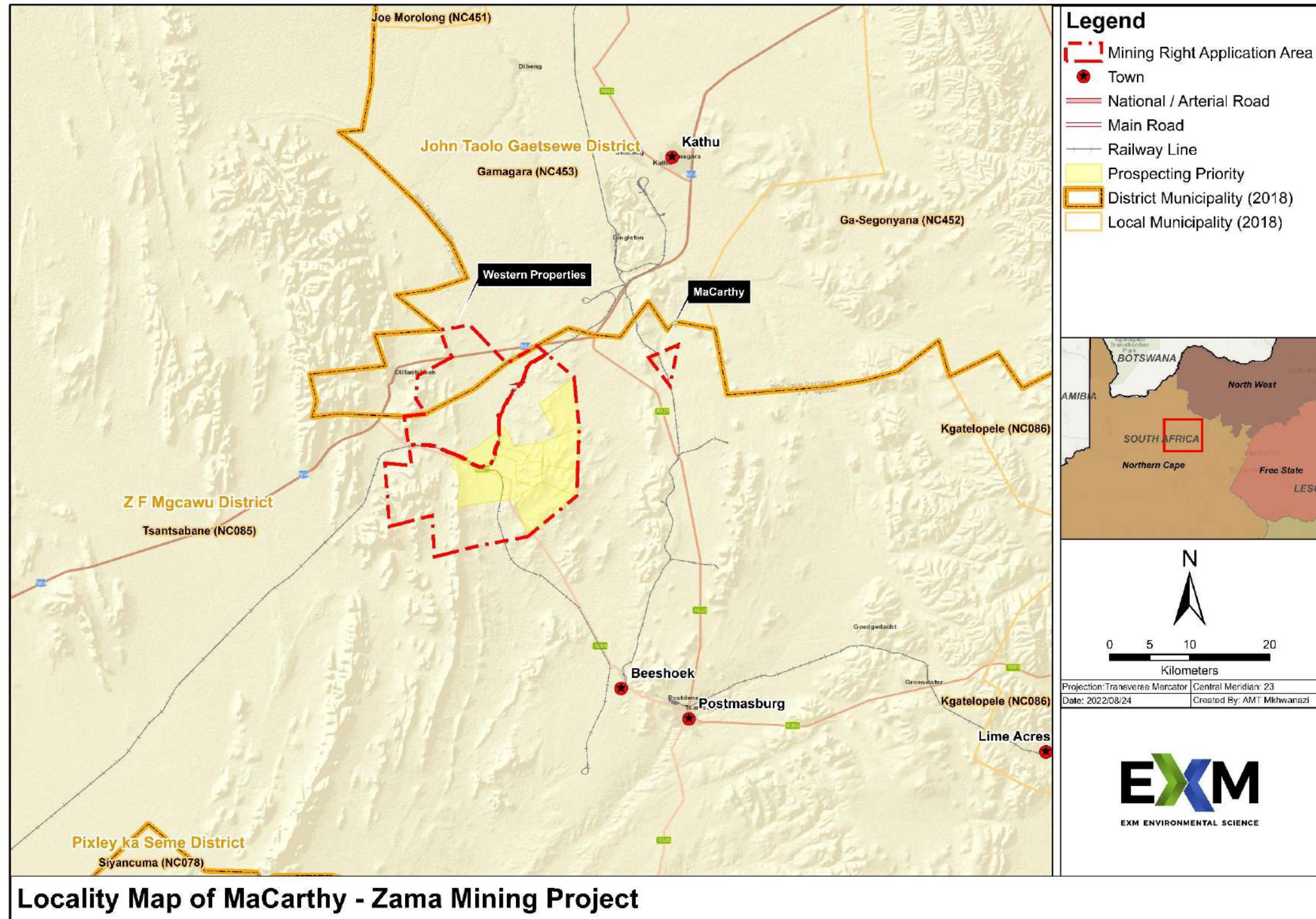


Figure 4.1: Zama Mining Project – Locality

5. DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY

This section provides a description of the proposed project, including the NEMA Listed Activities triggered, and a description of the activities and infrastructure associated with the project.

5.1 Listed and Specified Activities

The Table below contains the listed activities in terms of Listing Notices 1 (GN. 983), 2 (GN. 984), 3 (GN. 985) as well as GNR 921 (waste management listed activities) that are triggered by the proposed project. A full EIA and Scoping process in terms of the EIA Regulations (GN R. 982 of 2014, as amended by GN R326 of 2017) must therefore be undertaken to obtain an EA prior to commencement of the project.

Table 5-1: Listed Activities

PROJECT INFRASTRUCTURE AND ACTIVITIES	AERIAL EXTENT OF THE ACTIVITY HA OR M ²	APPLICABLE LISTING NOTICE	APPLICABLE LISTING NOTICE
Mining Right	43 557.57 Ha	GNR 983 Activity 17 (activities requiring a mining right)	
Open Cast Iron Ore Pits	Western ~ 20.9 ha Eastern 3 ~ 6.15 ha Eastern 4 ~ 0.58 ha Eastern 5 ~ 0.76 ha	GNR 983 Activity 12 (infrastructure within or near a watercourse) GNR 984 Activity 15 (clearance of vegetation)	
Waste Rock Dumps	Western 1 ~ 9.95 ha Western 2 ~ 15.9 ha Eastern ~ 14.43 ha	GNR 983 Activity 12 (infrastructure within or near a watercourse) GNR 984 Activity 6 (waste license) Activity 15 (clearance of vegetation)	Category B: Activity 7, 10 & 11 The development of waste rock dumps and backfilling of open pits.
Manganese Ore Open Cast Pit	1 ~ 16.62 ha 2 ~ 0.98 ha 3 ~ 0.10 ha 4 ~ 0.74 ha	GNR 984 Activity 15 (clearance of vegetation) Activity 17 (activities requiring a mining right)	
Pit Backfilling			Category B: Activity 7, 10 & 11
Bulk Fuel Storage	TBD	GNR 984 Activity 4	

PROJECT INFRASTRUCTURE AND ACTIVITIES	AERIAL EXTENT OF THE ACTIVITY HA OR M ²	APPLICABLE LISTING NOTICE	APPLICABLE LISTING NOTICE
		(storage of dangerous goods)	
Roads (access road, haul roads and LDV roads)	Roads ~ 15km	GNR 983 Activity 56 (widening and lengthening of roads) Activity 12 (infrastructure within or near a watercourse) GNR 984 Activity 27 (development of roads)	
Infrastructure Areas	Western ~ 1.49 ha Eastern ~ 3.35 ha Future ~ 50 ha	GNR 984 Activity 15 (clearance of vegetation)	
Pollution Control Dam	0.3 ha	GNR 984 Activity 6 (water use licence) Activity 15 (clearance of vegetation)	
Solar PV Power Facilities Plants	West ~ 0.09 ha East ~ 0.7 ha	GNR 983 Activity 1 (development of infrastructure for the generation of electricity from a renewable resource) GNR 984 Activity 15 (clearance of vegetation)	
Dewatering Infrastructure	Pipeline ~6.4 km Pump station ~ 0.09 ha	GNR 983 Activity 9 (development of pipelines for the transportation of water) Activity 10 (pipelines) Activity 12 (infrastructure within or near a watercourse)	
Stormwater Management infrastructure	TBD	GNR 983 Activity 12 (infrastructure within or near a watercourse)	
Magazine Area	~0.23 ha	GNR 983 Activity 27 (clearance of vegetation) Activity 14 (storage of dangerous goods)	

PROJECT INFRASTRUCTURE AND ACTIVITIES	AERIAL EXTENT OF THE ACTIVITY HA OR M ²	APPLICABLE LISTING NOTICE	APPLICABLE LISTING NOTICE
Prospecting	TBD	GNR 984 Activity 6 (waste licence) Activity 15 (clearance of vegetation)	Category B: Activity 7, 10 & 11 Disposal of residue from prospecting activities.

5.2 Description of Activities to be Undertaken

Zama Mining Resources (Pty) Ltd (Zama Mining) is applying for a mining right for iron ore, manganese and other minerals on the properties listed in Section 2, located within the Tsantsabane and Gamagara Local Municipal areas. Zama Mining has been the holder of prospecting rights for iron ore and manganese on these properties since 2013.

The application area has been divided into two sections (see Figure 4.1), namely MaCarthy currently designated for mining activities, and the Western Properties with areas prioritised for prospecting activities.

5.3 MaCarthy Open Pit Mine

Zama Mining is planning to commence with mining at MaCarthy. Iron ore will be extracted from several open pits by means of conventional open-pit mining methods at a rate of approximately 1 million ton per annum. The extraction of ore and waste is done by drilling, blasting, loading, and hauling. MaCarthy is planned to be contractor mined throughout the life of the mine, utilising articulated dump trucks and diesel hydraulic excavators with support equipment. The steps in the mining process are as follows:

- Bush clearing and topsoil removal
- Drilling and Blasting
- Overburden Removal (pre-stripping & internal waste) and hauling to the waste rock dumps
- Drilling and blasting of ore and hauling to the ore rehandling areas for loading onto road trucks
- Ongoing rehabilitation of overburden/waste rock dumps

No processing is currently planned to be undertaken at MaCarthy and iron ore will be trucked/hailed to offsite to customers where it will be beneficiated through a toll treatment DMS or UHDMS process. Sishen mine has been identified as a customer and ore

will need to be trucked from MaCarthy to Sishen. Ore transport route alternatives are under investigation (see Section 9.3).

The current duration of the MaCarthy section is estimated at 12 years, with construction planned to commence in 2024 and the initial ore being extracted from 2025 to 2034, which will be followed by a year of rehabilitation. There will be approximately 300 persons involved in the operation of MaCarthy. It is estimated that 100-150 persons will be involved in construction.

The following phases are planned for MaCarthy:

Table 5-2: MaCarthy Open Pit Mining Phases

Construction Phase	The construction phase will be undertaken over a one-year (2024) period, which includes clearing vegetation for the proposed pit and waste rock dump (WRD) positions, site establishment and mining infrastructure construction.
Operational Phase	The operation will produce an average of 980 kt of ore per annum over the life of mine, with an average Fe product target of 800 ktpa. This phase commences in 2025 and will continue until 2034, which equates to a LoM of 10 years.
Closure phase	The closure phase will commence during the last year of production (2035) with a gradual decline in mining operations. Concurrent rehabilitation of waste rock dumps will occur throughout the LoM; therefore, the focus will be placed on workers' re-allocation and final rehabilitation.

There is the potential for mining of additional minerals (such as manganese) as well as on-site processing, but these activities are currently not included as part of the Environmental Impact Assessment.

The proposed infrastructure for the MaCarthy section as shown in Figure 2.1. The mine activities at MaCarthy are divided into two sections, separated by the Transnet Railway servitude and drainage area (a tributary of the Ga-Mogara River) that bisects the property. The site will be accessed via a new road to be constructed linking the mine to the regional road (R325) located approximately 2.2 km to the west and this will cross the adjacent mining right area of Salene mine.

The proposed for mining includes:

- Mine Pits
- Overburden/Waste Rocks Dumps
- Workshops, Parking, Sewage Treatment and Administration areas
- Pollution Control Dams (PCDs)

- Access Road / Export-Import Pipeline and Servitude
- Site Roads
- Internal Roads;
- Photovoltaic (PV) Solar Facilities;
- Explosive Magazines;
- Dewatering/Water Supply infrastructure;
- Stormwater Management Infrastructure; and
- Site Access Road.

The water supply options for the mine are still to be determined and will be dependent on the results of aquifer testing and assessment of pit dewatering requirements. Provision has been made for an export-import water pipeline to connect to the Vaal-Gamagara water supply scheme. Should water from dewatering (if required) be insufficient to meet the needs of the mine then water will be purchased from the Regional Water Supplier (currently under the control of Bloem Water). If there is excess water then it will need to be supplied to the Vaal-Gamagara scheme.

Sewage will be managed through package sewage treatment plants and the treated effluent will be incorporated into the mine water balance for inclusion in the water supply for water use activities.

Workshop waste and waste originating from other administration facilities will be temporarily stored on site in a designated area before being removed from site for recycling or off-site disposal.

5.4 Western Properties

Prospecting activities are planned for the Western Properties. The following areas are being prioritised for prospecting and a prospecting work programme has been included as part of the mining right application:

- Compass 665 RE
- Hilliard 664 RE
- Hilliard 664 Portion 1
- Uys 663 Portion 3
- Uys 663 Portion 4

- Uys 663 Portion 6
- Groot Venn 777 RE
- Crossley 660 RE

The location of the prospecting priority area is indicated in Figure 3.1.

Prospecting will involve diamond and percussion drilling. Activities include clearance of areas for the establishment of the drill rigs and associated infrastructure (e.g. wooden hut, portable toilet, safety barricades and waste bins), drill water supply, management and drill site access roads. A site will need to be identified for the disposal of drill sludge and drill chips. The layout of a typical drill site is given in Figure 5.1

Water supply options for drilling activities are still being considered. Options include the trucking of water or sourcing from groundwater (see Section 9.5).

Options for mineral residue (drill slimes and drill chips) are also still being considered. These include off-site disposal or the development of a waste disposal facility (see Section 8.5).

There will be approximately 40 persons involved in prospecting activities.

The EIA will include a screening of environmental sensitivities including biodiversity, freshwater ecology, heritage and archaeological sites, **within the priority areas only** and the prospecting works programme (i.e. location of boreholes) will be planned to avoid impacts on sensitive areas.

Prospecting activities on more properties would require an additional environmental authorisation informed by a future EIA process.

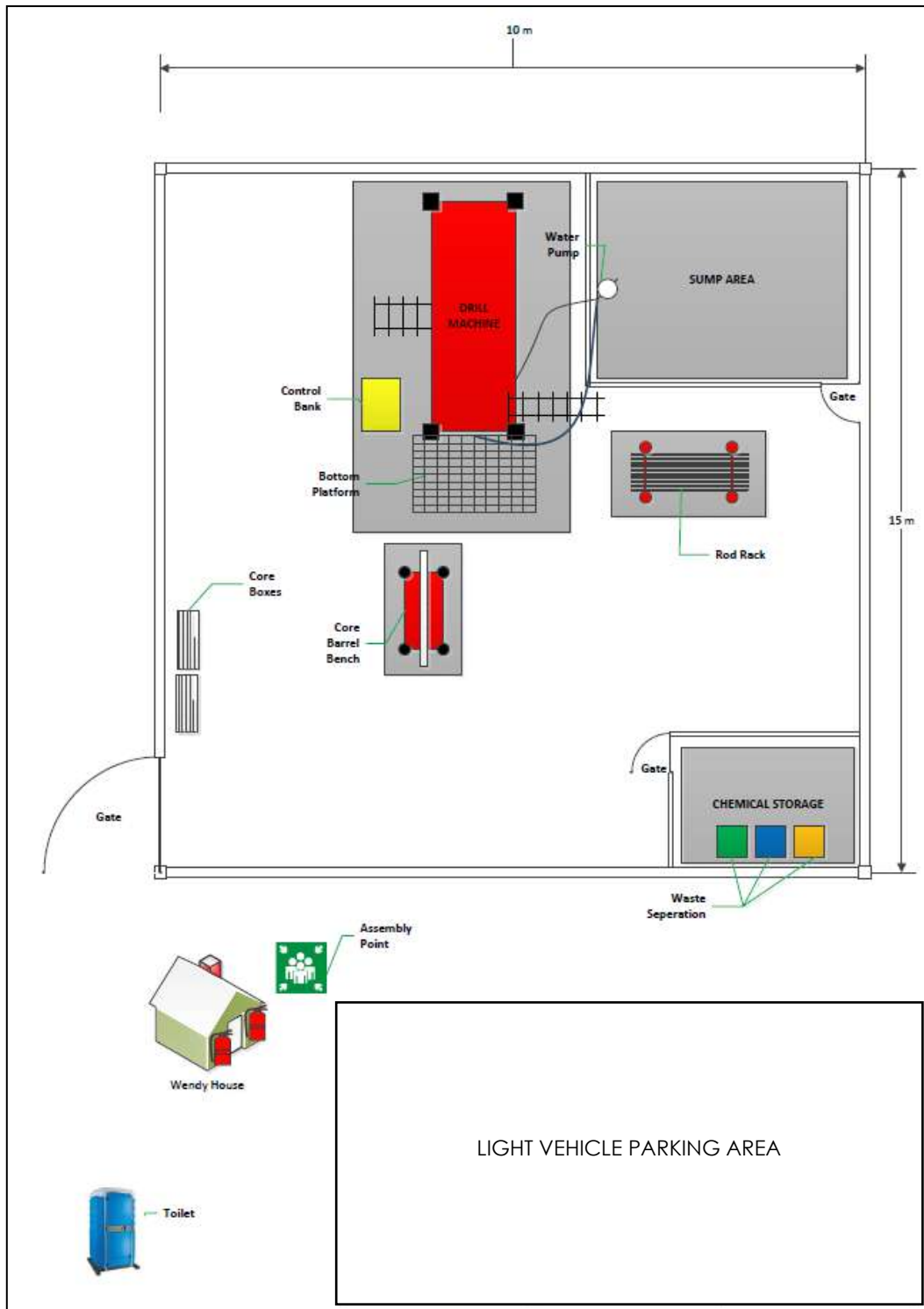


Figure 5.1: Typical Drill Site Layout

6. POLICY AND LEGISLATIVE CONTEXT

This document has been prepared strictly in accordance with the template as prescribed by the Department of Mineral Resources & Energy (DMRE) format and the requirement of the National Environmental Management Act (NEMA) (No. 107 of 1998) and the EIA Regulations (GNR. 982 of 4 December 2014 as amended by GNR. 326 of 7 April 2017).

This section outlines the key legislative requirements applicable to the project.

6.1 Mineral and Petroleum Resources Development Act (No. 28 of 2002)

The Minerals and Petroleum Resources Development Act (MPRDA) regulates the requirements for a mining right to mine a mineral and undertake associated activities. The MPRDA requires the holder of a mining right not to cause any significant pollution or environmental degradation.

Zama Mining is applying for a mining right in terms of Section 22 of the MPRDA for iron ore, manganese and other minerals on the properties listed in Table 5-1. Zama Mining has been the holder of prospecting rights for iron ore and manganese on these properties since 2013.

Sections 53 and 54 of the Regulations require the holder of a mining right to make financial provision for rehabilitation and to action closure objectives of the Mine. These sections are however a consequence of Section 41 of the MPRDA (also now repealed) that requires the holder to make financial provision for closure and rehabilitation of the Mine. Financial provision for mine rehabilitation and closure is now regulated under NEMA and subsequent regulations. However, since the MPRD Regulations are not repealed, Section 53 and 54 can still be applicable.

6.2 National Environmental Management Act (No. 107 of 1998)

6.2.1 Screening Tool

A report generated by the national web-based environmental screening tool is required to be submitted as part of the application for EA in terms of section 24(5)(h) of the NEMA and regulation 16(1)(b)(v) of the EIA regulations, 2014, as amended.

A Screening Report has been submitted as part of the application and has guided the planning for the Environmental Impact Assessment (EIA) process for the project.

6.2.2 EIA Regulations

Section 24 of NEMA provides for activities that require Environmental Authorisation (EA) prior to commencement. This has resulted in the promulgation of Listing Notices 1 (GN.R.

983), 2 (GN.R. 984) and 3 (GN.R. 985) with the Environmental Impact Assessment (EIA) Regulations (GNR 982) of 2014 as amended by GN. 324-327 of 7 April 2017. Activities included in Listing Notices 1 and 3 require a Basic Impact Assessment to be undertaken and activities included in Listing Notices 2 require a scoping and full EIA process to be undertaken to obtain EA prior to commencement. The EIA is to be supported by specialist studies completed in accordance with the protocols as published under the EIA Regulations.

Activities under Listing Notice 2 (GN. 328) are triggered and thus the application for Environmental Authorisation (EA) requires the completion of a scoping and EIA process. An EA is being sought for activities applicable to the undertaking of the mining and prospecting activities, in terms of Listing Notices 1 and 2 (see Table 5-1).

Activities under Listing Notice 2 (GN. 328) are triggered and thus the application for environmental authorisation (EA) requires the completion of a scoping and EIA process. EA is being sought for activities applicable for the undertaking of the mining and prospecting activities, in terms of Listing Notices 1 and 2 (see Table 5-1).

6.2.3 Financial Provision Regulations

In November 2015, the Minister of Environmental Affairs promulgated regulations in terms of NEMA pertaining to the Financial Provisioning for Prospecting, Exploration, Mining or Production (NEMA Financial Provisioning Regulations). Planning for rehabilitation and closure as well as the associated financial provision is to be undertaken in accordance with the regulations. A Closure Plan report will be drafted in line with the regulatory requirements as part of the EIA studies and submitted to the Department as part of the application.

6.3 National Environmental Management: Waste Act (No. 59 of 2008)

In terms of the National Environmental Management: Waste Act (NEM: WA), waste management activities that are listed in regulations published under NEM: WA may not be undertaken without a Waste Management Licence. The listed activities for which a WML is required are contained in Government Notice (GN 921). Category A activities require a Waste Management Licence and a Basic Impact Assessment (BA) process must be conducted, and Category B activities require a Waste Management Licence and a full Scoping and EIA process must be conducted. In terms of Schedule 3 of NEM: WA, mining waste (residue stockpiles and deposits) are defined wastes falling under Category A – Hazardous Wastes of NEM: WA which includes waste rock.

The project will be required authorisation for activities listed under NEM: WA for the disposal of waste rock, backfilling of pits and the disposal of residue originating from prospecting activities (e.g. drill slimes and drill chips), as indicated in Table 4-1. An application for an integrated EA has been submitted to the DMRE.

6.4 National Environmental Management Act: Air Quality Act (No. 39 of 2004)

The National Environmental Management: Air Quality Act (NEM: AQA) controls and regulates atmospheric emissions and provides for Listed Activities (GNR. 893, November 2010) which have or may have a significant effect on the environment, including health, social conditions, economic conditions, ecological conditions, or cultural heritage. Any activity captured under this list require the person undertaking the activity to apply for an Atmospheric Emission Licence (AEL). The bulk storage of fuel for mining and light delivery vehicles requires an AEL if the activity is captured under Activity 2.4: Storage and Handling of Petroleum Products which includes all permanent immobile liquid storage facilities at a single site with a combined storage capacity of greater than 1 000 cubic metres.

Mining at MaCarthy is also required to comply with the National Dust Control Regulations (GNR. 827 of 1 November 2013) and the National Ambient Air Quality Standards (NAAQS, GNR. 1210 of 24 December 2009). The regulations/standards provide limits for PM₁₀ and dust fallout in residential and industrial areas.

The volume of petroleum products to be stored at MaCarthy will be confirmed as part of the EIA study, but current indications are that the volume is unlikely to exceed the threshold for an AEL.

6.5 National Environmental Management: Biodiversity Act (No. 10 of 2004)

Section 57 of the National Environmental Management Biodiversity Act (NEMBA) restricts certain activities involving threatened and protected species (as listed in Regulation GN. 151 and 152, February 2007) without a permit. Restricted activities applicable to the project are limited to the potential removal of Threatened or Protected Species (TOPS) and plants during the clearance of vegetation.

6.6 National Forests Act (No. 94 of 1998)

Sections 12 and 15 of the National Forests Act requires any person who damages, cuts, destroys, prunes or relocates a nationally protected tree (as listed in Regulation GN. 690, September 2017) to apply for a permit from the Department of Agriculture, Forestry and Fisheries (DAFF) to do so.

An application will be submitted for the removal of protected species prior to the commencement of construction after the EA has been issued.

6.7 Northern Cape Nature Conservation Act (No. 9 of 2009)

Section 49 and 50 of the Northern Cape Nature Conservation Act requires any person that intends to undertake a restricted activity in respect of protected plants and animals as set out in Schedule I and Schedule II of the Act to apply for a permit from the Northern Cape Department of Environment and Nature Conservation.

Application will need to be submitted for the necessary permits prior to the commencement of site clearance, after the EA has been issued.

6.8 National Water Act (No. 36 of 1998)

The purpose of the National Water Act (NWA) is to ensure that the nation's water resources are protected, used, developed, conserved, managed, and controlled. Section 21 of the NWA contains a list of activities that require a WUL prior to An WUL application process is being undertaken in terms of the Regulations Regarding the Procedural Requirements for Water Use Licence Applications and Appeals (GNR. 267 of 2017). The WUL application will be supported by the necessary Technical Reports and Integrated Water and Waste Management Plan (IWWMP) compiled in accordance with the requirements of GNR. 267.

Section 21 of the NWA requires any person undertaking a water use activity must either register or obtain a WUL unless it was an existing lawful use prior to the Act. Application will need to be made for licensing of water use activities triggered at the MaCarthy mine. It is envisaged that the following water uses will be applicable to allow for mining activities:

Table 6-1: Possible Water Use Activities for mining at MaCarthy

SECTION 21 WATER USE	POSSIBLE ACTIVITIES
Section 21 (a)	Abstraction and use of groundwater for mining activities, domestic purposes, and dust suppression.
Section 21 (c&i)	River crossings, destruction of drainage lines in mining and waste rock dump footprints, development of infrastructure in the proximity of wetlands.
Section 21 (g)	Waste Rock Dumps, In Pit Backfilling, Pollution Control Dams
Section 21 (j)	Dewatering of mine pits to allow for safe mining conditions.

Note that the dewatering requirements and the associated potential for groundwater supply for the mining and domestic use at MaCarthy is being investigated as part of the geohydrological investigation to be undertaken as part of the EIA process and WUL application.

Specialist freshwater ecological studies will inform the location of sensitive habitats and sites within the areas prioritised for prospecting activities on the Western Properties. The intention is for sensitive areas to be avoided during the undertaking for drilling activities. However, the source of water required for prospecting activities is still to be investigated and confirmed, as well as the option for the disposal of mineral residue (drill sludge and drill chips) originating from such activities. It is envisaged that the following water use activities may need to be licensed for prospecting activities in the priority areas:

Table 6-2: Possible Water Use Activities for Prospecting within Priority Areas on Western Properties

SECTION 21 WATER USE	POSSIBLE ACTIVITIES
Section 21 (a)	Use of groundwater for domestic supply, prospecting activities, and dust suppression.
Section 21 (g)	Disposal drilling residue including drill chops and drill slimes

Regulations for the use of water for mining and related activities aimed at protected water resources (GN R.704, June 1999) were promulgated in terms of Section 26 of the NWA. The regulations provide for:

- Restrictions on the locality with respect to residue deposits, dam or reservoirs as well as mining activities within the proximity of watercourse.
- Restriction on the use of material that can pollute a water resource for the purposes of construction.
- Capacity requirements of clean and dirty water systems.
- Protection of water resources from pollution sources at the mine in particular the separation of clean and dirty water and the prevention of spillages from dirty water containment facilities.

Exemption will need to be applied for in terms of Regulation 3 of GN R. 704 for applicable activities.

A register of water uses will be compiled during the EIA phase and the water use licensing process will be undertaken in parallel with the EIA process.

6.9 National Heritage Resources Act (No. 25 of 1999)

The National Heritage Resources Act (No. 25 of 1999) (NHRA) controls and regulates the interaction with heritage, archaeological, and paleontological artefacts and structures. Sections 34, 35 and 36 require that no person may demolish or alter any structure which is older than 60 years without a permit issued by the relevant provincial heritage resources agency. The NHRA further requires any person that disturbs any archaeological site, paleontological site or grave cannot do so without a permit.

Should any site need to be altered or destroyed, a permit will need to be obtained in terms of the NHRA. The South African Heritage Resources Council (SAHRA) will be consulted in terms of Section 38 of the Act.

A Heritage Impact Assessment and Phase 1 Paleontological Study has been undertaken of the MaCarthy mining area to inform the layout planning. Screening of heritage sensitives will be undertaken for the priority prospecting areas on the Western Properties

The National Heritage Resources Act controls and regulates the interaction with heritage, archaeological, and paleontological artefacts and structures. Sections 34, 35 and 36 require that no person may demolish or alter any structure which is older than 60 years without a permit issued by the relevant provincial heritage resources agency. The NHRA further requires any person that disturbs any archaeological site, paleontological site or grave cannot do so without a permit.

Should any site need to be altered or destroyed, a permit will need to be obtained in terms of the NHRA. The South African Heritage Resources Council (SAHRA) will be consulted in terms of Section 38 of the Act.

7. NEED AND DESIRABILITY OF THE PROPOSED ACTIVITY

The Zama Mining Project allows for the mining of the MaCarthy section for a period of 10 years with the aim to provide iron ore with an average grade of 66% to the market for toll treatment. Zama Mining has already secured the sale of the MaCarthy iron ore to Sishen Iron Ore Company (Pty) Ltd. The ore will be trucked directly to Sishen mine for further processing.

Furthermore, the mine also has the potential for further expansion including the mining of known manganese reserves. Prospecting activities planned for the Western Properties will focus on the potential for future mineable reserves and the extension of mining activities as part of the Zama Project. The mining of additional minerals included in the right, if awarded will also be explored.

The immediate mining activities at MaCarthy will provide employment for approximately 300 persons. A further 40 persons will be involved in prospecting activities planned for the Western Properties. Recruiting targets of Zama Mining staff at MaCarthy will be executed as follows:

- 80% from the Northern Cape area (the remaining 20% will, due to skills shortage being experienced in the Northern Cape of senior management, professionally qualified people, skilled technical people and academic qualified people, be recruited from elsewhere in South Africa;
- HDSA management target of 40% ('management' being the equivalent of Paterson Grade D and above) and non-managerial target of 60%;
- 10% of management positions filled by women; and
- 10% of women in mining (the core business of mining)

Zama Mining will aim to maintain a recruitment target of 80% of its employees from the Northern Cape with a focus on the Tsantsabane and Gamagara Municipal areas.

Provision has been made for human resource development of approximately 270 local persons through the life of the MaCarthy section which will focus on Adult Education & Training (AET), Leadership Development, Learnerships, Portable Skills, Bursaries & Internships.

Zama Mining has also, through their Draft Social and Labour Plan committed to a Local Economic Development spend of R16.9 million within 5 years of issue of the mining right. Most of this expenditure will be targeted at infrastructure development for communities, in collaboration with the local municipalities.

8. PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

Activities at the MaCarthy Section are planned for 12-year, including a construction phase of 1 year (2024), Life of Mine of 10 years (2025-2034) and rehabilitation in 2035. Prospecting activities will take place within the priority areas identified within the Western Properties in parallel to the mining activities. The EIA process will focus on the current planned activities at MaCarthy and within prospecting priority areas. Thus, it is required that the EA be issued to cover activities planned from 2024-2035 (12 years). Further environmental authorisation/s will be required for additional activities which form part of expansions under the mining right as these become apparent.

9. DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED PREFERRED ALTERNATIVES

9.1 No-Go Alternative

The no-go alternative has been considered. No impacts of sufficient significance to outweigh the benefits of the project have been identified to date. The option of no-go will continue to be assessed based on further stakeholder engagement and environmental and social studies undertaken in the EIA.

9.2 MaCarthy Layout Alternatives /Site Selection

The layout planning of the MaCarthy Section commenced with a desktop study to map environmental sensitive areas aimed at assisting initial mine planning. The layout planning will be updated as additional site sensitivities become apparent in the specialist studies undertaken as part of the EIA. The following were considered during the initial layout planning, the results of which are shown in Figure 9.1.

9.2.1 Biodiversity

Critical Biodiversity Areas (CBAs) are areas required to meet biodiversity targets for ecosystems, species, and ecological processes. The CBAs for the Northern Cape have been mapped by Holness & Oosthuysen (2016) and have been adopted by the Northern Cape Department of Environment and Conservation (DENC) to guide decision-making about where best to locate development.

- **CBA One** defines areas in which ecosystems and species remain fully intact and undisturbed. These are areas with high irreplaceability or have low flexibility in terms of meeting biodiversity pattern targets.

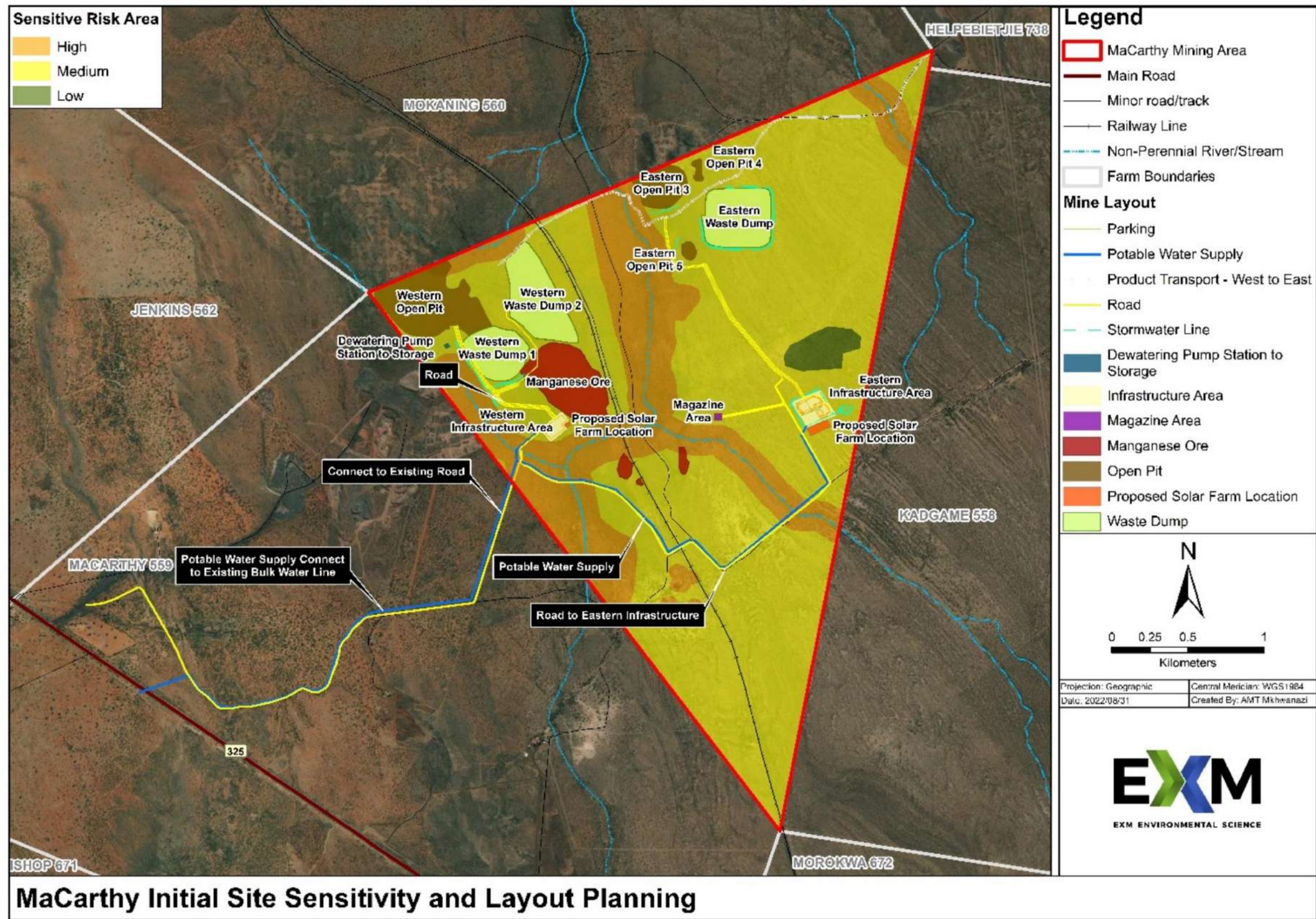


Figure 9.1: MaCarthy Initial Layout Planning in relation to Site Sensitivities.

- **CBA Two** defines near-natural landscapes where ecosystems and species are largely intact and undisturbed. These are areas with intermediate irreplaceability or some flexibility in terms of area required to meet biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without compromising our ability to achieve targets. These have been defined as having moderate sensitivity for the purpose of this assessment.
- **Ecological Support Areas (ESAs)** are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of CBAs and/or in delivering ecosystem services. ESA have been identified as being of low sensitivity for the purposes of this assessment and should also be avoided if possible.

CBA areas, if present were regarded as **No-Go** areas for development, but no such areas occur in the proposed MaCarthy mining area.

The entire farm however falls under an ESA are present and are regarded as being of moderate sensitivity in terms of development. There is thus no alternative but to develop within an ESA.

9.2.2 **Hydrological Features**

Hydrological features include ephemeral rivers, drainage lines, wetlands, and wetland pans. National Freshwater Ecosystem Priority Areas (NFEPA) have been identified to provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. As such NFEPA should be prioritised in terms of protection of freshwater ecological systems.

For the purposes of layout planning all wetland areas were regarded as **highly sensitive**. In addition, all other watercourses (drainage features) have been regarded as **highly sensitive**, including the floodline area or 100 m from the centre of the watercourse, where no floodlines are available. These areas should be avoided, unless there are no other alternatives available.

The iron ore reserves intersect a drainage feature in the north western section of the site and since the mining of the ore is critical to the feasibility of the mine, these could not be avoided. In addition, the river crossing cannot be avoided/excluded as mining needs to occur on either side of a major drainage feature as well as the Transnet freight railway line that follows the valley. The mine layout is divided into a western and eastern section, with much of the infrastructure duplicated in both sections in order to minimise the need for heavy mining equipment to continuously crossing the river (and railway line).

9.2.3 **Land Use and Land Tenure**

A critical land-use feature identified at the MaCarthy site is the Transnet freight railway line that bisects the property from north to south. This forms part of the Cape Corridor railway systems connecting Hotazel to the north to the ports of Gqeberha and Ngqura in the south east, providing the primary export channel for South Africa's manganese. As indicated in Section 9.2.2, the mine has been planned to minimise the need for crossings by HME.

The property is owned by Assmang Ltd and there is currently a tenant that farms on the land and resides within the homestead located in the southern section of the property. The farmstead has been avoided in the layout planning as it may have heritage significance (see Section 9.2.4). An agreement would still have to be entered into with the landowner should authorisation be granted for the project. The possible future of the tenant will be investigated as part of the Social Impact Assessment to be undertaken in the EIA phase.

9.2.4 **Heritage Resources**

Heritage sites have been mapped based on the Heritage Screening Report obtained from the Department of Forestry, Fisheries and the Environment (DFFE) National on-line Screening Tool.

The farmstead located in the southern section of MaCarthy are regarded as Grade III C Heritage sites (i.e., a site that must be satisfactorily studied before impact. For the purposes of the site layout planning these areas were considered to have **high sensitivity** and to be avoided until all other alternatives were exhausted. The sites have been avoided during the layout planning.

9.3 MaCarthy Access Road/Pipeline Route Selection

A new road will need to be developed to allow access to MaCarthy from the R325 public road that connects Postmasburg to Kathu, via the National Road N14. An export/import pipeline connecting to the Sedibeng Water pipeline is also required and this would follow the access road servitude. Several road route options were considered (Figure 9.2) as described below.

9.3.1 **Preferred Route Option 2**

Salene Mining (Pty) Ltd is actively mining on the properties (MacCarthy 559 Portion 2, 3 and 4) to the west of MaCarthy. Option 2 was developed in consultation with Salene mine and the route has been developed to avoid future infrastructure planned, particularly a waste rock dump expansion at the mine (awaiting environmental authorisation). The

route, where it crosses the properties under the control of Salene mine has in principle been agreed with Salene. The route will require that the MaCarthy traffic would use the same access gate as Salene mine as it connects the R325 with the Salene access road. A servitude would have to be registered across the properties should a mining right and environmental authorisation be granted for MaCarthy. This route will also entail less river/drainage crossings, compared to Option 1.

9.3.2 **Route Option 1**

The original route considered avoided the proposed infrastructure at Salene but connected to an existing road that crossed the Farm MaCarthy 559 Portion 1, which is currently mined by Jenkins Mine and owned by a different landowner. This would require a separate negotiations and servitude agreement from that with the Salene mine option. It was thus decided to avoid crossing of MaCarthy 559, Portion 1.

The section of the route that falls on MaCarthy 559 RE was also not considered favourable. Although it follows an existing farm road and there is thus some disturbance, this site passes near the farmstead, which may have impacts on significant heritage resources and is also currently occupied, with the future of the tenant still to be determined. Linking to this section from the north would also mean crossing the sensitive drainage area, which is to be avoided as far as possible.

9.3.3 **Route Option 3**

Option 3 was proposed as an alternative by the Freshwater Ecological Specialist (Scientific Aquatic Services, 2022), as it would result in significantly fewer crossing of significant drainage areas. However, since these drainage areas lie on MaCarthy 559 Portion 1, this option was not considered further.

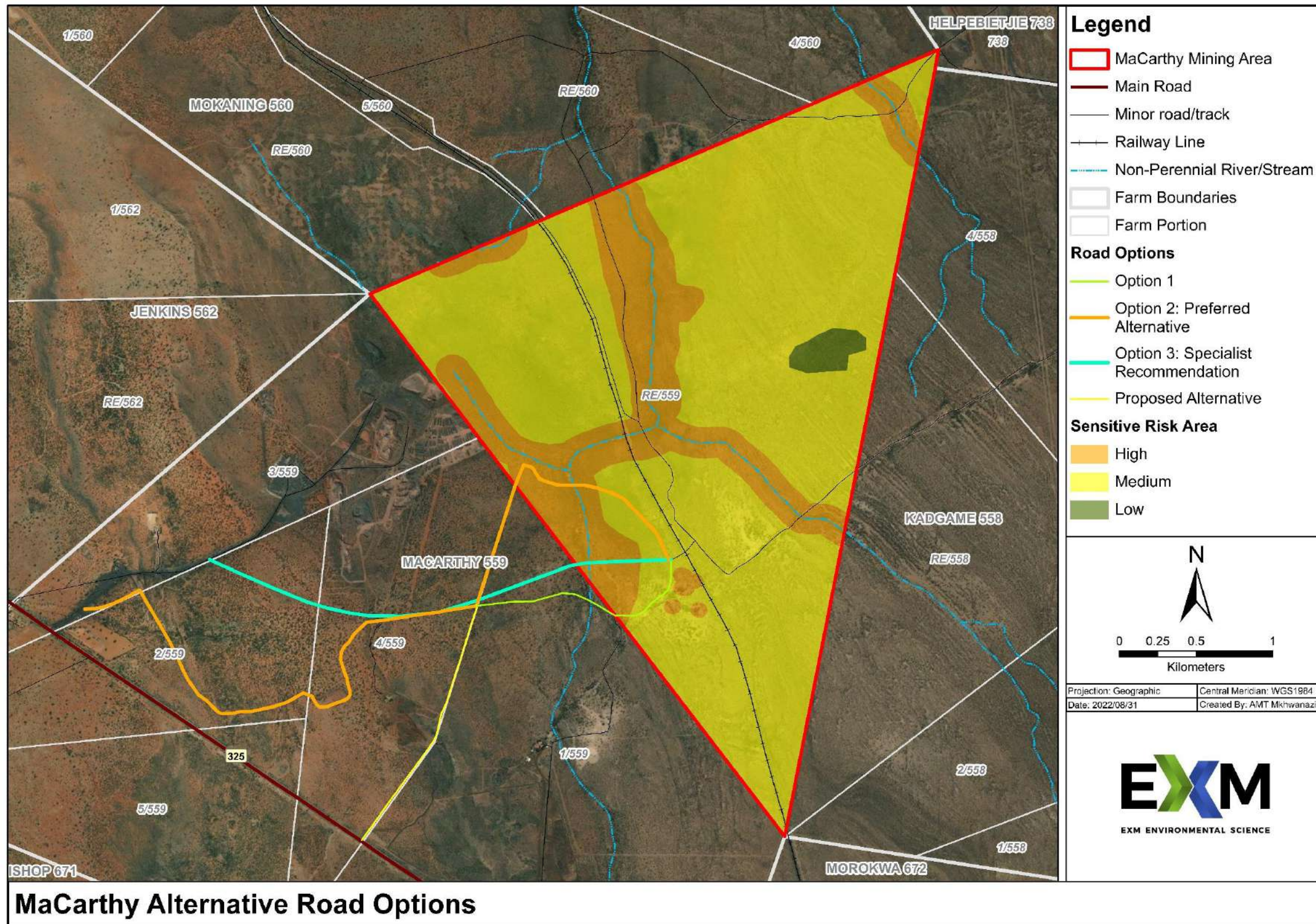


Figure 9.2: MaCarthy Road (and pipeline route) Options

9.3.4 **Proposed Alternative**

The proposed alternative which provides a direct link to the R325 running along the farm boundary has been tabled by the EAP for further consideration in the EIA phase. This option would follow an existing disturbed ecological corridor and provides a more direct route. The safety of an additional intersection on the R325 will however need to be investigated as compared to increased traffic use of the Salene mine intersection (see Preferred Option 2). This will be assessed as part of the specialist Traffic Impact Assessment that will be undertaken in the EIA phase of the project.

9.4 MaCarthy Ore Transport Route Options

Two alternatives are under consideration for the transport of iron ore to Sishen mine:

9.4.1 **Access Road Route Option**

This will involve the transport of iron ore via the proposed access route, linking to the R325 and then to Sishen mine (customer) via the N14 (Figure 9.3). Sishen could possibly be accessed via the Lylyveld North mining area, using the Dingleton Road (DR03333). This option would mean that there would be additional road truck traffic on the R325 and N14 which already have high traffic volumes. The route presents additional traffic safety risks including some dangerous turns connecting to the R325 and the Dingleton Road turning at the N14 junction. The route is still under consideration and will be assessed as part of the Traffic Impact Assessment and EIA.

9.4.2 **Minor Road Route Option**

There is a minor road (MN14146) that links MaCarthy to the Dingleton Road. The use of this road will negate the need for trucks to travel on the R325 and the N14. The road however passes through the neighbouring currently dormant Helpebietjie mine and the road is currently closed at this point. The road, however, has not been de-proclaimed and the option will require an agreement for trucks to pass through the Helpebietjie mining right area. The trucks would however need to cross the N14 to access Sishen mine via Lylyveld North and this presents a safety risk. Trucks from Demaneng currently cross at this point and the intersection is particularly dangerous. The option of passing under the N14 (using the existing Sishen mine underpass) will also be considered.

This option is still under consideration and will be investigated further in the Traffic Impact Assessment and EIA.

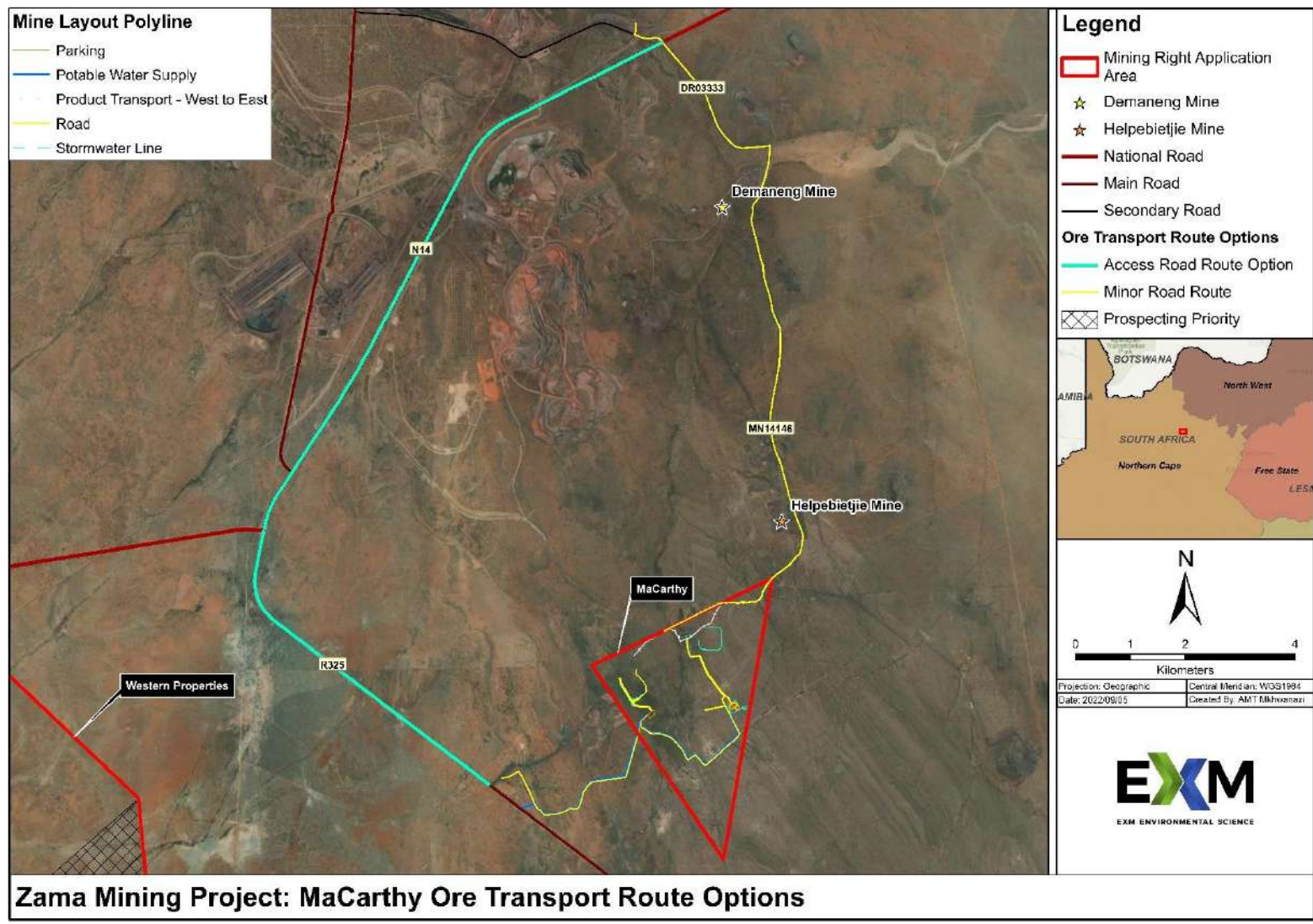


Figure 9.3: MaCarthy Ore Transport Route Options

9.5 MaCarthy Water Supply Options

As indicated in Section 5.3, the water supply options for the mine are still to be determined and will be dependent on the results of aquifer testing and assessment of pit dewatering requirements. The options include water supplied from pit dewatering or from the Vaal-Gamagara Pipeline dependent on agreement from the regional water supply authority (currently managed by Bloem Water).

9.6 Prospecting Water Supply Options

Water is required for drilling activities within the Prospecting Priority areas. Options for supply include the trucking of water from an outside source (potentially municipal supply) to where required or abstraction from groundwater. If groundwater abstraction is preferred, this would need to be supported by a Groundwater Impact Assessment and included in the water use licensing process.

9.7 Prospecting Mineral Residue Management Options

Prospecting activities result in the production of small quantities of mineral residue waste. This includes drill slimes (sludge) and drill chips. These will need to be managed and disposed of in terms of NEM: WA. Options include disposal at an existing licensed facility or the development of a waste facility within the area. Should on-site disposal be preferred this will require licensing under the National Waste Act and NEM: WA and will need to be appropriately designed and managed dependent on the pollution potential of the material.

10. DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

10.1 Identification of interested and affected parties

In order to develop a database as extensive as possible, the following steps were taken to develop the Interested and Affected Party (IAP) database for the Zama Mining Project.

- Review of existing databases from other projects undertaken in the Tsantsabane and Gamagara Local Municipal areas.
- Review of previous consultation that was undertaken by Zama Mining Resources as part of the prospecting right application and subsequent amendment.
- A detailed search was conducted to obtain farm names and numbers of the relevant properties on GIS and cadastral data,
- A Windeed search was conducted to obtain the title deed numbers and contact details of the landowners. However, due to the new Protection of Personal Information Act (POPIA), very limited information is available.
- Reconnaissance of the affected area to try and make contact with landowners on the Western Properties. Site notices (both in English and Afrikaans) and/or notification letters (both in English and Afrikaans) were placed on the gates of properties. These notices and letters explained the project and requested that the landowners or occupiers of land contact the EAP to confirm their ownership and provide contact details so that they could be notified throughout the EIA process.
- Further contact is being made via networking and referrals.

In terms of the EIA Regulations the following were also identified as IAPs for the project:

- Landowners or tenants adjacent to or within 100 m from the proposed study area.
- Representatives of the local municipality/ward councillor with jurisdiction in the area. The office of the mayor of the Tsantsabane and Gamagara Local Municipalities and the John Taolo Gaetsewe and ZF Mgcawu District Municipalities as well as the respective municipal managers have been included.
- Authorities or organs of state having jurisdiction in respect of any aspect of the activity

The following organs of state have been notified:

- Department of Mineral Resources and Energy – Northern Cape (the Competent Authority)
- Department of Water and Sanitation – Northern Cape
- Northern Cape Department of Environment and Nature Conservation
- Northern Cape Department of Land Reform and Rural Development
- Northern Cape Department of Economic Development and Tourism
- Northern Cape Department of Roads and Public Works

- Northern Cape Department of Social Development
- South African Heritage Resources Agency
- Persons who responded to the Background Information Document (BID), press advertisements and site posters.

A list of all parties that have been identified thus far is included as Appendix B1. Note that the IAP database will continue to be updated as IAPs become apparent throughout the scoping and EIA phases. The BID/Notification letter is provided in Appendix B2.

10.2 Notifications

In accordance with the Section 41(2)(b) of Chapter 6 of the EIA Regulations (GN. 982 of 4 December 2014, as amended), written notification (including a BID document by email) has been given to:

- Owners, persons in control of, and occupiers of land in the application area or on land adjacent to the site.
- Local government, municipalities, and organ of state with jurisdiction in the area.

The notification is provided in Appendix B2. Proof of the notification is provided in Appendix B3. Persons on the IAP database were notified of the project by:

- Email including BID (where email addresses are available); and/or
- SMS (where cell phone numbers are available).

10.3 Media advertisements and site notices

Press advertisements were placed in the following newspapers:

- The Kalahari Memorandum (Local Paper) in English on Friday, 2 September 2022
- The Kathu Gazette (Local Paper) in English on Friday, 2 September 2022
- The Noord Kaap Bulletin (Regional Paper) in Afrikaans on Thursday, 1 September 2022.

Site notices (A2 and A3 size) were placed (one in English and one in Afrikaans) at the entrance to MaCarthy farm. Notices were also placed at strategic public locations in Postmasburg on Wednesday, 7 September 2022. See location of adverts in Appendix B4.

Proof of placement of advertisements and site notices is included in Appendix B4.

10.4 Public and authority meetings

An open public information-sharing meeting will be held during the EIA phase of this project. The minutes of the meetings will be included in Appendix B5. Additional meetings will be held

as required by the IAPs.

10.5 Public review of draft scoping report

This draft scoping report is made available for public review from **Friday, 9 September – Monday, 10 October 2022**. (30 calendar days, excluding one public holiday) in accordance with Section 40 (3) of the 2014 EIA regulations.

Written comments and responses received to date are provided in Appendix B6.

Proof of notification is provided in B7.

10.6 Authority review of draft scoping report

This draft scoping report is made available for authority review from **Friday, 9 September – Monday, 10 October 2022**. (30 calendar days, excluding one public holiday) in accordance with Section 40 (3) of the 2014 EIA regulations.

10.7 Summary of issues raised by IAPs

Please refer to Appendix B6, for the full comments and correspondence with IAPs and authorities.

Table 10-1: Summary of Comments / Issues raised by IAPs

DATE	NAME	CORRESPONDENCE RECEIVED	EAPs RESPONSE TO ISSUES AS MANDATED BY THE APPLICANT	CONSULTATION STATUS
INTERESTED / AFFECTED PARTIES				
25 May 2022	MNR MARITZ	Landowner unaware of prospecting rights on his land.	EAP noted comment and ensured landowner would receive all future correspondence.	Finalised
2 June 2022	DF MALAN	Landowner unaware of prospecting rights on his land.	EAP noted comment and stated that previous work was done by different consultants and ensured landowner would receive all future correspondence.	Finalised
6 June 2022	MINETTE BEUKES	Responded to initial SMS notification and requested clarity of landownerships and further information.	EAP advised on ownership information and requested an update and clarification. EAP sent notification letter and maps.	Finalised
22 June 2022	IZAK POTGIETER	Lawyer representative sent letter requesting prospecting right and further information.	A full response with further information was sent by EAP. See appendix B6.	Open
9 July 2022	DF MALAN	Landowner requested more information about the applicant.	EAP sent information document and maps to landowner.	Finalised
2 September 2022	ELIZE NEL	Elize, from Tshiping, identified themselves at an interested party, and requested to be notified throughout the project.	Contact details have been added to the IAP database. BID was sent.	Finalised

DATE	NAME	CORRESPONDENCE RECEIVED	EAPs RESPONSE TO ISSUES AS MANDATED BY THE APPLICANT	CONSULTATION STATUS
2 September 2022	JC WESSELS	Requested further information.	EAP provided further details, as requested. BID was sent.	Finalised
2 September 2022	JAN OLIVIER	Requested to be registered as an IAP.	EAP acknowledged receipt of email and added details to IAP database for future correspondence. BID was sent.	Finalised
2 September 2022	ANDREW OLIVIER	Requested more information. Asked for BID to be sent as a PDF via WhatsApp.	EAP provided more details as requested. BID was sent.	Finalised
2 September 2022	HELENA VAN ZYL (ENDEMIC VISION)	Requested to be registered as an IAP	EAP acknowledged receipt of email and added details to IAP database for future correspondence. BID was sent.	Finalised
5 September 2022	MARTIN KOORZEN	Requested to be registered as an IAP.	Confirmed receipt of email and added details to IAP database. BID was sent.	Finalised
5 September 2022	ALBERTUS VILJOEN	Requested to be registered as an IAP.	Confirmed receipt of email and added details to IAP database. BID was sent.	Finalised
NO FURTHER COMMENTS HAVE BEEN RECEIVED TO DATE				

11. THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITES

11.1 Climate

Figure 11.1 illustrates the significant difference between the evaporation and rainfall, which is the cause of the semi-arid landscape associated with the site and surrounds.

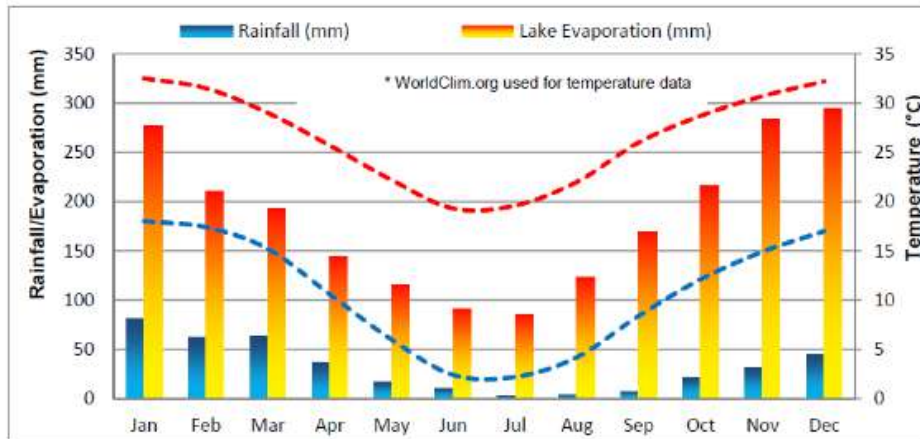


Figure 11.1: Average monthly climate for Sishen Mine (Design Point, 2017)

The regional wind direction and speeds are of importance as they provide an indication of the receptors areas that will experience the greatest impacts resulting from atmospheric emissions and dust. The wind rose for the period of July 2015 to June 2016 (as provided by Airshed, January 2018) is provided in Figure 11.2.

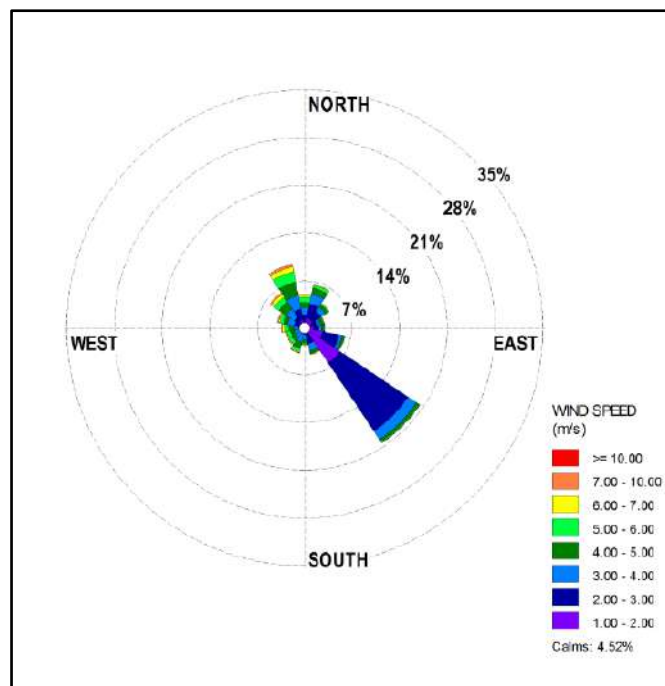


Figure 11.2: Period average Wind Rose for Sishen mine July 2015 to June 2016 (Airshed,

2018)

The wind field is dominated by winds from the north-west and south-east with calm conditions occurring only 5% of the time.

11.2 Topography

The regional topography is characterised by a flat, gently undulating plains interspersed with hills and mountains (Figure 11.3). The valleys have been used extensively for livestock farming activities while steep mountainous ridges being inhabitable, but often carry ore deposits that have been historically and are also currently being actively mined.

Most of the region lies at approximately 1200 metres above sea level (masl). A series of north to south orientated ridges (Langberge) occur within the western section of Western Properties which forms a significant topographical high in the region at 1 450 masl. The Priority Prospecting areas is characterised by a series of low lying koppies, incised by

Most of the region lies at approximately 1200 masl. A series of north to south orientated ridges (Langberge) occur within the western section of the Western Properties which forms a significant topographical high in the region at 1 450 masl. The Priority Prospecting areas is characterised by a series of low lying koppies, incised by extensive drainage areas.

The MaCarthy site has two significant topographical highs located within the north western (1 340 masl) and north eastern (1 270 masl) sections. These koppies are associated with the iron ore bodies and the plan is to mine the koppies to gain access to the ore. An extensive valley and river flood plain is situated between the two koppies (1 240 masl) which bisects the proposed MaCarthy mining area.

The valleys have been used extensively for livestock farming activities while steep mountainous ridges being inhabitable, but often carry ore deposits that have been historically and are also currently being actively mined.

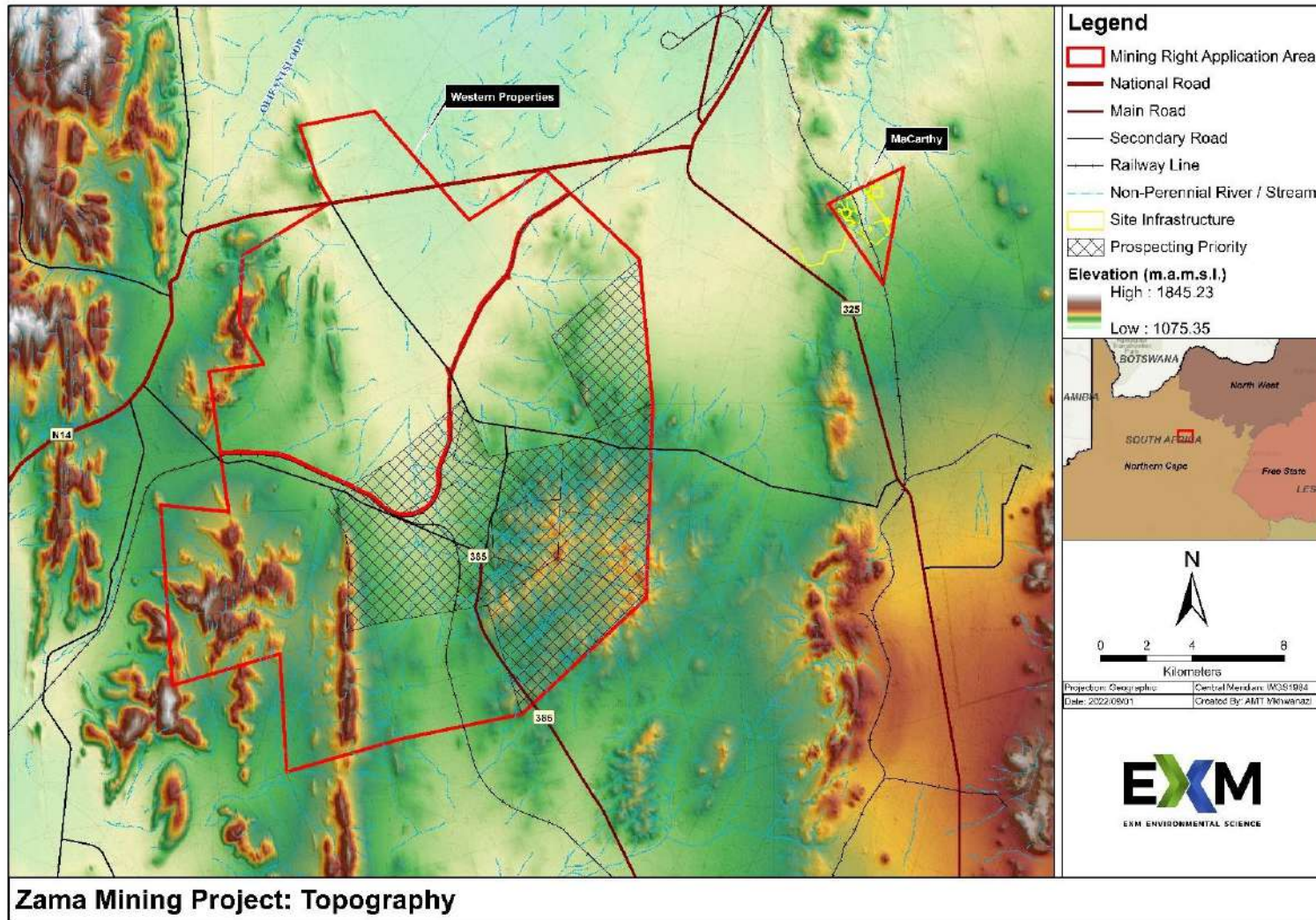


Figure 11.3: Zama Mining Project Topography

11.3 Geology

11.3.1 Regional Geology

The Transvaal Supergroup, or Griqualand West Supergroup as it is referred to where it occurs in the Northern Cape, is host to all the iron ore occurrences in the region. In the Kathu-Postmasburg region, the oldest rocks of the approximately 8 km thick Griqualand West Supergroup are the ~1.6 km thick carbonate platform sediments (dolomites with minor limestone, chert and shale) of the Campbellrand Subgroup of the Ghaap Group. Conformably overlying the carbonates is the banded iron formation unit, the Asbestos Hills Subgroup, which can be up to 500 m thick. Locally the upper portion of the banded iron formation (Kuruman Iron Formation) has been enriched to ore grade, i.e. Fe>60%, and the ores found within this unit comprise the bulk of the high-grade iron ores in the region (Figure 11.4).

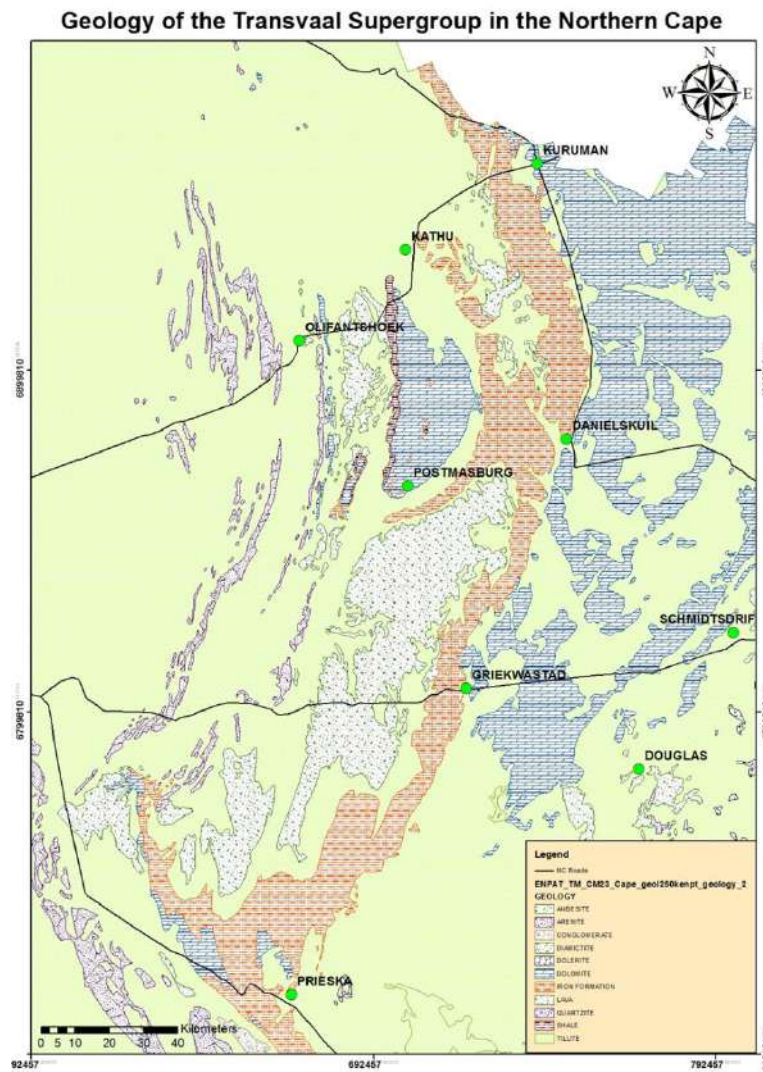


Figure 11.4: Geology of the Transvaal Supergroup in the Northern Cape.

11.3.2 **Local Geology**

The banded iron formations within the area belong to the Kuruman Iron Formation and have locally been named the Manganore Iron Formation. The formation represents remnants of the Asbestos Hills Subgroup that slumped into sinkhole structures in the Campbel rand dolomites during a hiatus preceding the deposition of the Gamagara Formation. The Griquatown Iron Formation, which comprises four upward-coarsening allochemical iron formation megacycles, has been removed by erosion in the area.

Dwyka Tillite and Kalahari Group sediments both unconformably overly the Olifantshoek Supergroup rocks in the area. The deposits are almost entirely blanketed by sand, dolocrete and calcrete of Kalahari Group with the exception of the Wolhaarkop Dome West of Postmasburg, where the Campbel rand Subgroup dolomites, Wolhaarkop Formation and Kuruman Formation banded iron formation are exposed. The Dwyka Tillite Group is poorly developed in the project area, with the Kalahari Group sediments unconformably overlying the Ongeluk Formation andesitic lavas and the Makganyene Formation diamictite of the Transvaal Supergroup.

The MaCarthy deposit (Figure 11.5) is characterised by the absence of the Dwyka tillite, thick Ongeluk lava or Makganyene Diamictite cover, and a poorly developed Gamagara sequence unconformably overlying the Transvaal Supergroup. Iron and manganese mineralization is typically preserved within paleo-sinkhole and ancient channel features where secondary mineralisation processes upgraded the Banded Iron Formation and conglomerates to high grade ores suitable for extraction. Mineralisation typically starts on surface and continues to a depth of approximately 100 m deep and is often associated with localised topographic highs.

The Western Properties of the project area is typified by thicker Ongeluk lava and well-preserved Transvaal Supergroup Sediments, like the Sishen area. Mineralization has been found within the so-called Manganore formation, underlying clastic sediments of the Gamagara Group and lavas of the Ongeluk Formation.

In both areas, the mineralisation is structurally controlled within localised sinkholes, graben and synclinal structures.

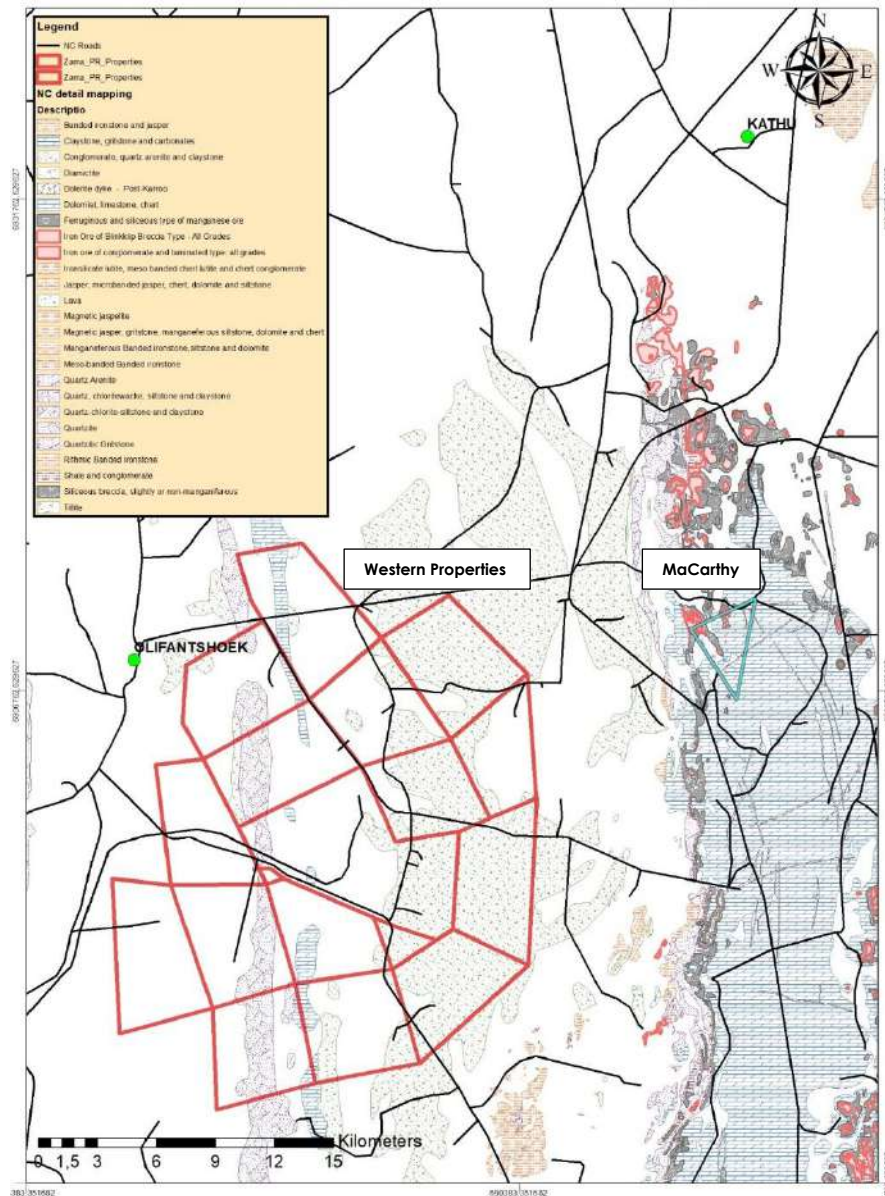


Figure 11.5: Local Geology of the Kathu – Olifantshoek Area

11.4 Soils and Land Capability

The region is largely dominated by shallow soils, such as Glenrosa (Gs) and Mispah (Ms) and moderately deep Hutton soils occurring in small patches due to limited weathering. These soils are not arable and fall into the Grazing Class VI.

The land capability within the region is generally suitable for grazing of livestock, which is the predominant farming practice in the area (Figure 11.6). The koppies and ridges are considered to wilderness areas.

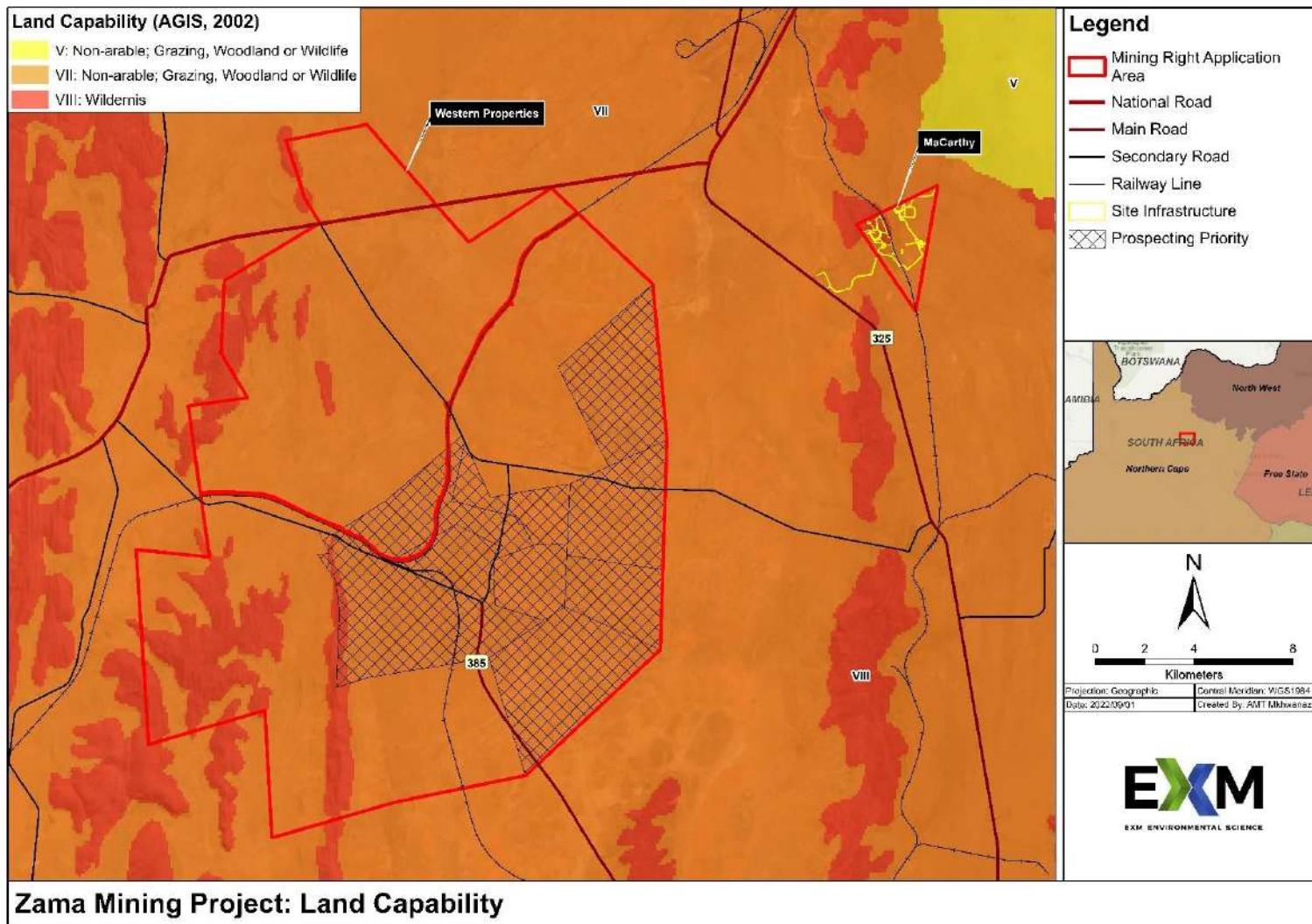


Figure 11.6: Zama Mining Project Land Capability

The structure of the soils at MaCarthy can be broadly described as sandy with loose and single grained structure (Zimpane Research, 2022). A somewhat impermeable calcrete (evaporite) layer is present at shallow depth within most part of the landscape, which has a moderate to good water holding capability.

11.5 Groundwater

11.5.1 Groundwater Vulnerability

Groundwater vulnerability refers to the likelihood for contamination to reach a certain area / receptor after it has been introduced to the surface. Based Groundwater Vulnerability Classification System (DWA, 2013), MaCarthy lies within an area considered to be most vulnerable (Pescali, 2021). Groundwater is the sole source of water supply for all intents in the Zama Mining Project and the area falls within a Strategic Water Source Area (Figure 11.7).

11.5.2 Aquifer Type

Two possible aquifer types have been found present in the region. The first aquifer is a shallow, double porosity, unconfined or semi-confined aquifer within the upper 2 to 20 meters of the geological profile. Farmers in the region use this aquifer widely for domestic and livestock water supply. Borehole yields in the calcrete aquifer generally vary from 0.2 to approximately 2 l/s. Consideration of the shallow aquifer system is especially important in this study because the shallow, weathered zone is where base flow, discharge and interaction with surface water take place. Any contamination (seepage or leachate) at surface will affect this aquifer most directly.

The second aquifer is the deeper, secondary porosity aquifer that occurs at depths usually exceeding 20 meters below surface and is the main aquifer system in the area when it comes to mine dewatering or groundwater supply. The aquifer is mostly semiconfined but can be fully confined in some areas. Fracturing in the aquifer usually occurs in the chert breccia (Manganese Marker) banded iron formation and to a lesser extent the underlying dolomite.

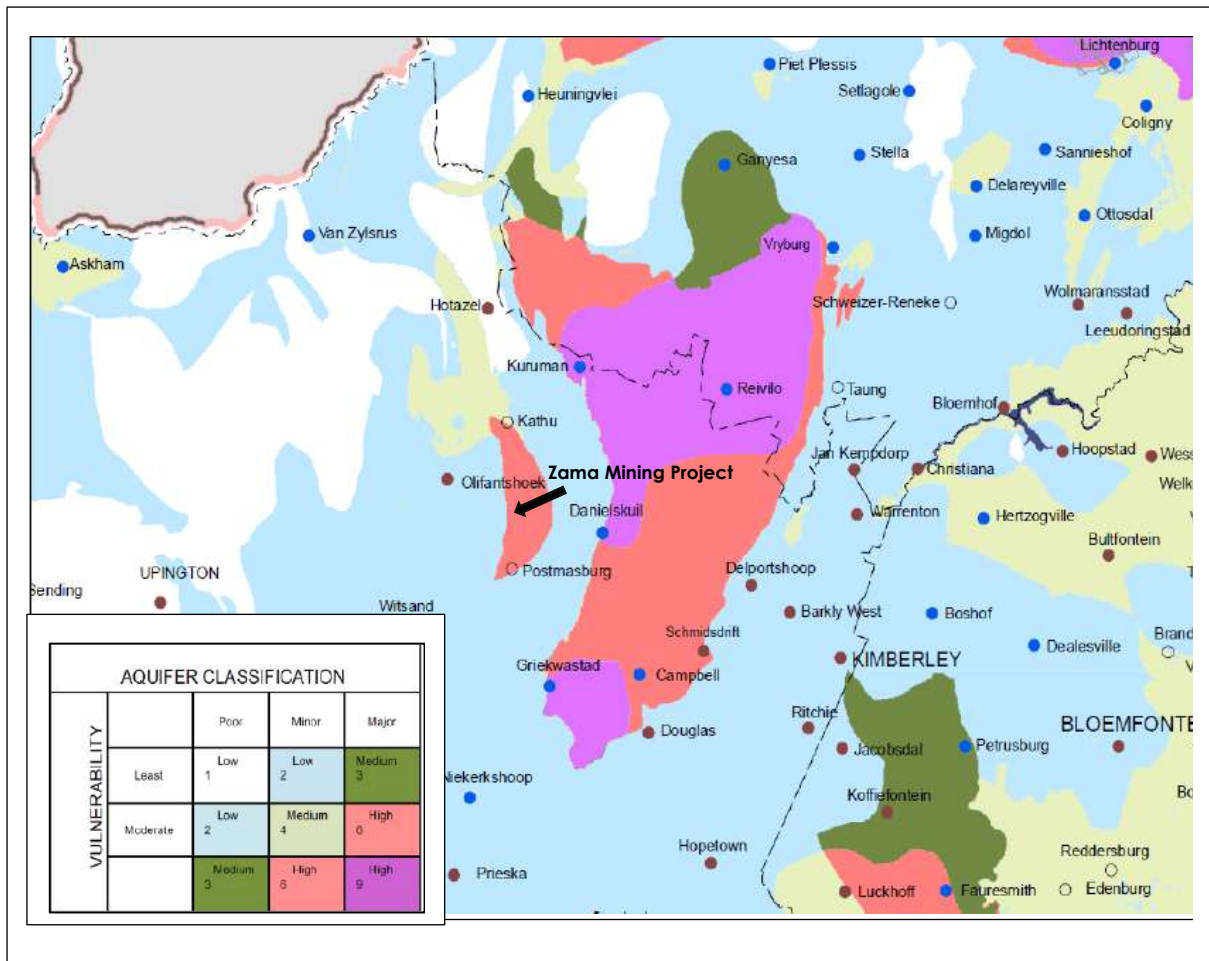


Figure 11.7 Groundwater Susceptibility Map of South (DWA, 2013)

11.5.3 Aquifer Yields

The yields in the aquifer may vary from 1 to more than 40 l/s. Fracturing is usually concentrated near the haematite ore bodies where mineralization and preservation of ore bodies occurred through folding, thrusting, fracturing and sinkhole formation/slumping. This aquifer system usually displays semiconfined or confined characteristics with piezometric heads often significantly higher than the water-bearing fracture position. The fractures may occur in any of the coexisting host rocks due to different tectonic, structural and depositional processes. The regional groundwater varies between 9 and 121 meters below surface.

11.5.4 Aquifer Levels

The groundwater levels at the adjacent Salene mine are at approximately 1 220 metres below sea level (mbsl) (Pescali, 2021) and static groundwater levels in the vicinity range between 10 and >68 meters below surface. It should be noted that mining at Salene Manganese does not intersect the water table. Dewatering requirements, input into the

mine water balance and impacts on groundwater levels will be investigated as part of the EIA specialist hydrogeological impact assessment. Should no groundwater be intersected during mining it will be necessary to import water from the Sedibeng Water pipeline that runs parallel to the R325 road, approximately 3 km to the west of MaCarthy.

11.5.5 **Pollution Pathways**

According to Pescali Environmental Consultants (2021) several geological structures such as dykes also exist in the region of MaCarthy. These structures and the weathered zone are possible pathways of elevated groundwater flow and contamination migration. Typically, in the region nitrate is a common contaminant. Nitrate contamination originates from nitrate-based explosives used in the mining activities as well as nitrates originating from the concentration of livestock within kraals and at watering holes. Nitrate levels of 10 mg/l have been recorded at the neighbouring Salene mine (Pescali, 2021) and is considered a key contaminant. The potential for contamination from sources at MaCarthy will be investigated as part of the specialist hydrogeological impact assessment.

11.6 Surface Water Resources

The Zama Mining Project lies within the Lower Vaal Water Management Area (WMA), specifically the Molopo Sub-WMA. The Western Properties, including the Priority Prospecting areas, cover two quaternary catchment areas, namely D73A, with drainage towards the Soutloop River in the south and the D41J catchment which drains to the north towards the Olifantsloop River, a tributary of the Ga-Mogara (Gamagara) River (Figure 11.8). The MaCarthy area falls within D41J quaternary catchment also draining north towards the Ga-Mogara (Gamagara) River, 8 km to the north. An unnamed tributary of the Ga-Mogara River bisects the MaCarthy property. Two other minor drainage lines occur on the property. The Prospecting Priority areas is characterised by several drainage lines that incise numerous koppies in this area.

Both the Ga-Mogara and Soutloop Rivers are classified as Freshwater Ecosystem Priority Area (FEPA) rivers. These river FEPAs achieve biodiversity targets for river ecosystems and threatened fish species and were identified in rivers that are currently in a good condition (A or B ecological category). The FEPA status indicates that the river systems should remain in a good condition to contribute to national biodiversity goals and support sustainable use of water resources.

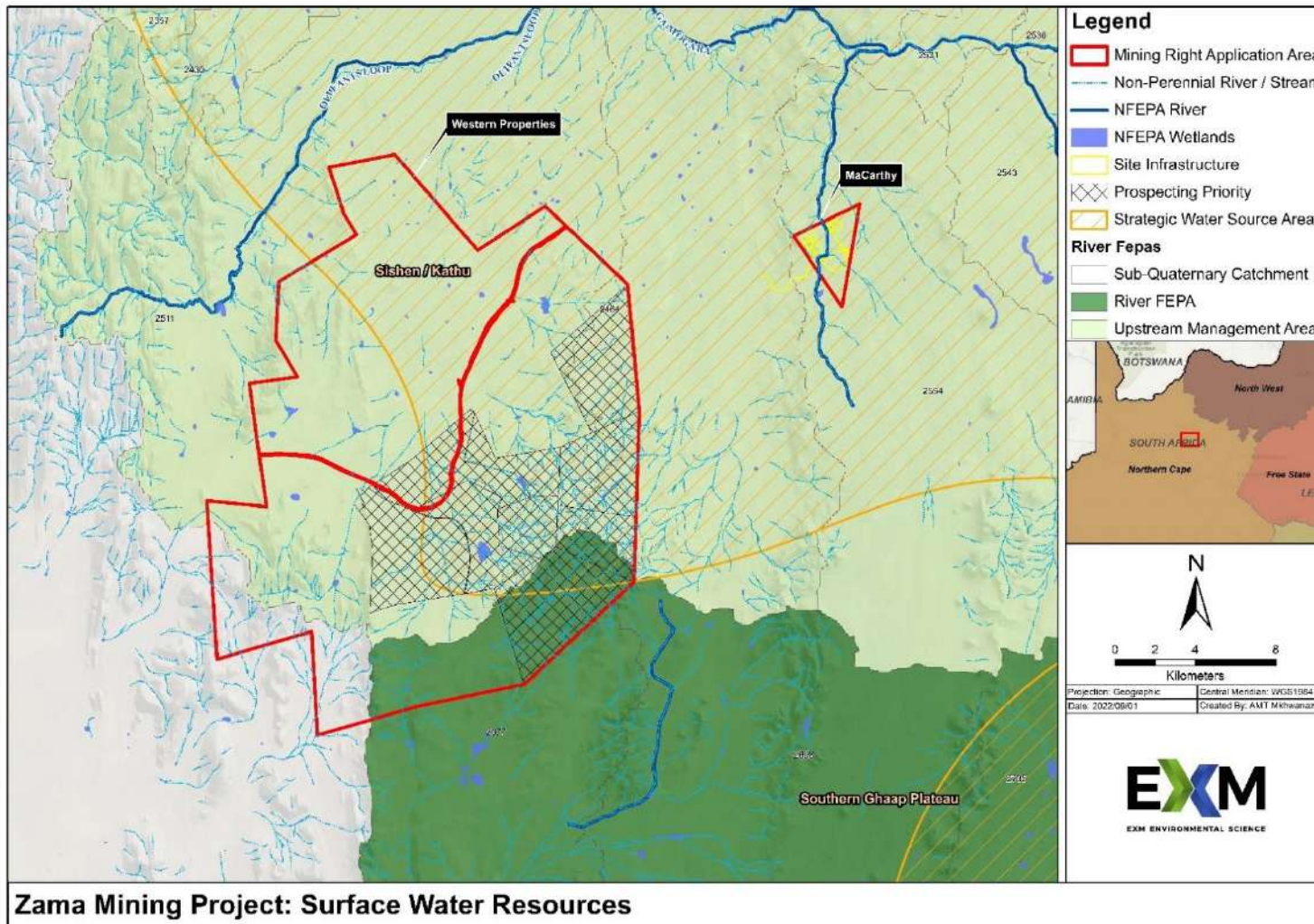


Figure 11.8: Zama Mining Project Surface Water Resources

Both the Ga-Mogara and Soutloop Rivers are classified as Freshwater Ecosystem Priority Area (FEPA) wetland areas. The entire mining right application are thus located within the management areas. These river FEPAs achieve biodiversity targets for river ecosystems and threatened fish species and were identified in rivers that are currently in a good condition (A or B ecological category). Their FEPA status indicates that they should remain in a good condition to contribute to national biodiversity goals and support sustainable use of water resources.

Several FEPA wetlands have also been identified in the area including two such wetlands within the Prospecting Priority area. The entire southern portion is considered a FEPA as it forms part of the catchment of the Soutloop River system which has high conservation priority.

11.7 Terrestrial Biodiversity

11.7.1 Vegetation Types

The study area falls within the Savanna Biome, the Eastern Kalahari Bioregion. The Kuruman Mountain Bushveld vegetation type occurs on the koppies at MaCarthy (Musina & Rutherford, 2018). The Kuruman Thornveld vegetation type occur in the valley areas of both MaCarthy and in the Priority Prospecting Areas. The Olifantshoek Plains Thornveld vegetation type predominates the other sections of the Priority Prospecting areas. The Koranna-Langeberg Mountain vegetation type occurs over the Langeberg Mountains located in the western section of the Priority Prospecting areas (Figure 11.9).

11.7.2 Sensitive Biodiversity Areas

No CBAs have been identified with the mining right application area (Figure 11.10). The majority of MaCarthy is however regarded as an ESA. The mountainous ridges within the Western Properties are also ESAs, with the Langberg ESA lying within the western portion of the Priority Prospecting areas. ESAs are areas which must retain their ecological processes that have not been met in CBAs or protected areas to meet biodiversity targets.

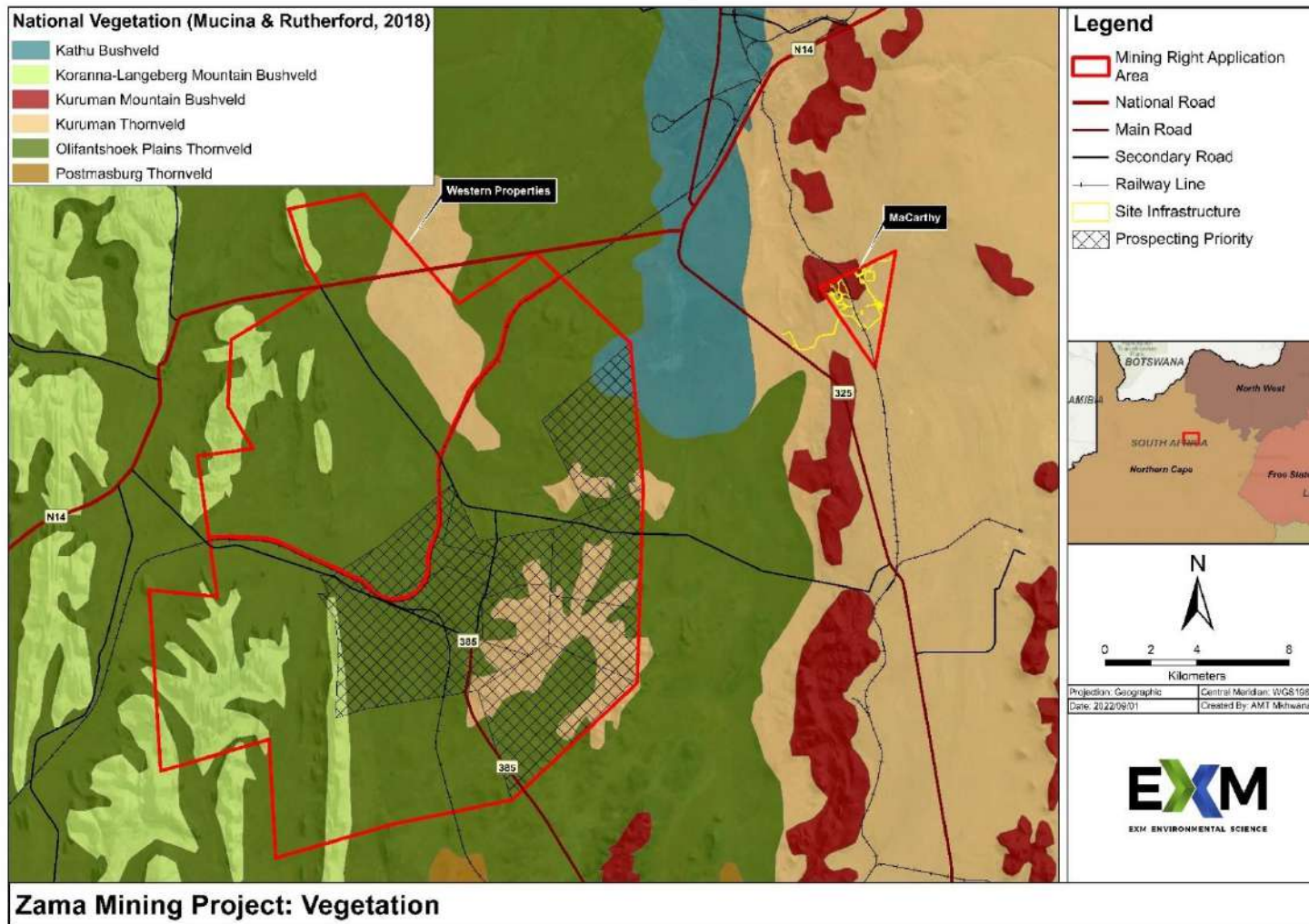


Figure 11.9: Zama Mining Project: Vegetation Types

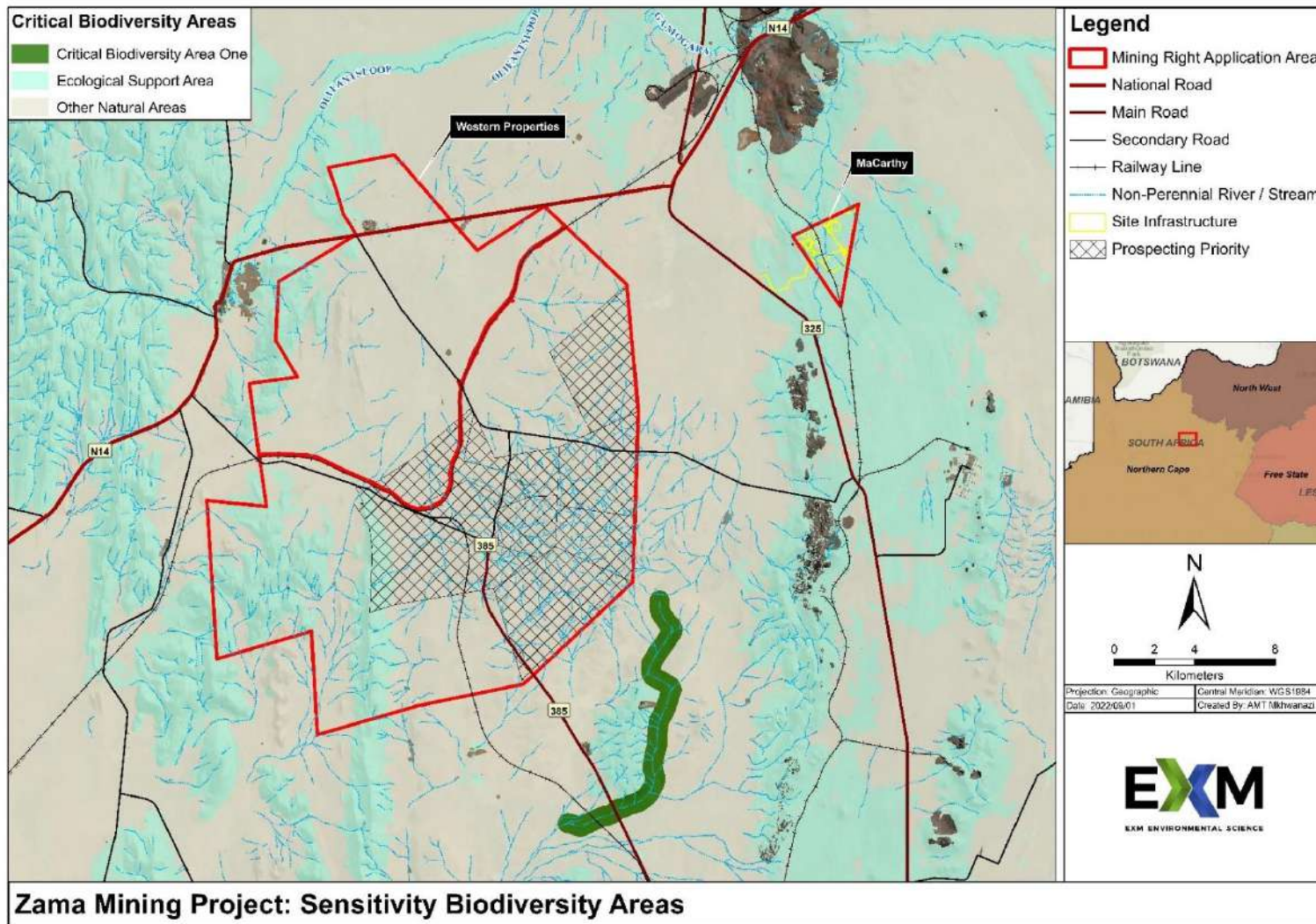


Figure 11.10: Zama Mining Project: Sensitive Biodiversity Areas

According to the Northern Cape Provincial Spatial Development Framework (2012) the study area falls within the Griqualand West Centre of Endemism. Key areas for the occurrence of endemics in the centre of endemism include the Ghaap Plateau, Kuruman Hills and Asbestos Hills which occur outside of the project area, but importantly also the Langeberg that occurs within the western section of the Priority Prospecting area. Koppies are generally considered to have high sensitivity in the region as they provide habitat for endemics and species of conservation concerns. Riparian habitats such as that at MaCarthy also have high sensitivity as these areas provide habitat that provides certain ecosystem services and act as ecological corridors.

11.8 Air Quality

Due to the nature of activities in the area, dust is viewed as the most important pollutant. Key sources of dust include unsurfaced roads and mining activities. The MaCarthy site lies in close proximity to existing open pit mining activities, with Salene mine to the west, Jenkins mine to the north west, Boskop and PMG mines to the south east and Khumani and Demaneng mines to the north. It is therefore expected that the baseline dust fallout and particulates (PM₁₀ and PM_{2.5}) will exceed residential standards.

The proposed activities at MaCarthy are expected to (potentially) contribute to the dust levels on the site and in the immediate surrounds. Sensitive receptors include homesteads in the vicinity of the mine (Figure 11.11). The cumulative air quality impact on receptors will need to be determined.

The Western Properties have not been subjected to extensive mining activities, and traffic on gravel roads is likely the most significant contributors to dust levels. Exceedances of residential standards would be expected near roads in this area.

11.9 Noise

Ambient noise levels in the region are affected by traffic, trains, mining, prospecting, and farming activities. The ambient noise levels in the vicinity of MaCarthy are expected to be elevated due to existing mining activities and traffic in the region. EARES (2020) found that both the daytime and night-time noise levels in the region were elevated but are regarded as typical of a suburban environment (Table 11-1).

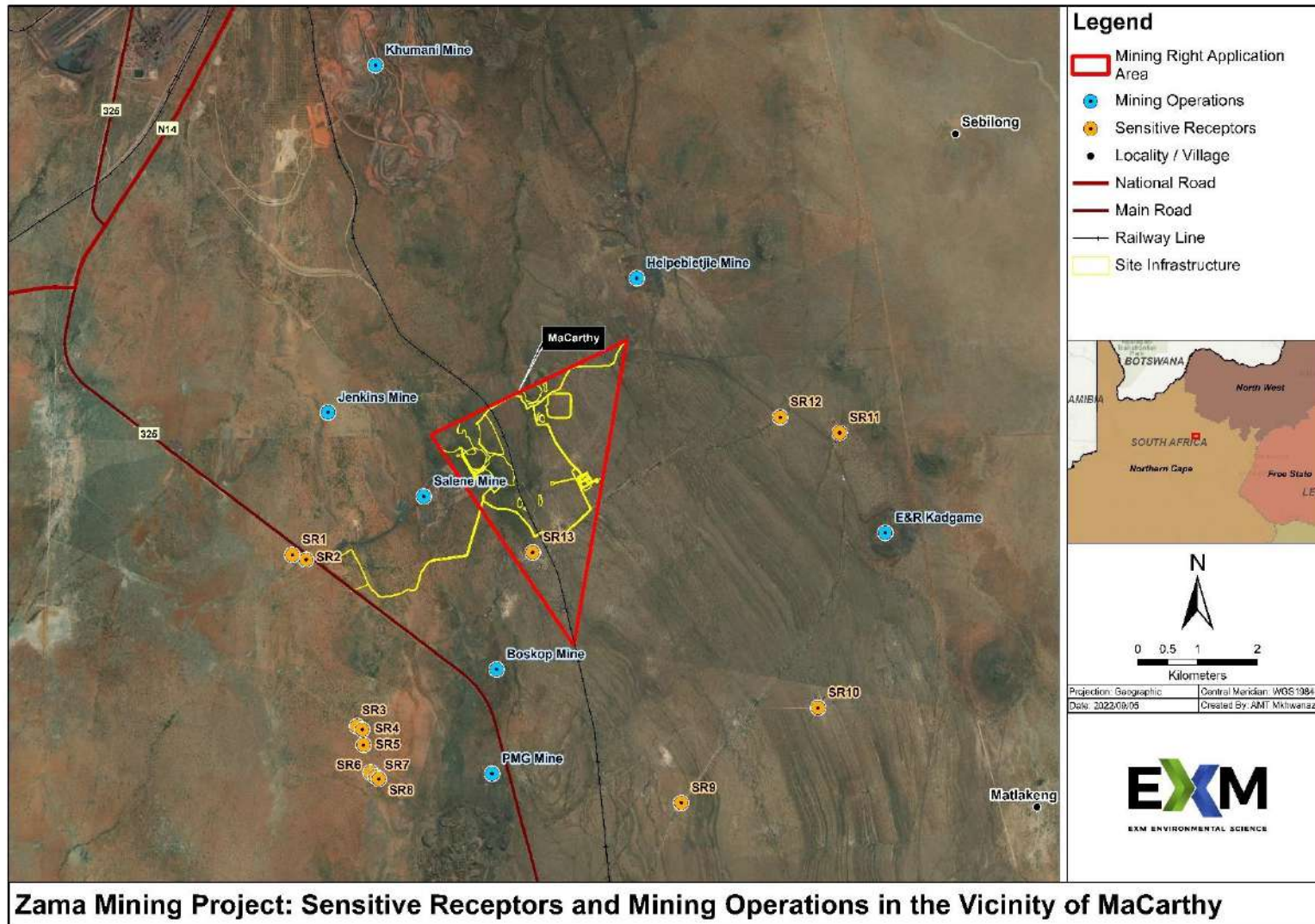


Figure 11.11: Sensitive Receptors and existing Mining Operations in the vicinity of MaCarthy

Table 11-1: Noise Levels recorded near MaCarthy

Measurement Point	Day-time A-Weighted Equivalent Rating Levels (dBA)	Night-time A-Weighted Equivalent Rating Levels (dBA)
SR2	51.8	50.0
SR4	58.8	51.3
SR13	44.8	41.3

Both daytime and night-time noise levels were found to exceed the national and international standards of 55 dBA and 45 dBA at neighbouring receptors. The location of the receptor points is shown in Figure 11.11.

11.10 Archaeology and Cultural Heritage

The project area is a historically sparsely populated rural area in which the human occupation consist of a limited (known) pre-colonial element (Stone Age) as well as a much later colonial (farmer) component (van Schalkwyk, 2022). The discovery of rich mineral resources such as manganese and iron gave rise to the development of a mining component.

Heritage sites have been mapped based on the Heritage Screening Report obtained from the DFFE National on-line Screening Tool (Figure 11.12). The farmstead at MaCarthy is of High Sensitivity based on the tool as it represents a Grade IIIc Heritage Site. This means a Heritage Site that must be satisfactorily studied before impact.

According to the Heritage Impact Assessment (Van Schalkwyk, 2022) the farmstead comprises two heritage sites:

- **Cemetery:** A very old, neglected burial site containing approximately six graves. The graves are possibly of former landowners. Some of the dates end in 1918. The site is fenced off, but this not maintained. Apparently, no descendants have visited the graves in recent years. The site is regarded as being of High/Medium Heritage significance.
- **Farmstead Buildings:** Old farmstead consisting of various elements: house, school, stores, threshing floor and cattle kraal. The site is regarded as being of Medium Heritage significance.

The only other site identified by Van Schalkwyk at MaCarthy is a low-density surface scatter of Later Stone Age flakes and cores located to the west of the farmstead, possibly dating to the Middle Stone Age. This is of low significance.

As indicated in Section 9.2, the sites have been avoided during the layout planning.

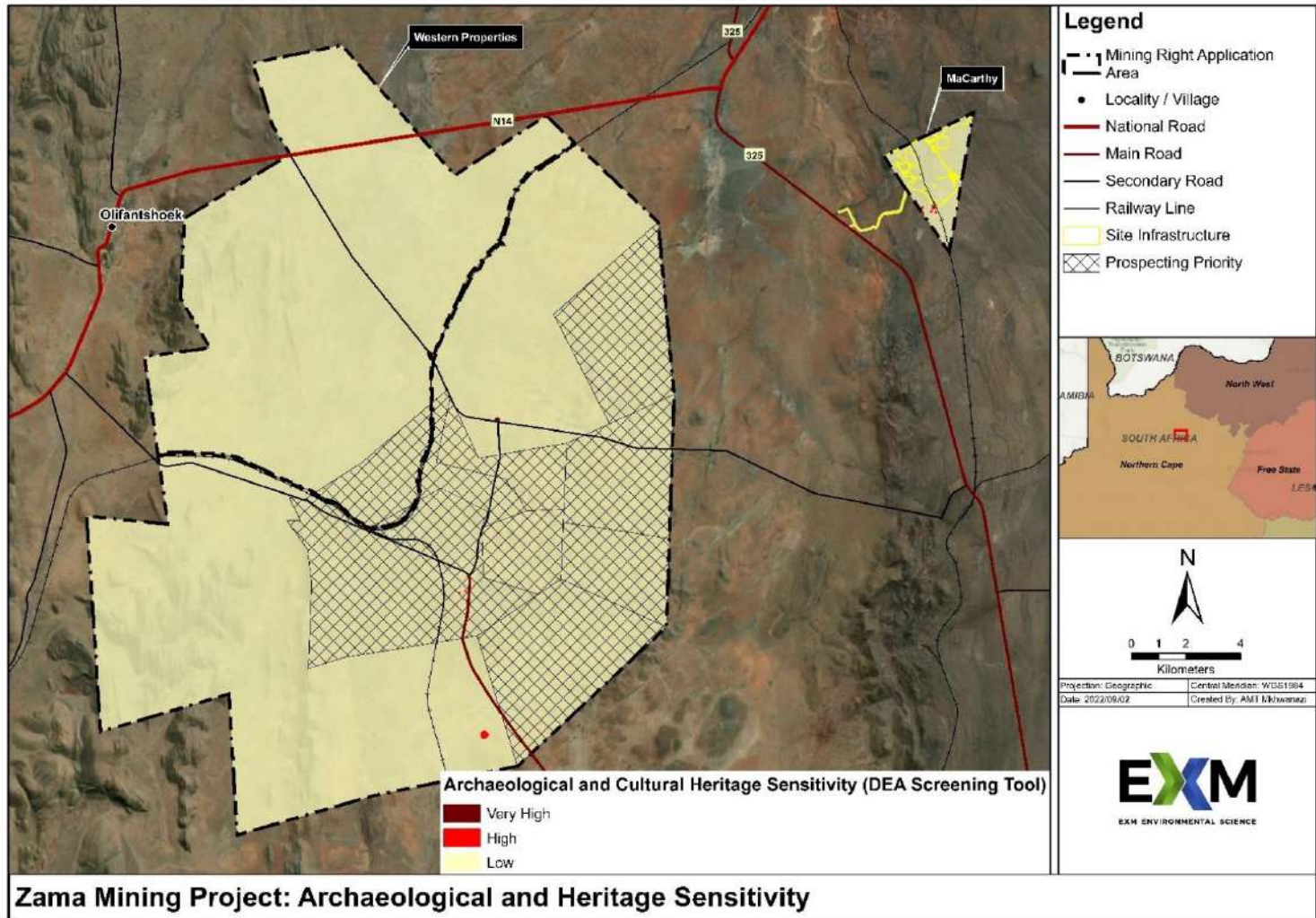


Figure 11.12: Zama Mining Project Archaeological and Heritage Sensitivity

The DFFE Screening Tool, also revealed several heritage sites within the Prospecting Priority Areas in the Western Properties. These sites are likely to be associated with farmsteads of historical settlers. The sites include:

- **Grade IIIA Heritage Resources** - must be retained. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.
- **A Grade IIIC Heritage Resource** - must be satisfactorily studied before impact. If the recording already Low Significance done (such as in an HIA or permit application) is not sufficient, further recording or even mitigation may be required.

Only prospecting activities are currently planned in this area and heritage sites will be avoided. A heritage screening will however be required for the area to ensure that sites are demarcated and protected.

11.11 Palaeontology

The South African Heritage Information System (SAHRIS) Palaeontology (Fossil) Sensitivity map indicates very highly sensitive rocks at MaCarthy (Figure 11.13). This applies to the Ghaap Group. This group is divided into the lower Campbell Rand Subgroup dolomites, limestones and cherts and upper Asbestos Hills Subgroup iron formation. Only the Campbell Rand dolomites and limestones can preserve trace fossils such as stromatolites that are layers of mineral sediments deposited by the photosynthetic activity of green and blue-green algal colonies. The algal cells, however, are very rarely preserved. A variety of types and forms of stromatolites have been described by Beukes (1987). Banded iron and haematite in the Asbestos Hills Subgroup were formed by the seasonal oxidation of iron but these are not a trace fossils (Bamford, 2020). A Phase 1 Palaeontological Study is however required for the MaCarthy area to confirm the presence of fossils in accordance with the requirements of the National Heritage Resources Act.

The SAHRIS Sensitivity map indicated that most of the Western Properties are of Medium palaeontological sensitivity. There is an area of high sensitivity in the north but this is outside of the Prospecting Priority areas. It is not anticipated that an fossils will be disturbed by proposed prospecting activities. A desktop Palaeontolglcal Impact Assessment will be undertaken to confirm this risk.

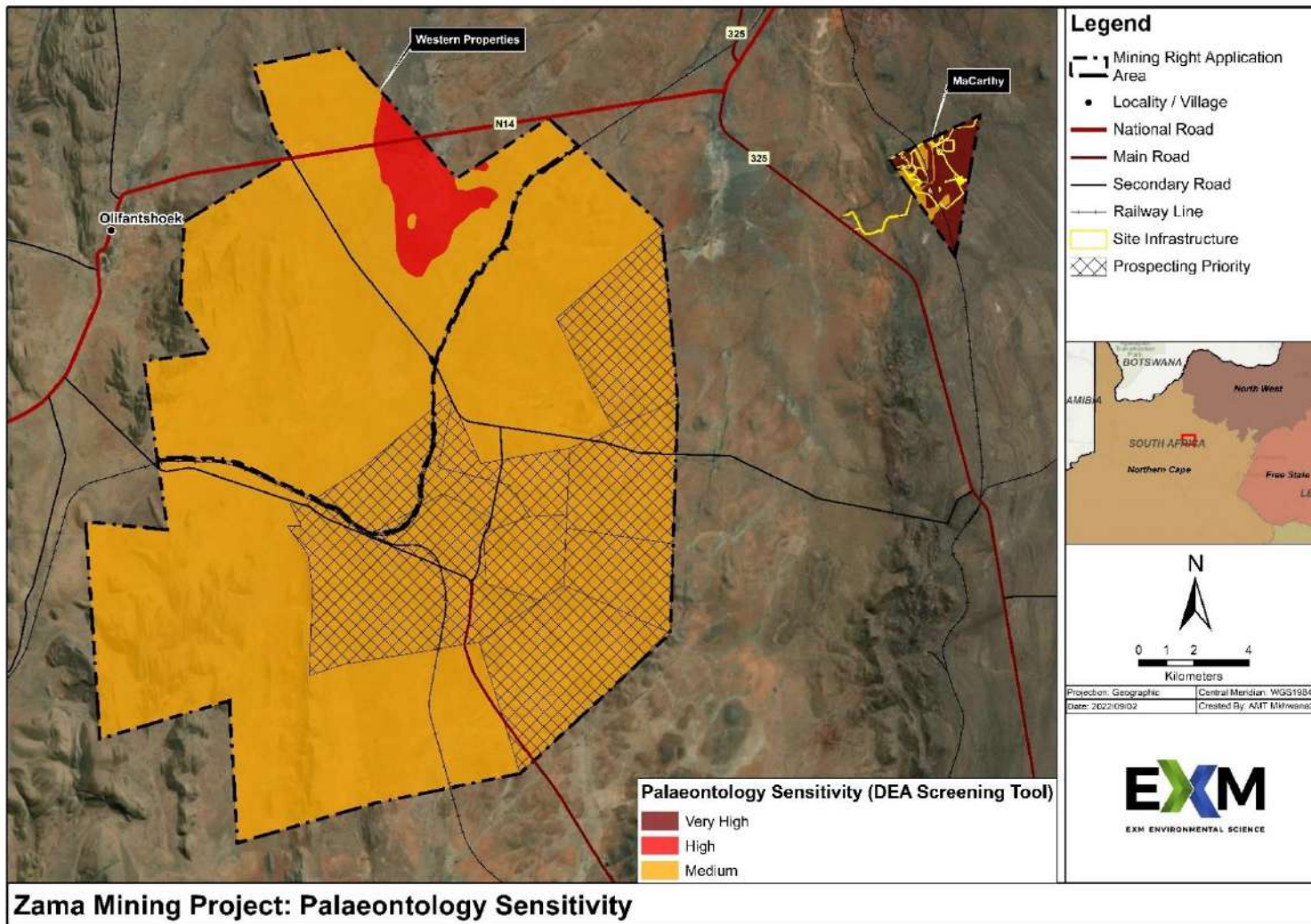


Figure 11.13: Zama Mining Project Palaeontological Sensitivity

11.12 Land Tenure

Zama Mining has held the prospecting right for iron ore and manganese over all properties included in the mining right application area since 2013. The properties included in the mining right application are all privately owned and are largely used for farming activities. Some of the properties are owned by Transnet and are used for infrastructure required to support the Sishen Iron Ore Export rail line which runs from west to east along the northern section of the Western Properties. The rail servitude is excluded from the mining right application area. There is also an existing quarry located on Cox 571 Portion 3. These farms are however not included in the Prospecting Priority Areas.

MaCarthy is owned by Assmang Limited and is currently used by a tenant for the purposes of livestock farming. The access road will cross three privately owned farms within the Salene mining area. There is also a rail servitude that crosses the MaCarthy site owned by Transnet. This will be excluded from the mining right area.

Land tenure based on the title deed holders for all areas within the mining right application area is provided in Figures 11.14.

11.13 Socio-Economic Environment

11.13.1 Area of Influence

Zama Mining is applying for a mining right on properties located within the Tsantsabane and Gamagara Local Municipal areas. The application areas are situated approximately 24 km south of Kathu, immediately east of Olifantshoek and 35 km north of Postmasburg, Northern Cape in the Gamagara and Tsantsabane Local Municipal areas.

The proposed mining activities at MaCarthy and the prospecting activities in the Prospecting Priority activities however will occur within the Tsantsabane Local Municipality although the closest communities are located within the Gamagara Municipality. The area of influence from a social perspective therefore includes communities in both municipal areas.

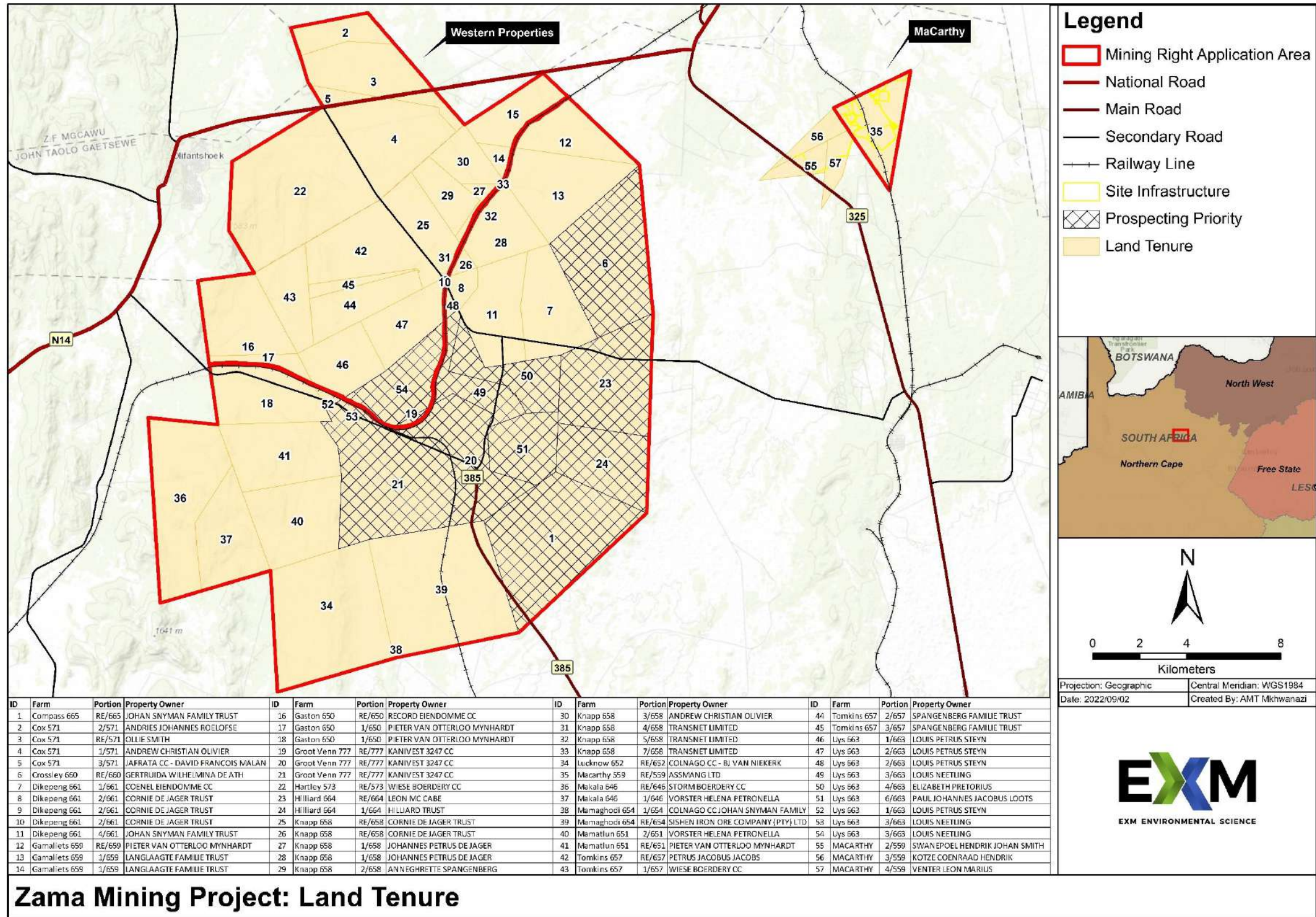


Figure 11.14: Zama Mining Project Land Tenure

Gamagara forms part of the John Taolo Gaetsewe (JTG) District Municipality and Tsantsabane forms part of the ZF Mgcawu District. The main towns and municipal areas that are included in each district are shown in Figure 11.15.

Key towns in the Gamagara municipality are:

- Kathu, the capital urban node and administrative capital of Gamagara LM.
- Sesheng, the main township in Gamagara LM, was initially established as hostels for Sishen Mineworkers, which were subsequently converted into family units.
- Mapoteng, an RDP housing area established to provide additional accommodation for mineworkers, the settlement has since seen a mushrooming of informal settlements.
- Siyathemba, a resettlement area, developed due to Sishen Mine's expansion to the west and the movement of persons from Dingleton.
- Dibeng, an important urban node that serves the local agricultural communities.
- Olifantshoek, a small town 81 km of Postmasburg and

The main residential areas within the Tsantsabane LM are:

- Postmasburg, the administrative seat of the municipality.
- Jenn-Haven, Groenwater and Skeyfontein, established due to land reform and restitution projects and accommodate small-scale farmers in a primarily presential area.
- Boichoko, Newtown, White City and Postdene, established townships.
- Mountainview and Greenfields, newly established informal settlements.
- Maranteng and Maremane informal settlement resulting from land redistribution.
- Beeshoek, a mining residential satellite town:

11.13.2 **Economic Profile**

JTG has a relatively large economy compared to the other Northern Cape districts. In 2016, it contributed 24.8% to the overall economy of the Northern Cape. At the same time, Gamagara Local Municipality contributed approximately 50.0% to the district municipality. Gamagara is thus a key economic contributor to both the district and the province. ZF Mgcawu also plays an important role in the Northern Cape, contributing to 22% of the economy. Tsantsabane contributes 20% to the district economy.

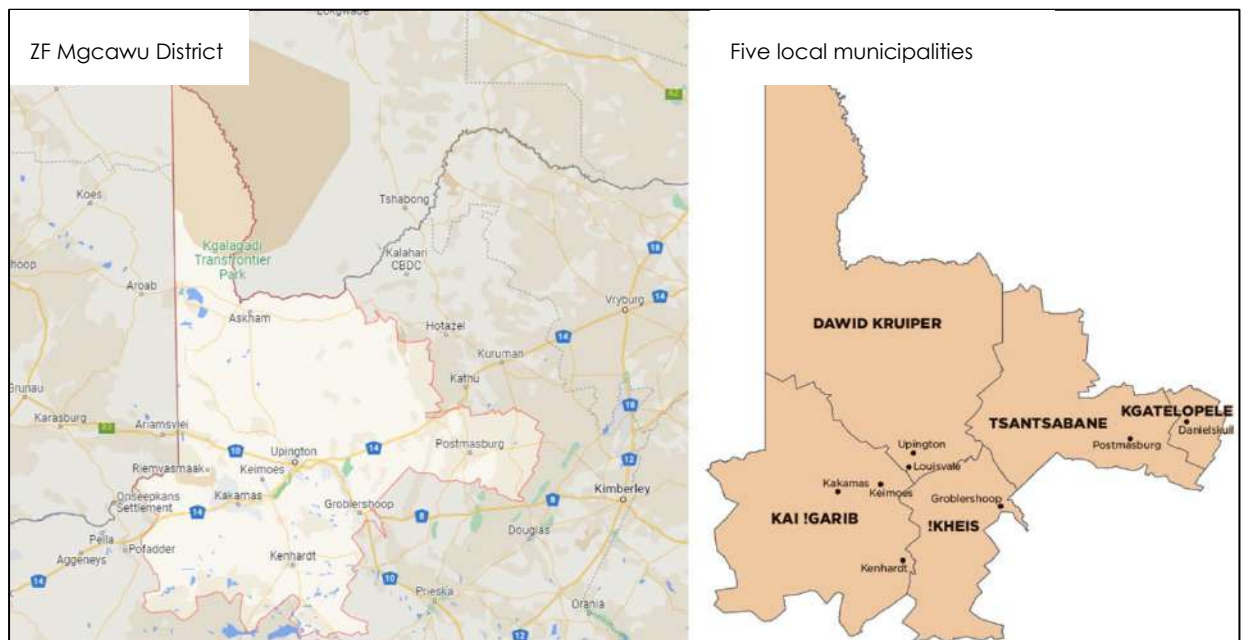
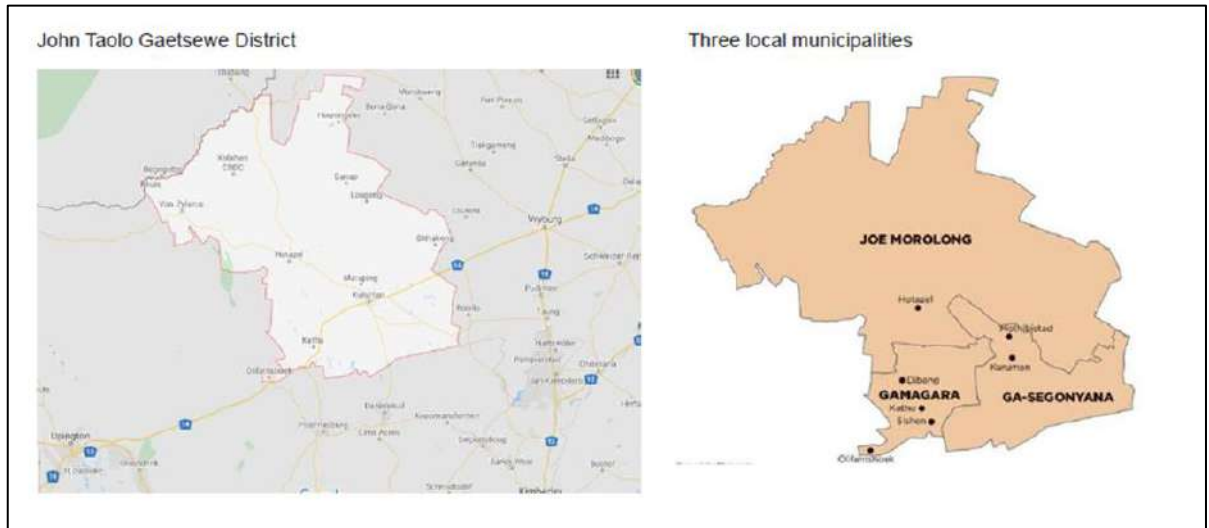


Figure 11.15: JTG and ZF Mgcawu District Municipalities and Main Towns

Figure 11.16 indicates that at a local level, the economy is driven by mining. Although mining is a crucial driver in the economic sector, it also contributes to the development of a secondary economy by creating indirect business opportunities for local business owners, e.g. guest houses, lodges, and retail stores (induced impact of mining). Although mining has a significant positive impact on the local economy, the lack of diversification places the region in a vulnerable position.

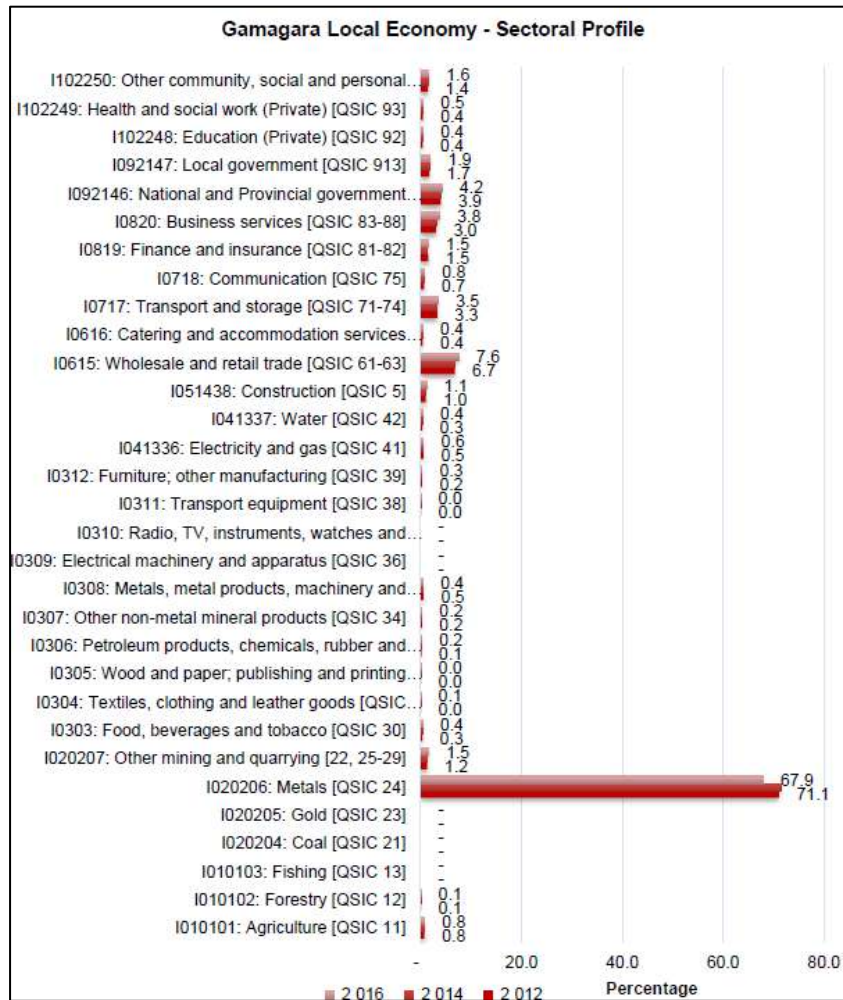
11.13.3 **Social Profile**

The key social indicators for JTG, Gamagara, ZF Mgcawu and Tsantsabane are shown in Table 11-2. Gamagara and Tsantsabane have similar social profiles, largely as a result of both municipalities' dependency on mining. The benefits of the mining sector are clearly reflected in the Social Performance Indicators.

What is not reflected in the indicators is the impact of the influx of jobseekers into the area. This is resulting in the rapid expansion of informal settlements in both municipal areas particularly in Mapoteng, Mountainview and Greenfields. It also means there is a disproportionate youth population in the area which is characterised by a high unemployment rate both in Tsantsabane and Gamagara. These people lack education and skills, the lack of which limits their employability into the formal mining sector (based on information and experience at Kolomela and Sishen mine).

In Gamagara, these people have organised themselves into various youth unemployment forums, with the objective of putting pressure on mining operations to employ and procure from their factions. The Tsantsabane community differs in that the local government takes the lead in this regard. In Tsantsabane local government has established a labour desk aimed at providing a mechanism for local persons to gain access to employment opportunities. In Gamagara there is currently no functional labour desk and as a result, employment opportunities may be highjacked by local community employment forums claiming to represent job seekers.

Gamagara Local Economy – Sectoral Profile



Tsantsabane Local Economy – Sectoral Profile

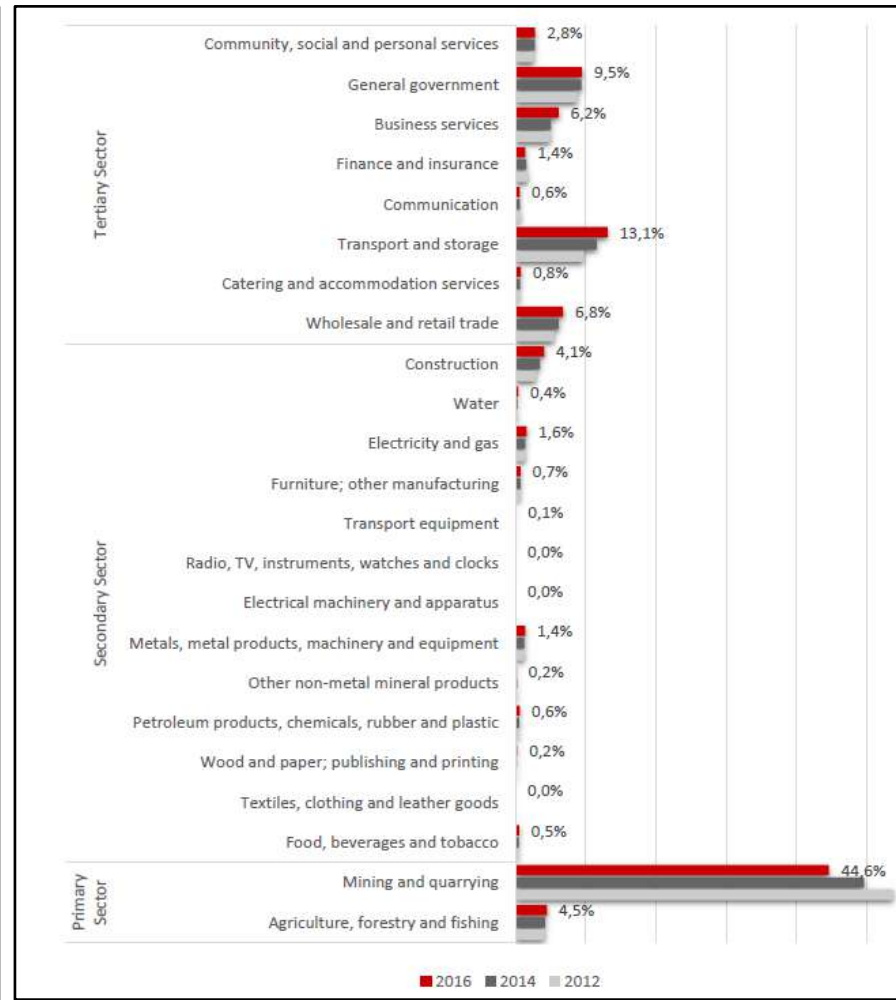


Figure 11.16: Local Economic Profile Gamagara and Tsantsabane (Demacon 2017 & 2019)

Table 11-2: Summary of Social Performance Indicators

Aspect	John Taolo Gaetsewe DM	Gamagara LM	ZF Mgawu DM	Tsantsabane LM
Population size	242 264	53 656	252 692	39 345
Number of households	72 310	15 723	74 091	11 821
Household size	3.4	3.4	3,9	3,3
Percentage of the population between 15 and 34	38.8	48.3	39%	42.1%
Most prevalent dwelling type: Formal	81%	79%	76%	78%
Percentage of households with access to a flush toilet connected to a public sewage system	28.29%	86%	78%	72%
Percentage of households with access to piped water*	91%	96%	91.6%	89.6%
The major source of energy for lighting: Electricity	88%	89%	89%	86%
The proportion of persons 20 years or older who have completed grade 12 only	26.1%	33.5%	28.9%	35.4%
Unemployment rate	29.7%	17.7%	10.2%	26%
Average household income	R78 640	R156 494	R 100 573	R 118 783

Source: Statistics SA, 2016, 2017; Demacon, 2017 & 2019

The influx of people into areas can create fertile ground for the growth of socially undesirable behaviours. Of particular concern are prostitution, teenage pregnancies, drug and alcohol abuse, gender-based violence, dropout from school, gang membership and the spread of HIV/AIDS.

Should the Zama mining right be issued, social interventions, as per Social and Labour Plan commitments should particularly look at addressing issues related to skills development and improving youth unemployment.

11.14 Current Land Use

The Geo Terra Imagery of the land use in the area is shown in Figure 11.17. The predominant land use in the mining right area, including the MaCarthy and the Priority Prospecting areas is livestock farming predominantly with cattle, sheep, goats and game. Other land uses in the area include mining activities particularly near the MaCarthy. Salene mine, Jenkins mine, Boskop, Khumani and Helpebietjie mines all lie in close proximity to MaCarthy (Figure 11.11). Of importance is also the proximity of the South African National Defence Force Lohatla Military Combat Training Centre, located approximately 5 km east of MaCarthy. The DFFE screening tool indicates that MaCarthy has low sensitivity from a Civil Aviation perspective. However, the proximity of Lohatla suggests that the impact of infrastructure such as the proposed PV Solar Facilities at MaCarthy on activities at Lohatla need to be considered. Note that the Matlakeng community no longer exists.

The R385 and several other district and minor roads traverse the Prospecting Priority area. These roads are gravel and are in quite poor condition due to recent good rains received. Access on many of the minor roads is restricted as gates have been locked by landowners.

The Sishen Iron Ore Export Line linking Sishen mine to the port of Saldanha Bay crosses the Prospecting Priority area, as does the Direct Rail Link to Kolomela mine.

The R325 links Postmasburg in the south to the N14, and Olifantshoek and Kathu in the northeast and northwest, respectively. This road runs to approximately 2.3 km west of MaCarthy. The MaCarthy access road will link the site to the R325, tarred road. The Vaal-Gamagara Water Pipeline runs parallel to the R325 road and MaCarthy will link to this pipeline for export/import water. There is also a minor road (MN14146) that links the site to the N14, passing through Helpebietjie mine. The road access is currently restricted by Helpebietjie mine.

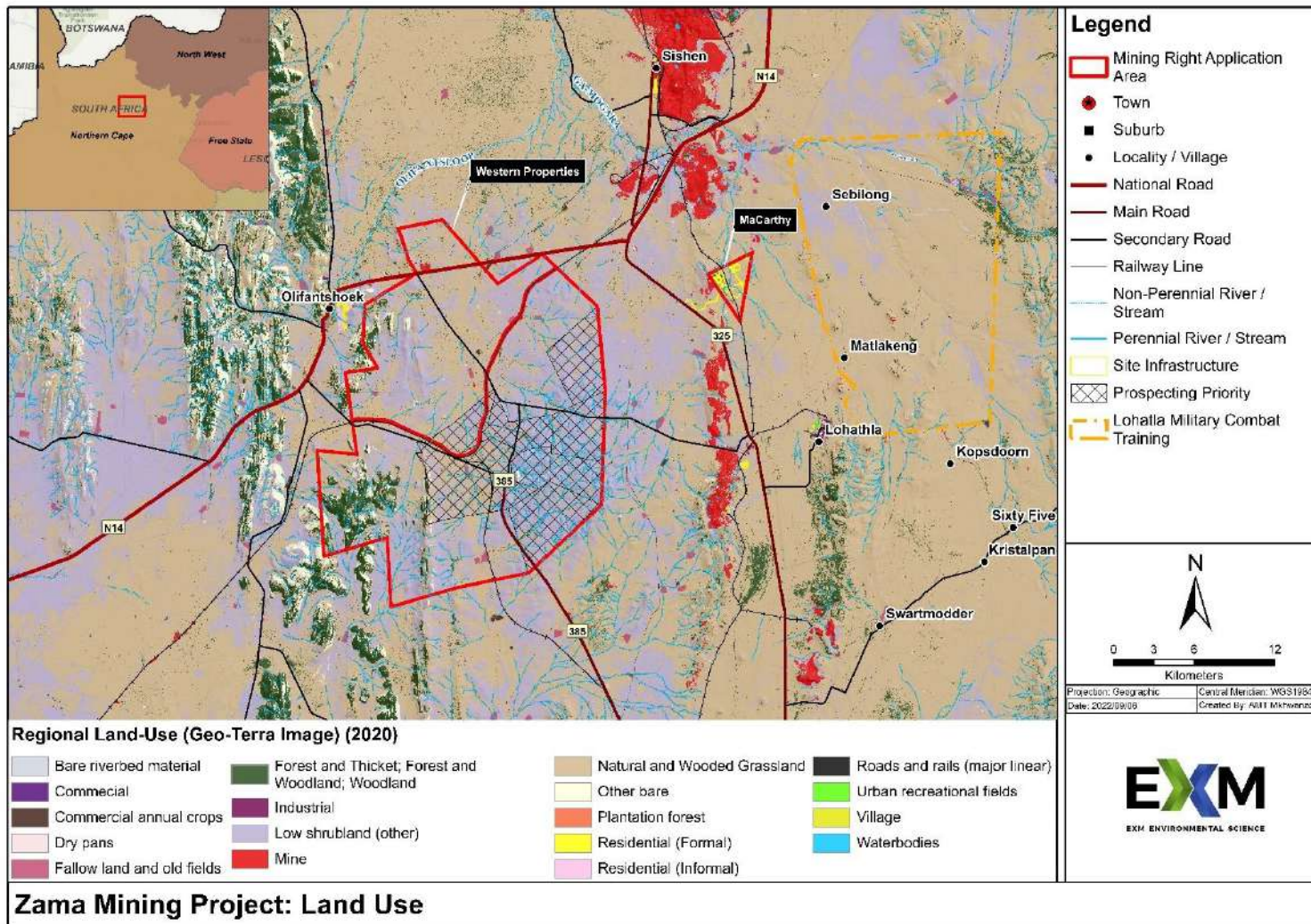


Figure 11.17: Zama Mining Project Geo Terra Land Use Map

12. PLAN OF STUDY FOR THE ENVIRONMENTAL IMPACT ASSESSMENT

12.1 Impacts identified

A scoping level identification of potential environmental impacts (physical, biological, social and economic) associated with the proposed project are listed in Table 12-1, with a framework for further work to be undertaken during the EIA phase also provided.

Table 12-1: Potential Environmental and Social Impacts

IMPACT	IMPACT SOURCE	SIGNIFICANCE/COMMENT	SCOPE OF WORK FOR EIA / FURTHER WORK
CLIMATE			
Contribution to climate change.	Emission of greenhouse gases (GHGs)	Consumption of fossil fuels for the operation of on-site haul trucks, transport vehicles and machinery as well as electricity consumption contributes to GHG emissions. Exploration machinery (drill rigs) and vehicles will also contribute to GHG emissions.	Consideration to be given to energy and fuel efficiency when selecting preferred technologies for the implementation of the project (PV Solar facilities have already been provided for at MaCarthy). The contribution of the project to CO ₂ emissions will be determined.
AIR QUALITY			
Increased dust levels.	Entrainment of dust from roads, stockpiles, and waste rock dumps. Generation of dust from blasting and materials handling.	Activities related to mining at MaCarthy will have a cumulative impact on dust levels in the area. The baseline dust levels in the area is expected to be high and thus cumulative impacts will be significant. Movement of vehicles and machinery associated with exploration activities may contribute to dust in the Prospecting Priority area. This is however expected to be minimal.	The magnitude and extent of the impact of dust generation on the surrounding environment and receptors in the vicinity of MaCarthy needs to be determined. A specialist Air Quality Impact Assessment is to be undertaken as part of the EIA. A dust monitoring programme is to be implemented at MaCarthy should the project proceed.
NOISE			
Increase in ambient noise levels.	Noise from blasting, movement of vehicles, operation of machinery and traffic.	Baseline noise levels already exceed relevant standards and activities at MaCarthy will contribute cumulatively to noise levels at sensitive receptor points. Prospecting activities may also result in noise disturbances at sensitive receptor points.	A Noise Impact Assessment is to be undertaken to determine the cumulative impact of noise levels in the vicinity of MaCarthy.

IMPACT	IMPACT SOURCE	SIGNIFICANCE/COMMENT	SCOPE OF WORK FOR EIA / FURTHER WORK
SOIL AND LAND CAPABILITY			
Loss of soil and land capability.	Clearance of vegetation at MaCarthy. Change in land use. Clearance of vegetation for prospecting sites.	The land capability of the area is low and the availability of soils for rehabilitation is limited. Affected sites will need to be rehabilitated to a state that supports at least livestock grazing (which is the current potential).	An Agricultural Impact Assessment is to be undertaken focussed on the impact on land capability and the development of a rehabilitation plan for mining and prospecting aimed at restoring the land to a state that is suitable for livestock grazing.
TERRESTRIAL BIODIVERSITY			
Loss of ecosystems, habitats or species of conservation importance.	Clearance of vegetation and disturbance of habitats for the construction of infrastructure associated with mining and prospecting. Secondary impacts disturbing ecological habitats such as an increase in noise, fallout dust, contamination of habitats, poaching and animal strikes on access routes.	Sensitive ecosystems, habitats and species do occur on the site and surrounding environment. The development of the MaCarthy mine will have a definite impact on biodiversity. Prospecting activities could result in the disturbance of sensitive sites if not identified.	A Specialist Terrestrial Ecological Impact Assessment to be undertaken for MaCarthy. Sensitive ecosystems and habitats are to be mapped in the Prospecting Priority areas. These areas should avoided as part of the planned prospecting operations. Project layout planning to be revised as part of the EIA phase to minimise impact on sensitive environments as far as practicable.
SURFACE WATER			
Disturbance of surface water resources.	Disturbance of watercourses, wetland pans or any other surface water resources due to site clearance and development of infrastructure.	Sensitive surface water environments are present on the site including ephemeral watercourses and wetland pans and microhabitats. These are to be protected.	A Specialist Freshwater Ecological Impact Assessment to be undertaken at MaCarthy and sensitive habitats are to be mapped. Project layout to be updated as required to avoid sensitive habitats. Sensitive freshwater habitats within the Prospecting Priority areas are to be identified and mapped. These areas are to be avoided during prospecting activities.
Erosion and increase sediment loads.	Site clearance and erosion of waste rock dumps.	Rivers systems to protected from erosion and sediment loads due to disturbance of catchments.	Stormwater management plan required for the management of run-off from the site.
Spillage of contaminated water into the natural environment.	Incorrect or insufficient stormwater and/or dirty mine water management.	Dirty water run-off is to be managed and prevented from entering into the surrounding environment.	Stormwater management plan to be developed to ensure the protection of surface water resources from spillages and dirty water run-off.
GROUNDWATER			
Lowering of groundwater levels and affecting aquifer yield	Dewatering of aquifers to allow for mining below groundwater levels. Abstraction of groundwater for use in prospecting and mining activities.	It is uncertain as to whether dewatering will be required for mining activities at MaCarthy. Similarly, the source of the water for use at the mine is not known at this stage. The source of water for prospecting activities	Boreholes are to be drilled for the purpose of testing the availability of water within the aquifer at MaCarthy. Groundwater modelling is to be undertaken based on the results to determine the water balance of the mine. This will determine the dewatering requirements and the

IMPACT	IMPACT SOURCE	SIGNIFICANCE/COMMENT	SCOPE OF WORK FOR EIA / FURTHER WORK
		needs to be determined.	source of water to be used at the mine. If there is insufficient water available for use at the mine, it is likely that water will be sourced from the Vaal-Gamagara pipeline (Sedibeng Water). The impact of dewatering, if required, is to be assessed as part of a Groundwater Impact Assessment. The source of water for prospecting needs to be confirmed. If the water is to be sourced from groundwater, the impact of the abstraction on the groundwater levels and yields needs to be assessed.
Pollution of groundwater resources.	Leaching of contaminants from waste rock dumps, backfilled areas and pollution control dams at MaCarthy. Leaching of contaminants from mineral residue (slimes and drill chips) emanating from prospecting activities. Nitrates from blasting activities.	Based on current knowledge of residue deposits at other mining operations (Kolomela and Sishen) within the area, the risk of pollution is considered to be low.	A Waste Assessment is to be carried out in accordance with GNR.635 to confirm the risk of contamination from mineral residue and the mitigation measures required. The option for the management of mineral residue waste originating at prospecting activities is to be confirmed. If it is to be disposed, an appropriate waste site is to be designed with the relevant mitigation measures in place. The Groundwater Impact Assessment is to be undertaken to determine the potential risk of contamination of groundwater.
Pollution of groundwater resources.	Storage and handling of hazardous chemicals during the construction and operational phases of the project.	There is the possibility of spillages of hazardous chemicals during construction and operation of MaCarthy mine as well prospecting activities. The risk of contamination is likely to be insignificant if managed correctly.	Hazardous chemicals to be stored and handled during the construction and operational phases of the project are to be identified. Procedures are to be developed that ensure appropriate mitigation is in place.
CULTURAL HERITAGE			
Disturbance of sites of archaeological, palaeontological, cultural or heritage importance.	Site clearance and demolition of infrastructure for the construction of infrastructure, development of pits at MaCarthy as well as the development of prospecting sites.	Archaeological and historical sites do occur at MaCarthy but are unlikely to be impacted by the development, given the current site layout planning. Archaeological and historical sites may be disturbed due prospecting activities if not managed correctly. Fossils are unlikely to occur on site, but must be confirmed for MaCarthy which has very High Palaeontological sensitivity.	Phase 1 study to be completed to determine the potential for palaeontological resources at MaCarthy. A desktop study is to be completed for the Priority Prospecting area. A Heritage Impact Assessment is to be completed for MaCarthy and heritage sites of significance avoided where possible. The Prospecting Priority Areas is to be screened for heritage sites (field study) and these sites are to be mapped and avoided.
LAND USE			
Change in land use from livestock grazing to mining	Development of infrastructure and development of mine pits and WRDs at MaCarthy.	The development of the mine infrastructure will significantly change the availability of grazing at MaCarthy.	The option of continued livestock farming in undisturbed areas during the duration of the mine operations needs to be determined.

IMPACT	IMPACT SOURCE	SIGNIFICANCE/COMMENT	SCOPE OF WORK FOR EIA / FURTHER WORK
	Disturbance of grazing areas by prospecting activities.	Prospecting activities will result in the temporary disturbance of areas used for livestock grazing.	The Agricultural Impact Assessment will inform the rehabilitation planning aimed at restoring the land to a desired end-use (livestock grazing).
Crossing of rail servitude	The Transnet Freight Rail will be crossed at 2 points to allow access between the western and eastern portions of MaCarthy.	The rail crossing presents a significant safety risk to persons crossing the rail as well as trains.	Consultation with Transnet to commence as soon as possible. The significance of the safety risk will be determined.
MaCarthy road access and pipeline route.	The proposed MaCarthy access road/pipeline route crosses Salene mine and private land.	Salene mining activities may be affected if there is no collaborative planning.	Discussions with Salene have commenced and will continue. A servitude agreement would be required.
SOCIO-ECONOMICS			
Contribution to employment and local economy.	Employment of local persons during construction and operation of MaCarthy. Employment of local persons for prospecting activities. Procurement from local SMMEs.	The employment and procurement of opportunities to be created are not significant due to the small scale of the proposed operations.	A Social Impact Assessment to be undertaken for the project. Social management plan to be developed for construction and operation of MaCarthy as well as prospecting activities focussed at maximising the employment of local persons (e.g., through Human Resource Development programmes aimed at upskilling local persons) and procurement from local SMMEs.
Influx of persons	The lure of job opportunities at the Zama Project may result increased influx.	Influx specifically due to the Zama Mining Project is unlikely contribute significantly to current influx issues.	Standards for local employment and procurement need to be set and clearly communicated that give preference to local persons.
Increase in social ills (crime, disease, prostitution)	Influx of job-seekers.	See above	See above.
TRAFFIC			
Reduced/affected road safety	The transportation of ore from MaCarthy via public road.	The additional traffic, specifically due to ore transportation from MaCarthy will pose additional road safety risks.	A Traffic Impact Assessment is required to investigate the preferred transport options. The safety of access to MaCarthy via the planned access road is also to be investigated together with the alternatives.
VISUAL ENVIRONMENT			
Disturbance of natural views and sense of place.	Visual appearance of infrastructure in relation to surrounding receptors.	The development of infrastructure at MaCarthy will have an impact on the local visual environment. The ore bodies are located on the koppies located on the site and the mining will permanently alter the landscape.	Visual Impact Assessment to be completed as part of the EIA.
CIVIL AVIATION			
Impact on civil aviation due to risks	PV Solar farms at MaCarthy.	Based on the DFFE screening tool, the area is considered to have low significance from a civil	Confirmation of Civil Aviation risk.

IMPACT	IMPACT SOURCE	SIGNIFICANCE/COMMENT	SCOPE OF WORK FOR EIA / FURTHER WORK
to air traffic.		aviation perspective. However, the proximity to Lohatla Military Base does present some risk.	

12.2 Methodology used in determining the significance of environmental impacts

An initial indication of the potential impacts is described in Table 12-1. This is based on an understanding of the baseline environment, existing information and the details currently available for the Zama Mining Project. The nature and significance of impacts will be confirmed in the EIA phase of the project. Where required, specialist input will be obtained (as identified in this Scoping Report) to assist with determining the significance of the impacts and to identify mitigation measures to address such impacts.

Further information regarding the methodology for assessing the significance of impacts in the EIA Phase is provided in Section 12.10.

12.3 The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected.

The Zama Mining Project will have a definite impact on the environment. The initial layout has been planned based on initial site sensitivities identified and disturbance of sensitive sites kept to a minimum. However, the ore bodies are associated with the koppies prevalent on the site. The mining of these areas will result in the disturbance of sensitive biodiversity areas as the koppies provide habitat for species of conservation significance. In addition, the mining of the koppies will potentially result in a significant change in the landscape.

The project will have an impact on freshwater resources and land use, since the site is bisected by an extensive drainage area which forms a tributary of the FEPA Ga-Mogara River. A Transnet Freight Rail follows the river valley. Mining will take place on both the western and eastern sides of MaCarthy and these features will thus need to be crossed. The impact has been mitigated in the initial layout plan by providing duplicate infrastructure on either side of the river and the rail line. However, the need to cross the river and rail cannot be avoided. The impacts of the crossings in terms of freshwater ecology as well as safety of the rail crossing need to be further assessed.

The impact on groundwater levels and surrounding users is still under investigation. Indications from neighbouring mines is that dewatering will not be required, but this is to be confirmed.

The development of an access road linking MaCarthy to the regional road R325, will need to cross a property currently used by Salene mine. The preferred option has been planned based on initial consultations with Salene mine. Final options still need to be assessed that minimise impacts on road traffic safety as well as the proposed land use activities. Similarly, the ore transport route poses a risk to traffic safety and therefore the best options as well as the required mitigation need to be determined.

Prospecting activities can be planned to avoid sensitive areas and the impacts on the environment are expected to be low. Sensitive sites including terrestrial and freshwater habitats that support important ecosystems and species of conservation of concern, as well as significant archaeological and heritage areas need to be mapped so that these can be avoided. In addition, should the on-site options for the abstraction of water and the disposal of mineral residue be considered, the impacts of these on the groundwater environment and surrounding land users will need to be investigated.

12.4 The possible mitigation measures that could be applied and the level of residual risk.

A scoping level description of the impacts, possible mitigation measures and level of residual risk is described in Table 11-2.

12.5 The outcome of the site selection - Final site layout plan

The initial site layout of MaCarthy considered environmental sensitivities identified in the desktop study. The site layout will be further investigated in the EIA phase of the project. The outcome of specialist studies will be incorporated into the site sensitivity mapping. Impacts on sensitive sites, including heritage, biodiversity, surface water resources will be identified, and the layout revised as required and where practicable to minimise impacts. The preferred access road and pipeline servitude route was planned based on initial discussions with Salene mine taking into consideration the planned future expansions at the mine.

Sensitive areas within the Prospecting Priority areas will also be identified through specialist on-site screening of biodiversity, archaeology and heritage sites and freshwater habitats. These sites will be mapped for consideration in the prospecting works programme to be implemented in this area.

12.6 Motivation where no alternative sites were considered

Alternative layouts and positioning of infrastructure will be considered as part of the EIA Phase based on the outcomes of specialist studies and in consultation with Zama Mining.

12.7 Statement motivating the preferred site

It is motivated that the layout plan presented in Scoping be modified in the EIA phase of the study based on the outcomes of the specialist studies. The preferred site layout will be presented in the EIA Report.

Table 12-2: Project Impacts, Mitigation Measures and the Level of Residual Risk

ACTIVITY	POTENTIAL IMPACTS	MITIGATION TYPE	POTENTIAL FOR RESIDUAL RISK
MaCarthy			
Mine Pits	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Location of the pits defined by ore bodies thus the potential for avoidance of such sites is limited.	High – the pit location will have an impact on sensitive environments and species.
	Loss of soil and land capability.	Soil to be removed and protected for use in rehabilitation. Backfilling option to be maximised.	High – there will be loss on land capability in the pit areas.
	Lowering of groundwater levels due to dewatering.	The need for dewatering is to be determined through aquifer testing and groundwater modelling. The impact of dewatering, if required, will need to be assessed.	High – the impact on groundwater needs to be determined.
	Pollution of groundwater due to seepage from exposed surfaces.	Waste assessment to confirm pollution potential of rock.	Low – It is not expected to have potential for high levels of pollution, based on existing information available at Kolomela Mine.
	Disturbance of watercourses, wetlands or sensitive freshwater environments.	Current indications are that pit areas will not result in the disturbance of watercourse or wetlands. This is to be confirmed in the specialist investigations undertaken in the EIA phase.	Low – current layout planning indicates that surface water disturbances due to pits have been avoided.
	Pollution and loss of surface water within catchments.	Stormwater management to be in place to divert runoff around pit areas and return this water to catchments.	Low – the stormwater management plan will address protection of catchments.
	Dust from blasting, haul roads and mining activities.	Permanent haul roads will be provided with chemical suppressants. Wet suppression to be used on temporary roads.	Medium – dust control measures in place require high levels of management and management.
	Landscape disturbance and alteration of sense of place.	Backfilling option to be maximised.	High – the landscape will be permanently altered.
	GHG emissions from haul trucks and machinery operating at mine.	Implement measures to reduce fuel consumption. Consider fuel efficiency of equipment.	Low – the proposed mine is a small operation and is not expected to contribute significantly to GHGs.
Overburden/Waste Rock Dumps	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species and heritage sites.	Site layout planning to ensure protection of sensitive environment, species and heritage resources.	High – position of the dump can be changed as required to protective sensitive environments and heritage sites, but the space available is limited so impacts are expected.

ACTIVITY	POTENTIAL IMPACTS	MITIGATION TYPE	POTENTIAL FOR RESIDUAL RISK
	Loss of soils and land capability.	Soils to be removed and protected for use in rehabilitation of surfaces of waste rock dumps. Implement rehabilitation aimed at restoring land to in order that it can be used for livestock grazing in the future.	Medium – dumps will be sloped and rehabilitated, but it can be expected that there will be some loss in land capability in these areas due to topographical changes resulting from the WRD development.
	Pollution of groundwater due to seepage and surface water due to dirty water run-off.	Waste assessment to confirm pollution potential of waste. Run-off to be prevented from entering into the natural environment.	Low – It is not expected to have potential for high levels of pollution, based on existing information available at Kolomela Mine.
	Disturbance of watercourses, wetlands or sensitive freshwater environments.	Current indications are that waste rock dump areas will not result in the disturbance of watercourses or wetlands. This is to be confirmed in the specialist investigations undertaken in the EIA phase.	Low – current layout planning indicates that surface water disturbances due to waste rock dumps have been avoided.
	Pollution and loss of surface water within catchments.	Stormwater management to be in place to divert clean water around pit areas and return this water to catchments.	Low – stormwater management plan to address protection of catchments.
	Dust from haulage of waste rock along haul roads, material handling and entrainment from surface.	Permanent haul roads will be provided with chemical suppressants. Wet suppression to be used on temporary roads. Ongoing rehabilitation of waste rock dumps to take place.	Medium – this management of waste rock is a significant contributor to dust levels in the environment even with mitigation. The mitigation requires high cost and management.
	GHG emissions from haul trucks and machinery operating at mine.	Implement measures to reduce fuel consumption. Consider fuel efficiency of equipment.	Low – the proposed mine is a small operation and is not expected to contribute significantly to GHGs.
	Landscape disturbance and alteration of sense of place.	Ongoing rehabilitation of waste rock dumps including alteration of slopes.	High – the landscape will be permanently altered.
	Noise due to haulage and dumping of waste rock	Difficult to mitigate. Should predicted impacts on specific receptors based on Specialist Noise Impact Assessment considered to be unacceptable – specific mitigation will need to be implemented.	Medium – the dumping of waste rock from elevated heights does impact on noise levels.
Workshops, Parking and Administration areas	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Site layout planning to ensure protection of sensitive environment and species.	Low – position of the infrastructure can be changed as required to protect sensitive environments. Disturbance of species of conservation importance can be avoided.
	Loss of soil and land capability.	Soil to be removed and protected for use in	Low – soils can be managed to ensure effective

ACTIVITY	POTENTIAL IMPACTS	MITIGATION TYPE	POTENTIAL FOR RESIDUAL RISK
		rehabilitation of disturbed footprints.	rehabilitation and restoration of land capability.
	Disturbance of watercourses, wetlands or sensitive freshwater environments.	Current indications are that infrastructure will not result in the disturbance of watercourses or wetlands. This needs to be confirmed in the specialist investigations undertaken in the EIA phase.	Low – layout planning to avoid sensitive surface water environments.
	Pollution of soils, surface water or groundwater due to storage and handling of hydrocarbons and other hazardous chemicals.	Hazardous chemicals are to be stored and handled in areas where spillages can be contained.	Low – planning in design phase to ensure implementation of measures to protect the environment from pollution. Procedures to be in place for the storage and management of hazardous chemicals.
	Pollution and nuisance caused by poor waste management.	Designated waste storage areas to be in place for recyclable, general and hazardous waste provided with measures to prevent pollution and nuisances.	Low - planning in design phase to ensure facilities for the proper management of waste are in place. Procedures to be in place for the storage and management of waste produced on site.
	Increased traffic levels and congestion for people travelling to site.	Implement measures recommended by Traffic Impact Assessment to minimise traffic safety risks.	Medium – Baseline traffic safety issues will be difficult to mitigate as it is out of the control of project.
	Increased energy (electricity) consumption and associated GHGs.	Solar power options have been planned for .	Low – the operation has planned for renewable energy sources.
Pollution Control Dams	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Site layout planning to ensure protection of sensitive environment and species.	Low – position of the infrastructure can be changed as required to protective sensitive environments. Disturbance of species of conservation importance can be avoided.
	Loss of soils and land capability.	Soils to be removed and protected for use in rehabilitation of disturbed footprints.	Low – soil can be managed to ensure effective rehabilitation and restoration of land capability.
	Pollution of surface water or groundwater due to seepage or overflow from dam.	The PCDs are to be designed to prevent spillage into any clean water system more than once in 50 years (in line with GN. 704 requirements). Water is to be returned for use. The dam liners are to be such that seepage into groundwater is prevented.	Low – planning in design to ensure that pollution risks are mitigated.
Access Road / Pipeline and Servitude	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Site layout planning to ensure protection of sensitive environments and associated species.	Low – position of the infrastructure can be changed as required to protect sensitive environments.
	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive	Site layout planning to ensure protection of sensitive environment and species.	Low – position of the infrastructure can be changed as required to protective sensitive

ACTIVITY	POTENTIAL IMPACTS	MITIGATION TYPE	POTENTIAL FOR RESIDUAL RISK
	environments/species.		environments.
	Disturbance of mining activities at Salene mine	The servitude route is to be planned in consultation with Salene mine and the affected landowners.	Low – route to be agreed with affected parties . Servitude agreement to be put in place for right of use.
	Water supply to or from Vaal-Gamagara scheme.	A groundwater investigation is to be completed to determine the dewatering requirements of the mine. Water will either need to be supplied to or from the Vaal-Gamagara pipeline dependent on the water balance. Agreements will need to be entered with the Regional Water Supply scheme (currently under the management of Bloem Water).	Medium – The water balance for the mine is yet to be determined. The necessary agreements will need to be entered into with the Regional Water Supply Body.
	Dust entrainment from vehicle traffic along the road.	Appropriate dust suppression (based on recommendation of air quality specialist) to be put in place.	Medium – the entrainment of dust from the access road will need to be properly managed to minimise dust emissions.
	Decreased road safety	Traffic impact assessment to investigate the safest options for connecting to the regional road (R325).	Medium – the safety risks and mitigation are still to be investigated and will inform the residual risk.
Ore Transport Routes	Decreased road safety	Traffic impact assessment to investigate the safest for the transport of ore to clients (currently Sishen mine).	Medium – the safety risks and mitigation are still to be investigated and will inform the residual risk.
	Dust entrainment from vehicle traffic along the gravel road (along minor road route option)	Appropriate dust suppression (based on recommendation of air quality specialist) to be put in place.	Medium – the entrainment of dust along roads will need to be managed in collaboration with other users.
	Disturbance of activities at neighbouring mines i.e. Helpebietjie mine (minor road route option).	Consultation with Helpebietjie mine is required as the route passes through the mining area. The option is dependent on agreement with Helpebietjie mine.	Medium -agreement to be sought with neighbouring mine.
Site Roads	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Site layout planning to ensure protection of sensitive environment and species.	Low – position of the roads can be changed as required to protective sensitive environments.
	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Site layout planning to ensure protection of sensitive environment and species.	Low – position of the roads can be changed as required to protective sensitive environments.
	Disturbance of watercourses, wetlands or sensitive freshwater environments.	Current indications are that infrastructure will not result in the disturbance of watercourses or	Low –.layout planning to avoid sensitive surface water environments.

ACTIVITY	POTENTIAL IMPACTS	MITIGATION TYPE	POTENTIAL FOR RESIDUAL RISK
		wetlands. This is to be confirmed in the specialist investigations undertaken in the EIA phase.	
	Dust entrainment from vehicle traffic.	Appropriate dust suppression (based on recommendation of air quality specialist) to be put in place.	Medium – the entrainment of dust from the access road will need to be properly managed to minimise dust emissions.
	Disturbance of heritage sites	Roads have been planned to avoid heritage sites.	Low – the site layout planning can be amended as required to avoid heritage sites.
	Decreased safety at rail crossings.	The crossing of the Transnet Freight Line is to be planned in consultation with Transnet. The necessary mitigation is to be put in place to ensure safety of train and vehicle users at crossings.	Medium – the impacts and mitigation still need to be investigated and understood.
	Disturbance of surface water resources	The roads will result in crossing of surface water features. The number of disturbance are to be minimised in layout planning. The crossing are to be designed to minimise the risk of impedance of flow and erosion.	Medium –the crossing will result in definite disturbance of watercourses as crossings cannot be avoided completely...
PV Solar Facilities	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Site layout planning to ensure protection of sensitive environment and species.	Low – position of the PV Solar Farms can be changed as required to protective sensitive environments.
	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Site layout planning to ensure protection of sensitive environment and species.	Low – position of the PV Solar Plants can be changed as required to protective sensitive environments.
	Disturbance of avifauna	Investigate the occurrence of avifauna susceptible to impacts associated with PV solar infrastructure.	Medium – PV Solar farms are not extensive and the necessary mitigation as identified to protect avifauna is to be included as required.
	Disturbance of civil aviation activities	Screening of civil aviation risks to be undertaken given the proximity of the SANDF Lohatla facility to the mine.	Low – initial screening indicates that the risk to civil aviation is low.
Water Supply	Lowering of groundwater levels due to abstraction of water.	The need for dewatering of the pits needs to be determined through aquifer testing and groundwater modelling. A water balance will be completed to confirm the source of water for the mine, either from dewatering or from the Regional Water Supply Body or both. Agreement to be sought with the Regional water Supply Body for import/export of water.	High – the impact on groundwater needs to be determined. Consultation with Regional Water Supply Body still to commence.

ACTIVITY	POTENTIAL IMPACTS	MITIGATION TYPE	POTENTIAL FOR RESIDUAL RISK
Employment & Procurement	Continued contribution to employment and local economy	Implement employment and procurement procedures to ensure benefit to the local economy.	Low – employment and procurement procedures can be developed and measures can be put in place to ensure that they are adhered to.
Priority Prospecting Areas			
Prospecting Sites	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Site layout planning to ensure protection of sensitive environment and species. Clearance of vegetation is to be kept at a minimum required for the establishment of temporary infrastructure. Ongoing rehabilitation of sites to be undertaken as prospecting activities continue.	Low – position of the prospecting sites can be changed as required to protective sensitive environments.
	Loss of soils and land capability.	Soil removal is to be kept to a minimum. Soils to be removed and protected for use in rehabilitation of disturbed footprints. Minimum required for the establishment of temporary infrastructure. Ongoing rehabilitation of sites to be undertaken as prospecting activities continue.	Low – disturbance of soils can be kept to a minimum..
	Contamination of soils by spilled hazardous chemicals (e.g. drilling fluids, lubricants) and mineral residue (drill chips and drill slimes)	Use of impermeable barriers (e.g. plastic sheeting) in areas where hazardous chemical substances are used or have the potential to spill. Procedures to be in place for the containment and management of spills in the case of spillage.	Low – the impact can be managed through the inclusion of suitable mitigation and implementation of procedures.
	Site clearance resulting in the disturbance of archaeological and heritage sites.	Screening of drill areas to identify archaeological and heritage sites. Sensitive sites are to be avoided. Chance-Find Procedure to be in place.	Low – archaeological and heritage sites to be avoided. Chance-Find procedure to be in place. .
	Disturbance of wetlands and watercourses	Watercourses and wetlands to be mapped and disturbances to be avoided.	Low – disturbances to be avoided.
Employment & Procurement	Continued contribution to employment and local economy	Implement employment and procurement procedures to ensure benefit to the local economy.	Low – employment and procurement procedures can be developed and measures can be put in place to ensure that they are adhered to.
Water Supply	Impact on surrounding water users if water is abstracted for drilling purposes.	The source of water for drilling activities to be investigated.	Medium – source of drilling water still to be confirmed and associated impacts to be

ACTIVITY	POTENTIAL IMPACTS	MITIGATION TYPE	POTENTIAL FOR RESIDUAL RISK
		Groundwater impacts to be understood if option of groundwater abstraction is considered.	investigated.
Mineral Residue Disposal	Pollution of groundwater due to seepage	Waste assessment to confirm pollution potential of mineral residue originating from drilling slimes and drill chips. Appropriate disposal options to be identified.	Low – mineral residue to be disposed in a manner to ensure protection of the environment.
Site access roads	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	New roads to be kept to a minimum. Screening and mapping to ensure protection of sensitive environment and species.	Low – position of the roads can be changed as required to protective sensitive environments. Disturbance of species of conservation importance can be avoided.
	Loss of soils and land capability.	Soils to be removed and protected for use in rehabilitation of disturbed footprints.	Low – soils can be managed to ensure effective rehabilitation and restoration of land capability.
	Dust entrainment from vehicle traffic along gravel roads.	Appropriate dust suppression to be put in place as required.	Medium – the entrainment of dust along roads will need to be managed in collaboration with other users.

12.8 Description of alternatives to be considered including the option of not going ahead with the activity.

The following alternatives will be considered as part of the EIA process:

12.8.1 No-Go alternative

The no-go alternative (not proceeding with the proposed activities) will be further considered in the EIA phase of the project. If impacts outweigh the benefits of the project, then the project should not proceed.

12.8.2 Layout alternatives

The current layout of the MaCarthy mine will be revised based on the outcomes of the specialist studies and further investigations. This will be done in consultation with Zama Mining to ensure that the impacts of the project are kept to a minimum.

12.8.3 MaCarthy Road Access Alternatives

As indicated in Section 9.2 the access road route alternatives are still under consideration. These will be further assessed based on the impacts on the land user (Salene mine). The traffic safety risks at the intersections with the regional road R325 also need to be investigated as part of the Traffic Impact Assessment.

12.8.4 MaCarthy Ore Transport Route Options

As indicated in Section 9.3, the ore transport route options are still under investigation. The preferred alternative will be dependent on traffic safety risks identified in the Traffic Impact Assessment and is also dependent on agreement with the neighbouring Helpebietjie mine should the minor road route option be preferred, as the minor road passes through the Helpebietjie mining right area.

12.8.5 MaCarthy Water Supply Options

As indicated in Section 9.4, water supply options for MaCarthy are still under investigation. The Groundwater Impact Assessment will determine the requirement for pit dewatering and the water available for supply to the mine. The surplus or shortage of water will need to be supplied to or from the Vaal-Gamagara pipeline.

12.8.6 Prospecting Water Supply Options

As indicated in Section 9.5, water supply options for prospecting activities still need to be investigated and include import of water to the area or supply from groundwater. The impacts of the options need to be assessed.

12.8.7 Prospecting Mineral Residue Management

As indicated in Section 9.6, the option for the disposal of the mineral residue, drill chips and slimes need to be determined. The feasibility of on-site versus off-site disposal will be assessed during the EIA.

12.9 Description of the aspects to be assessed as part of the environmental impact assessment process (including aspects to be assessed by specialists)

Where the EAP does not have sufficient expertise or information in a particular field to adequately determine the baseline environmental conditions or to assess the impacts, specialists in those fields will be appointed to provide the necessary information required to facilitate the EIA. The requirements for further work have been identified in the scoping phase (see Table 12-1). This forms the terms of reference for the EIA phase of the project.

The following outlines the scope of work for specialist studies to inform the EIA and EMPr programme. Should it become apparent during the EIA phase that additional specialist studies are required, the terms of reference will be drawn up and these will then be included in the EIA report.

Specialist reports will be structured in terms of the protocols for the specialist assessment and minimum report content requirements (where available) as published in terms of the EIA Regulations. The specialist studies identified thus far are discussed below.

12.9.1 Contribution to Climate Change

Carbon dioxide (CO₂) is the most important GHG to be produced by activities related to the project. Cognisance will be given to measures to ensure efficient use of electricity and fuel and these will be reported on in the EIA phase.

12.9.2 Air Quality Impact Assessment

An Air Quality Impact Assessment will be undertaken to quantify the magnitude and extent of dust impacts due to activities at MaCarthy. Airshed Planning Professionals (Pty) Ltd has been appointed to complete the work required. The scope of work will include:

- A review of the baseline air quality;
- Identification of receptor sites;
- Establishment of an emissions inventory for emissions sources;
- Atmospheric dispersion simulations (modelling)
- Compliance assessment and health risk screening;

- Recommendation of mitigation measures and recommendations for monitoring.

12.9.3 **Noise Impact Assessment**

A Noise Impact Assessment will be undertaken to quantify the magnitude and extend of noise impacts due to activities at MaCarthy. Airshed Planning Professionals (Pty) Ltd has been appointed to complete the specialist work. The scope of work will include:

- Identification of receptors;
- A baseline noise survey and noise measurements;
- Establishment of a noise inventory;
- Noise propagation simulations;
- Assessment of noise impacts;
- Recommendations for mitigation, management and monitoring.

Cognisance will be given to the protocol for specialist assessment and minimum report content requirements for noise impacts (GN. 320 of March 2020).

12.9.4 **Groundwater Impact Assessment**

Gradient Groundwater Consulting has been appointed to undertake the specialist Groundwater Impact Assessment for MaCarthy. The scope of work for the groundwater study will cover all aspects of a comprehensive groundwater study to:

- Describe baseline geohydrological conditions in terms of groundwater users and uses;
- Characterise groundwater in the area in terms of aquifer types, yields, level and quality and postulate a conceptual geohydrological model for the area;
- Model and assess the requirements for dewatering and provide input into the mine water balance;
- Model the impacts of dewatering (if required) and the potential pollution sources on the groundwater regime;
- Propose a management plan and monitoring protocol for the project.

Should the option of abstraction of groundwater be selected for water supply to prospecting activities, then a groundwater assessment will be undertaken to determine the impact on the groundwater regime and users in the vicinity of the water supply point/s.

12.9.5 **Agricultural Impact Assessment**

An Agricultural Impact Assessment will be undertaken by EXM Advisory Services for MaCarthy to assess the impact on agricultural activities and to inform the rehabilitation planning at MaCarthy. This will include the identification of mitigation and management measures to protect soils to ensure that these will be preserved for use in rehabilitation that will allow for the restoration of the grazing potential at rehabilitated sites.

12.9.6 **Terrestrial Biodiversity Impact Assessment**

A specialist Terrestrial Impact Assessment is being undertaken for MaCarthy by Trogon Biodiversity. The study includes:

- A desktop study of available databases and previous work done at the site and in the area;
- Identification of faunal species of conservation importance that occur in the area;
- Identification of species of conservation importance;
- Mapping of sensitive sites;
- Recommendations for revised layout planning to mitigate impacts;
- Impact assessment and reporting including mitigation and management requirements.

Cognisance will be given to the protocol for specialist assessment and minimum report content requirements for impacts on terrestrial biodiversity (GN. 320 of March 2020).

Sensitive avifauna will be identified that may be susceptible to impacts of PV Solar facilities to inform the necessary mitigation requirements.

In addition, an on-site screening level assessment will be undertaken for Prospecting Priority areas to identify sensitive areas. These areas will be mapped to inform the prospecting works programme. Sensitive biodiversity areas will be avoided during prospecting.

12.9.7 **Freshwater Impact Assessment**

A specialist Freshwater Impact Assessment is being undertaken by Scientific Aquatic Services (Pty) Ltd for MaCarthy. The study includes:

- A desktop study of available databases and previous work done in the area;
- Site work and mapping of freshwater habitats in the area;
- Determination of Ecological Importance & Sensitivity (EIS) and Present Ecological Status (PES) scores freshwater environs;
- Identification of watercourse drivers and receptors;

- Description of impact and recommended mitigation.

Cognisance will be given to the protocol for specialist assessment and minimum report content requirements for impacts on aquatic biodiversity, as appropriate (GN. 320 of March 2020).

An on-site screening of sensitive freshwater environments will be undertaken for the Prospecting Priority areas. The sensitive areas will be mapped to inform the prospecting works programme. Sensitive freshwater habitats will be avoided during prospecting.

12.9.8 **Palaeontological Study**

A Phase 1 Palaeontological Assessment of MaCarthy will be carried out by L. Rossouw heritage consultant based on the requirement of the National Heritage Resources Act the as set out by South African Heritage Resources Agency (SAHRA). A desktop level palaeontological assessment will be undertaken for the Prospecting Priority areas.

12.9.9 **Archaeology and Heritage Impact Assessment**

J S van Schalkwyk has been appointed to undertake a Phase 1 Heritage Impact Assessment of MaCarthy in accordance the National Heritage Resources Act and the requirements of SAHRA. The heritage study will incorporate:

- Desktop study and review of previous studies done in the area;
- Identification of sites of archaeological and heritage importance at all development areas;
- Classification of resources according to cultural and heritage significance;
- Assessment of impacts in accordance with SAHRA's requirements;
- Photographic evidence of sites; and
- Mitigation.

Archaeological and heritage resources will be mapped, and the site layout revised to avoid impacts on resources, where practicable.

An on-site screening of archaeological and heritage resources will also be undertaken for the Prospecting Priority Areas. The study will comply with the requirements of SAHRA and will serve to map heritage resources to be avoided during prospecting.

12.9.10 **Hydropedological Assessment**

Zimpande Research Collaborative (Pty) Ltd will conduct a Hydropedological Assessment to assess the impacts that the proposed mining and infrastructure at MaCarthy will have on unsaturated flow processes and wetlands.

The study will include:

- Desktop review of existing soil, geohydrological data and/or reports, where available;
- Conduct a soil survey to verify current soil conditions on site;
- Subsurface soil observations will be made by means of a standard hand auger method, and soil in the vicinity of the investigated wetland features will be classified;
- Field data will include a description of physical soil properties including the following parameters.
- Hydrological hillslope classification using the Le Roux, et al. (2015) method;
- Collect selected verification samples for textural analysis at an accredited analytical laboratory;
- Identify the potential impacts of the proposed development on the unsaturated flow processes and wetlands;
- Quantify hydropedological losses (%);
- Determine a scientific buffer taking into consideration important wetland recharge soils;
- Recommend suitable mitigation and management measures; and
- Compile a brief report on the conceptual hydropedological regime of the investigated wetlands based on the identified soil types under current condition
- Estimate the hydraulic conductivity according to soil texture according to the FAO method (FAO, 1980).

12.9.11 **Mineral Waste Assessment**

Gradient Groundwater Consulting will undertake a mineral waste assessment to determine the pollution potential of the mineral residue deposits i.e. Overburden/Waste Rock Dumps at MaCarthy. Core rock samples have also been sourced from the exploration activities for the purpose of determining the pollutant that could originate from the overburden and waste rock. The objective will be to assess the waste streams in terms of the National Norms and Standards for the Assessment of Waste for Landfill Disposal (GNR. 635 of 2013). Risks to the groundwater environment because of the disposal of the mineral waste will be determined. Recommendations will be made as mitigation and management measures to be put in place in accordance with legislative requirements. This will serve as part of the motivation for a Waste Management Licence application for the disposal of such waste at MaCarthy.

If on-site disposal of prospecting mineral residue is chosen, then the mineral waste assessment will be expanded to include drill chips and slimes from prospecting activities.

12.9.12 **Water Balance and Stormwater Management Plan**

Nurizon Consulting Engineers will be responsible for the Water Balance and Stormwater Management Plan for MaCarthy. The aim of the study will be to determine the water demand requirements for the mine and to link this to the water supply options. In addition, the water management infrastructure will be planned to ensure the protection of the environment and comply with GN.704 requirements. The outputs will include a concept level designs of water management infrastructure at a level of detail required to support the water use licence application.

12.9.13 **Socio-Economic Impact Assessment**

Atlegang Social Intelligence has been appointed to assess the impact of the MaCarthy Project on social and economic environment. This assessment will involve the completion of the following tasks:

- Desktop study and update of the current social and economic profile for the area of influence of the Zama Mining Project;
- Determination of the social and economic consequences of the project;
- Identify social interventions that are to be put in place to maximise local opportunities and reduce social impacts.

12.9.14 **Traffic impact assessment**

R&G Kalahari Consulting Engineers has been appointed to assess the predicted impact of MaCarthy on traffic safety. The study will assess traffic safety consideration of the various access and transport route alternatives. Recommendations are to be made for preferred alternatives and for measures to be put in place to improve traffic safety.

12.9.15 **Visual Impact Assessment**

EXM Environmental Advisory will undertake a Visual Impact Assessment in support of the application. A Geographic Information System (GIS) will be used to create a model which will show the combined visual intrusion of the existing and planned infrastructure and assess the impact on sensitive receptors. A report will be developed with a description of the baseline visual characteristics, impact prediction methodology and results of the impact assessment.

12.9.16 **Financial Provision & Rehabilitation planning**

The rehabilitation requirements for the MaCarthy will be determined including closure objectives and actions required to meet such objectives, both during the operational phase and at closure. EXM Environmental Advisory will undertake a Financial Provision and Closure Costing in support of the application and in accordance with the financial provision regulations including the Rehabilitation/Closure and Risk Reports required for submission to the DMRE.

12.10 Proposed method of assessing the environmental aspects including the proposed method of assessing alternatives

12.10.1 **Impact Ranking Criteria**

The impact assessment method used by the EAP considers the current environment, the details of the proposed project and the findings of the specialist studies. Cognisance will be given to both positive and negative impacts that may result from the development. The significance of the impact is dependent on the consequence and the probability that the impact will occur.

$$\text{impact significance} = (\text{consequence} \times \text{probability})$$

Where:

$$\text{consequence} = (\text{severity} + \text{extent})/2$$

and

$$\text{severity} = [\text{intensity} + \text{duration}]/2$$

Table 12-3: Criteria for Assessment the Impact Significance

SEVERITY CRITERIA

INTENSITY = MAGNITUDE OF IMPACT	RATING
Insignificant: impact is of a very low magnitude	1
Low: impact is of low magnitude	2
Medium: impact is of medium magnitude	3
High: impact is of high magnitude	4
Very high: impact is of highest order possible	5

DURATION = HOW LONG THE IMPACT LASTS	RATING
Very short-term: impact lasts for a very short time (less than a month)	1
Short-term: impact lasts for a short time (months but less than a year)	2
Medium-term: impact lasts for the for more than a year but less than the life of operation.	3
Long-term: impact occurs over the operational life of the proposed extension.	4

Residual: impact is permanent (remains after mine closure)	5
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EXTENT = SPATIAL SCOPE OF IMPACT/ FOOTPRINT AREA / NUMBER OF RECEPTORS	RATING
Limited: impact affects the mine site	1
Small: impact extends to the whole farm portion	2
Medium: impact extends to neighboring properties	3
Large: impact affects the surrounding community	4
Very Large: The impact affects an area larger the municipal area	5

PROBABILITY

PROBABILITY = LIKELIHOOD THAT THE IMPACT WILL OCCUR	RATING
Highly unlikely: the impact is highly unlikely to occur	0.2
Unlikely: the impact is unlikely to occur	0.4
Possible: the impact could possibly occur	0.6
Probable: the impact will probably occur	0.8
Definite: the impact will occur	1

IMPACT SIGNIFICANCE

NEGATIVE IMPACTS

≤1	Very low	Impact is negligible. No mitigation required.
>1≤2	Low	Impact is of a low order. Mitigation could be considered to reduce impacts. But does not affect environmental acceptability.
>2≤3	Moderate	Impact is real but not substantial in relation to other impacts. Mitigation should be implemented to reduce impacts.
>3≤4	High	Impact is substantial. Mitigation is required to lower impacts to acceptable levels.
>4≤5	Very High	Impact is of the highest order possible. Mitigation is required to lower impacts to acceptable levels. Potential Fatal Flaw.

POSITIVE IMPACTS

≤1	Very low	Impact is negligible.
>1≤2	Low	Impact is of a low order.
>2≤3	Moderate	Impact is real but not substantial in relation to other impacts.
>3≤4	High	Impact is substantial.
>4≤5	Very High	Impact is of the highest order possible.

12.10.2 Cumulative Impacts

Cumulative impacts are defined as: “the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area”. Taking into consideration the above definition, the cumulative impacts for the project will be assessed by considering the potential impacts in relation to the status of the environment which

includes existing impacts from Sishen Mine.

12.10.3 Mitigation Measures

A **no net loss** approach will be adopted in terms of the management of impacts at the project.

- **Avoidance** – impacts are to be avoided where practicable e.g. through the implementation of alternatives.
- **Mitigation** – should it not be possible to avoid all impacts the remaining impacts are to be mitigated to acceptable levels.
- **Offset** – should it not be possible to avoid and mitigate all impacts to acceptable levels it will be necessary to offset the remaining impacts. Suitable offsets will need to be identified.

Mitigation measures for significant impacts which cannot be avoided will be identified. The impacts will be ranked before and after the implementation of the mitigation measures. Consideration will also be given to the confidence level that can be placed on the successful implementation of the mitigation level as follows:

- **High Confidence:** mitigation measure easy and inexpensive to implement.
- **Medium Confidence:** mitigation measure expensive or difficult to implement.
- **Low Confidence:** mitigation measure expensive and difficult to implement.

Where mitigation is not sufficient to reduce the impact to acceptable levels offsets will need to be considered.

12.10.4 Project Phases

The environmental impacts for the project will be assessed over the five phases of the project i.e., the planning and design, construction, operation, decommissioning and post-closure phase.

12.11 Stages at which the competent authority will be consulted

The competent authority is the Department of Mineral Resources & Energy (DMRE) for environmental applications relevant to mining and associated activities. The following specific consultations will be included:

- Application Consultation – the department will be contacted to confirm receipt of the application (September 2022);

- Consultation on approval of Scoping Report including follow-up on approval and comments from the DMRE on Scoping Report (December 2023);
- Consultation after submission of the EIA including a presentation on content and findings of EIA (May 2023);
- Authority Site Visit (May 2023); and
- Ongoing consultation and feedback as to the authorisation status.

12.12 Particulars of the public participation process with regard to the impact assessment process that will be conducted

12.12.1 Steps to be taken to notify Interested and Affected Parties

All persons registered as interested and affected parties (IAPs) will be given an opportunity to review and comment on the EIA Report as well as specialist reports. Note that registration of additional persons for participation will continue throughout the process. Parties will be contacted regarding the availability of the report via email, or bulk SMS.

12.12.2 Details of the Engagement Process to be followed

12.13 Description of the tasks that will be undertaken during the environmental impact assessment process

The following tasks are to still to be completed:

- Conduct public consultation and respond to comments on draft Scoping report;
- Submit final scoping report (incorporating public and commenting authority comments) to DMRE (this report);
- Completion of specialist studies and collation of additional information;
- Assess impacts and revise as required project description and layout in consultation with Zama Mining;
- Compile revised layout plan and select preferred alternatives;
- Identification of additional mitigation and environmental management requirements for incorporation into the project;
- Compile Draft EIA Report;
- Compile Draft EMPr;
- Public Review of Draft EIA Report and EMPr;

- Address public comment as required;
- Finalise EIA Report and EMPr; and
- Consult with Competent Authority (DMRE) and other commenting authorities as required to address queries.

A description of the tasks that will be undertaken during the EIA phase is provided below in Table 12-4.

Table 12-4: EIA Tasks and Timing

Phase	EAP activity	Opportunities for Consultation and Participation		SCHEDULE
		Competent Authorities	IAPs, State Departments and Organs of State	
Application	Follow-up on receipt of application.	Consultation with DMRE	-	September 2022
	Follow-up on formal acknowledgement of receipt and application reference	DMR acknowledgement of receipt of application	-	September 2022
Scoping	Notification IAPs Inform persons of the project	Register interest, concerns and questions	IAPs to register interest, concerns and questions	September 2022
	Submit draft scoping to public and commenting authorities	Draft support submitted	IAPs to provide comments	Sept/Oct 2022
	Submit scoping report to authority	Authority to accept scoping report OR refuse	IAPs comments are in the final scoping report	Dec/Jan 2022
Specialist Assessments and Input	EAP to manage specialist activities and collate information for EIA.	-	-	September – December 2022
EIA Phase	Assess environmental impacts. Compile draft EIA and EMP report	-	-	Jan 2023
	Arrange meetings and consultations	Meetings if required.	Public feedback meeting/. Focused consultation with IAPs or commenting authorities if required.	Feb 2023
	Submit draft EIA report to IAPs authorities.	Review of draft EIA report (30 days). Comments to EAP	Review of draft EIA report (30 days). Comments to EAP	
	Address public comment and finalise EIA and EMP reports			
	Final EIA report to authority (106 days from acceptance of scoping).	Authority acknowledge receipt of EIA report (10 days).		March/April 2023
Authority review and Authorisation Phase	Arrange feedback meeting	DMR Request for Additional Information	-	April-June 2023
	-	Environmental Authorisation Granted / Refused (107 days).	-	June/July 2023
	Notifications to I&APs regarding environmental authorisation (granted or refused).		-	July 2023
Appeal Phase	EAP to provide guidance regarding the appeal process as and when required.	Consultation during processing of appeal if relevant.	Submit appeal in terms of National Appeal Regulations	As required

12.14 Measures to avoid, reverse, mitigate, or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

Refer to Table 12-2.

13. OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

13.1 Impact on the socio-economic conditions of any directly affected person.

Specialist studies are being undertaken in the EIA phase to assess the social and economic impacts of the proposed project.

13.2 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act.

The impacts on heritage will be assessed in the EIA Phase and impacts avoided as far as practicable based on revised layout planning.


14. OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE ACT

None applicable at this stage.

15. UNDERTAKINGS BY THE EAP

I, Kerry Colleen Fairley, the Environmental Assessment Practitioner responsible for compiling this report, undertake that:

- the information provided herein is correct;
- the comments and inputs from stakeholders and I&APs has been correctly recorded;
- information and responses provided to stakeholders and I&APs by the EAP is correct; and
- the level of agreement with I&APs and stakeholders has been correctly recorded and reported.

Name	Affiliation	Designation	Signature	Date
Kerry Fairley	EXM Advisory Services (Pty) Ltd	Environmental Assessment Practitioner		8 September 2022

16. REFERENCES

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