




EXM ENVIRONMENTAL SCIENCE

**ZAMA MINING RESOURCES (PTY) LTD**  
**ENVIRONMENTAL IMPACT ASSESSMENT IN SUPPORT OF**  
**A MINING RIGHT APPLICATION IN THE GAMAGARA AND**  
**TSANTSABANE LOCAL MUNICIPALITIES**  
**NORTHERN CAPE PROVINCE**

**Environmental Impact Assessment Report in support of a**  
**Mining Right Application for Open Pit Mining on the Farm**  
**MaCarthy RE and Prospecting Activities on Various Properties**

**Final for Submission**

**DMRE REF: NC30/5/1/2/2/10219MR**

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## ZAMA MINING RESOURCES (PTY) LTD

August 2023




Final

### Environmental Impact Assessment Report in support of a Mining Right Application for Open Pit Mining on the Farm MaCarthy RE and Prospecting Activities on Various Properties

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Name	Designation	Signature	Date
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# 1. EXECUTIVE SUMMARY

## 1.1 Project Background

Zama Mining Resources (Pty) Ltd ("Zama Mining") is in the process of applying for a Mining Right at the Department of Mineral Resources and Energy ("DMRE") for iron ore, manganese and other minerals on the properties listed in Table 1-1. The extent of the application area is shown in Figure 1-1 and the individual properties included in the application are shown in the land tenure map as shown in Figure 10-18. The required Environmental Authorisation ("EA") processes are currently undertaken in accordance with relevant legislation in support of the Mining Right application.

The mining right area covers approximately 43 557.5 hectares ("ha") and includes properties on which Zama Mining has held a prospecting right since 2013. For the purposes of the Zama Mining Project, the mining right application area has been divided into 2 sections, including MaCarthy and the Western Properties.

Open pit mining activities for the extraction of Iron Ore are currently only planned for the MaCarthy Section supported by the development of open pits, waste rock dumps, workshops, administration areas, roads, pipelines, sewage treatment and photovoltaic (PV) solar facilities. The infrastructure associated with the MaCarthy Section will cover approximately 90 hectares and details of the project is provided in Section 5 of this report. Prospecting activities are planned on the Prospecting Priority Areas of the Western Section of the application area as shown in Figure 1-1 which will entail diamond and percussion drilling.

**Table 1-1: 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



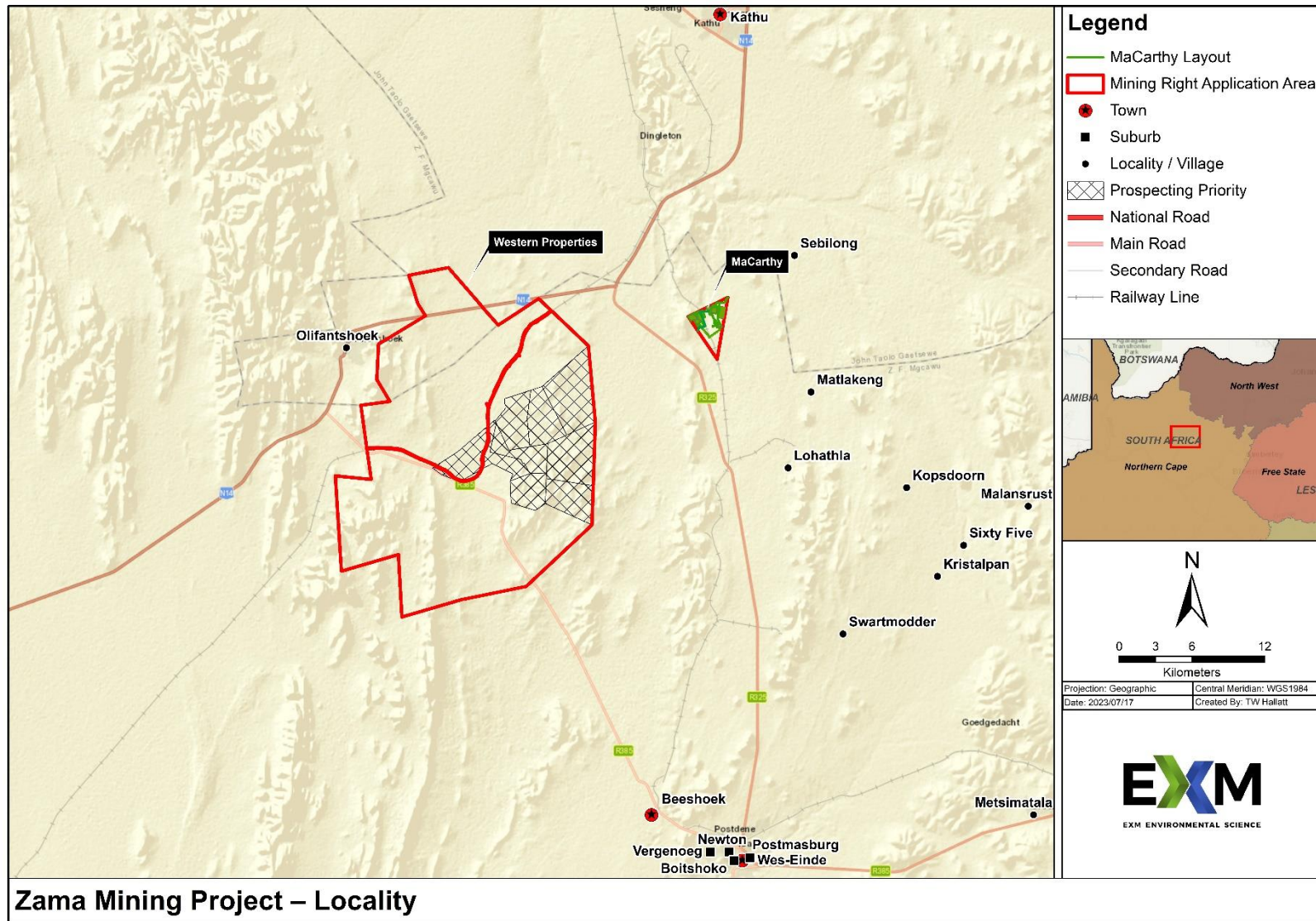


Figure 1-1: General Location Map



## **1.2 Authorisations Required**

### **1.2.1 Full Environmental Impact Assessment**

The proposed Open Pit Mining and Prospecting Activities triggers activities (detailed in Section 5 of this report) published in Listing Notice 1 (GN R. 327) and Listing Notice 2 (GN R. 325), promulgated in terms of the National Environmental Management Act (No. 107 of 1998) ("NEMA"). A full Scoping and Environmental Impact Assessment ("EIA") process in terms of the EIA Regulations (GN R. 326 of 2017) is therefore undertaken to obtain Environmental Authorisation ("EA") prior to commencement. It should be noted that the EIA focussed on both the mining as well as the prospecting activities.

It should be noted that a separate EIA with supporting public participation will have to be undertaken if future mining activities will be conducted on any properties other than the Remaining Extent of the Farm MaCarthy.

### **1.2.2 Waste Management Licence Application**

The proposed establishment of Waste Rock Dumps ("WRDs") as well as backfilling of the open pits as part of the proposed mining operations on the MaCarthy Section triggers activities listed in Category B in GN.R. 921 published in terms of the National Environmental Management Waste Act (No. 59 of 2008) ("NEM: WA") (detailed in Section 5 of this report). Therefore, a Waste Management Licence ("WML") is required prior to commencement. An Integrated EA application is therefore undertaken to obtain authorisation for NEMA and NEM: WA listed activities.

### **1.2.3 Water Use Licence Application**

Undertaking Activities listed in Section 21 of the National Water Act (No. 36 of 1998) ("NWA") requires a Water Use Licence ("WUL") prior to commencement. The proposed Open Pit Mining Activities triggers Activities (c), (g), (i) and (j) in Section 21 of the NWA. An Integrated WUL application (DWS Reference: WU26789) is undertaken in parallel to the EIA process for the MaCarthy Section to obtain authorisation for the proposed water uses. No water uses are currently planned or applied for the prospecting activities at the Western Properties.

## **1.3 Public participation**

A public participation process ("PPP") is conducted in terms of the Chapter 6 of NEMA and the EIA regulations and the Regulations regarding the Procedural Requirements for Water Use Licence Applications and Appeals (GN.R. 267). A consolidated PPP is undertaken in support of the EIA, WML and WUL applications. The purpose of the public

participation process is to inform all the identified Interested and Affected Parties (“IAPs”) of the proposed mining/prospecting project and associated application processes and allow them to raise comments/concerns.

The draft scoping report was made available for public review from Friday, 9 September to Monday, 10 October 2022. (30 calendar days, excluding one public holiday) in accordance with Section 40 (3) of the 2014 EIA regulations. The final scoping report was submitted to the CA on the 10th of February 2023 and accepted on the 20th of February 2023. The draft EIR was made available for public review from Wednesday 26th of July 2023 to Saturday 26th of August 2023 (30 calendar days, excluding one public holiday).

All written comments and responses received to date are provided in Table 9-1. The final EIR is now being submitted to the CA for decision making.

#### 1.4 Specialist studies

The following specialist studies have been undertaken in support of the EIA are included in Part C of this document.

**Table 1-2: Specialist Studies undertaken.**

Specialist study	Annexure
Air Quality Impact Assessment (Airshed Planning Professionals, 2022)	Appendix A
Soil, Land Capability and Land Use Assessment (Zimpande Research Collaborative, 2022)	Appendix B
Biodiversity Assessment for MaCarthy (Trogon Biodiversity, 2022).	Appendix C1
Biodiversity Assessment for Western Properties (The Biodiversity Company, 2022).	Appendix C2
Noise Impact Assessment (Airshed Planning Professionals, 2022)	Appendix D
Traffic Impact Assessment (R&G Kalahari, 2023)	Appendix E
Freshwater Impact Assessment for MaCarthy (Scientific Aquatic Services, 2022).	Appendix F1
Freshwater Impact Assessment for Western Properties (Scientific Aquatic Services, 2022).	Appendix F2
Heritage Impact Assessment for MaCarthy (van Schalkwyk, JA, 2022).	Appendix G1
Heritage Impact Assessment for Western Properties (van Schalkwyk, JA, 2022).	Appendix G2
Palaeontology Impact Assessment (Fourie, H. Dr, 2023)	Appendix H
Social Impact Assessment (Atlegang Social Intelligence, 2023)	Appendix I
Visual Impact Assessment (EXM Environmental Services, 2023)	Appendix J
Final Closure and Rehabilitation Plan (EXM Environmental Services, 2023)	Appendix K
Hydropedology Assessment (Zimpande Research Collaborative, 2022)	Appendix L
Geohydrological Impact Assessment (Gradient Consulting, 2023)	Appendix M
Stormwater Management Plan and Engineering Design Report (Nurizon Consulting Engineers, 2023)	Appendix N

#### 1.5 Summary of Key Environmental Impacts and Mitigation Measures

The outcome of the impact assessment and key mitigation included in the Environmental Management Programme (“EMPr”) (**Part B**) are summarised in the Table 1-3 below. Impacts for the sections of MaCarthy and the Western Properties have been separately

assessed. The table shows both the significance rating of the impacts with and without the implementation of mitigation measures. The implementation of mitigation measures will lower the significance of the impacts to acceptable levels as indicated in the Table 1-3 below. The complete impact assessment is provided in **Part A: Appendix C**.



**Table 1-3: Summary of Impact Assessment Finding and Key Mitigation Measures**

Impact Category	Phase	Impact Description	Significance Pre-Mitigation	Mitigation Measures	Significance With Mitigation
<b>Western Prospecting Priority Areas</b>					
<b>Biodiversity</b>	Construction and Operations	<ul style="list-style-type: none"> <li>Impact on floral habitat and diversity and impact on habitat units with high site ecological importance as a result of vegetation clearance and edge effects.</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Clearly demarcate prospecting site footprint prior to commencement.</li> <li>Vegetation clearance only allowed in demarcated area.</li> <li>Avoid sensitive areas such as ridges/koppies.</li> <li>Existing farm roads to be used as far as possible. Additional roads only to be established in agreement with landowners.</li> <li>Obtain permits for the removal/relocation of protected species.</li> <li>Concurrent rehabilitation of drill sites and must be signed off by the environmental officer.</li> <li>Monitoring of rehabilitated sites to ensure that rehabilitation was successfully implemented.</li> </ul>	<b>Low</b>
<b>Surface Water Resources</b>	Construction	<ul style="list-style-type: none"> <li>Destruction/disturbance of wetland habitat due to Encroachment of cryptic wetland pans and freshwater micro-habitats.</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>The 100m development buffer from water courses and 500m wetland buffers must be dedicated/marked no go areas.</li> <li>Undertake concurrent rehabilitation of all prospecting areas.</li> <li>Implement adequate measures for waste and hazardous substances management at all drill sites.</li> <li>Obtain a WUL if prospecting activities will intrude regulated buffer zones.</li> </ul>	<b>Low</b>
<b>Fire management</b>	Construction	<ul style="list-style-type: none"> <li>The impact of lightening and potential fires on farming activities.</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>No smoking allowed at the prospecting sites, or only in dedicated areas according to internal procedures.</li> <li>Risk of fires must be clearly communicated to all employees at prospecting sites. Implement an emergency preparedness plan with specific measures related to fire management.</li> <li>Firefighting equipment must be placed at strategic locations and serviced according to manufacturer's specifications.</li> <li>Ensure adequate communication with landowners regarding fires and collaborate with adjacent farmers with regards to fire management.</li> </ul>	<b>Low</b>
<b>Land use and land capability</b>	Construction	<ul style="list-style-type: none"> <li>Impacts on current farming activities due to loss of grazing land and change in land use.</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Concurrent rehabilitation of drill sites and the success thereof must be signed off by the environmental officer.</li> <li>Proactive consultation with landowners to establish adequate access agreements.</li> </ul>	<b>Low</b>
<b>Heritage</b>	Footprint construction	<ul style="list-style-type: none"> <li>Impact on burial ground and graves as a result of encroachment of identified heritage sites.</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Identified heritage resources must be dedicated no go areas.</li> <li>Obtain relevant permits if heritage resources will be impacted. Implement a chance find procedure in case where possible heritage/fossil finds are uncovered.</li> </ul>	<b>Low</b>

Impact Category	Phase	Impact Description	Significance Pre-Mitigation	Mitigation Measures	Significance With Mitigation
<b>Safety and security</b>	Prospecting activities	<ul style="list-style-type: none"> <li>Increase in crime due to movement of drilling contractors and influx of workers</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Establish access agreements with landowners with specific measures as agreed with regards to security.</li> <li>Drilling contractors should not be allowed to move outside of designated areas.</li> <li>Access of personnel related to the prospecting operations will only be allowed on approval by the project manager.</li> <li>All personnel that have access to the property needs to be made visible.</li> <li>Drilling contractors to be housed off the drilling property.</li> </ul>	<b>Low</b>
	<b>McCarthy Mining Section</b>				
<b>Soil</b>	Site Prep and Construction	<ul style="list-style-type: none"> <li>Loss of topsoil as result of soil erosion</li> <li>Loss of soil and land capability due to removal of topsoil</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Plan soil stockpile positions according to other future footprints to prevent disturbance.</li> <li>Stripping of topsoil only allowed in demarcated and approved footprints.</li> <li>Monitor stockpiles for erosion problems</li> <li>Topsoil stockpiles may not exceed 2 meters.</li> <li>No equipment will be allowed on top of stockpiles for any reason including deposition of soil.</li> <li>Topsoil stockpiles must be separated from areas with the potential to cause pollution, i.e., use berms to separate areas.</li> <li>Implement measures contained in the site stormwater management plan, including a silt trap downstream of the WRDs.</li> </ul>	<b>Low</b>
	Operational	<ul style="list-style-type: none"> <li>Loss of topsoil stockpiles</li> <li>Negative impact on rehabilitation success</li> <li>Erosion on or compaction of soil stockpiles</li> <li>Proliferation of AIPs on soil stockpiles</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Install dissipating structures (such as gabions) at stormwater discharge points, where necessary, as per the stormwater management plan.</li> <li>Rehabilitation/stabilisation of areas disturbed.</li> <li>Monitor soil stockpiles for erosion problems.</li> <li>No equipment will be allowed on top of stockpiles for any reason including deposition of soil.</li> </ul>	<b>Low</b>
<b>Biodiversity Flora</b>	Planning of facility	<ul style="list-style-type: none"> <li>Impact on floral Habitat and diversity</li> <li>Fragmentation of habitats</li> <li>Impact on habitat units with High Site Ecological Importance</li> </ul>	<b>High</b>	<ul style="list-style-type: none"> <li>Clearly demarcate construction footprint prior to commencement. Vegetation clearance only allowed in demarcated and approved footprints.</li> <li>Placement of construction camps, contractor's laydown areas and other temporary infrastructure are to be placed within areas that have already been modified or fall within the overall development footprint,</li> </ul>	<b>Moderate</b>
	Operational	<ul style="list-style-type: none"> <li>Destruction of protected plant species.</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Obtain permits for the removal/relocation of protected species.</li> <li>Rehabilitation of areas temporarily disturbed by construction activities.</li> <li>Restrict movement outside authorised areas.</li> <li>Consideration should be given to rescue and relocation of succulent or bulbous species and other protected species.</li> </ul>	<b>Low</b>

Impact Category	Phase	Impact Description	Significance Pre-Mitigation	Mitigation Measures	Significance With Mitigation
	Construction and Operational	<ul style="list-style-type: none"> <li>Impact on floral Habitat and Diversity</li> <li>Outcompeting of natural species</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Rehabilitation of mining footprints as per the rehabilitation plan.</li> <li>Develop and implement a plan which contains measures to eradicate Alien Invasive Plants.</li> <li>Topsoil stockpiles to be kept clear of Alien Invasive Plants.</li> <li>Use only registered Pest Control Operators (PCOs) for the use of any herbicides.</li> </ul>	Low
<b>Biodiversity Fauna</b>	Planning of facility	<ul style="list-style-type: none"> <li>Direct or indirect impacts on habitat as a result of encroachment of fauna</li> </ul>	High	<ul style="list-style-type: none"> <li>Implement strict speed limits during construction to prevent vehicles colliding with or running over animals.</li> <li>Conduct a walk through to ensure that all faunal species (where practicable) have left the demarcated area prior to the commencement of construction activities.</li> <li>Hunting/trapping or collecting of any faunal species is strictly prohibited.</li> <li>Awareness training during construction regarding the presence of faunal species on site.</li> <li>Rehabilitation of mining footprints as per the rehabilitation plan.</li> </ul>	Moderate
<b>Biodiversity Flora</b>	Construction	<ul style="list-style-type: none"> <li>Impact on habitat units with High Site Ecological Importance and faunal mortalities due to vegetation removal, earth works and collisions with vehicles</li> </ul>	High	<ul style="list-style-type: none"> <li>Clearly demarcate authorised footprint and encroachment of adjacent areas must be prohibited.</li> <li>Contractors must be informed of the extent of the authorised footprint.</li> <li>Implement control measures to eradicate Alien Invasive Plants.</li> <li>Obtain permits for the removal/ relocation of protected species.</li> <li>Consideration should be given to rescue and relocation of protected succulent and bulbous species and other protected species.</li> <li>Rehabilitation of mining footprints as per the rehabilitation plan.</li> </ul>	Moderate
	Operational	<ul style="list-style-type: none"> <li>Impact on habitat units with High Site Ecological Importance and faunal mortalities due to encroachment of adjacent areas and edge effects.</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Rehabilitation of mining footprints as per the rehabilitation plan.</li> </ul>	Low
<b>Surface Water Resources</b>	Planning	<ul style="list-style-type: none"> <li>Loss of wetlands and episodic drainage lines due to the layout directly impacting cryptic wetlands</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Implement mitigated layout plan to avoid wetland pans and other freshwater microhabitats.</li> <li>Water crossings must be designed with measures in place to prevent erosion in episodic drainage lines.</li> <li>Water crossings must be designed to allow for connectivity between the up and downstream aquatic environment.</li> <li>Implement stormwater control measures as stipulated in the stormwater management plan to prevent sedimentation of water courses.</li> <li>The 100m development buffer from water courses (not authorised in the WUL) must be dedicated/ marked no go areas.</li> <li>Restrict movement outside demarcated areas, especially close to water courses.</li> </ul>	Low



Impact Category	Phase	Impact Description	Significance Pre-Mitigation	Mitigation Measures	Significance With Mitigation
				<ul style="list-style-type: none"> <li>Water courses must be monitored for the infestation of alien and invader plants and measures must be implemented to eradicate such plants.</li> </ul>	
<b>Surface Water Resources</b>	Site Prep and Construction	<ul style="list-style-type: none"> <li>Destruction/disturbance of wetland habitat due to encroachment of cryptic wetland pans and freshwater micro-habitats</li> <li>Pollution of surface water resources due to spillages from temporary toilets</li> <li>Erosion and soil disturbance sedimentation of water courses from runoff from exposed surfaces.</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Implement mitigated road alignment to avoid wetland pans and freshwater micro-habitats.</li> <li>Implement mitigated layout plan to avoid wetland pans and other freshwater microhabitats.</li> <li>Water crossings must be designed with measures in place to prevent erosion in episodic drainage lines.</li> <li>Water crossings must be designed to allow for connectivity between the up and downstream aquatic environment.</li> <li>Implement stormwater control measures as stipulated in stormwater management plan to prevent sedimentation of water courses.</li> <li>The 100m development buffer from water courses (not authorised in the WUL) must be dedicated/marked no go areas.</li> <li>Restrict movement outside demarcated areas, especially close to water courses.</li> <li>Water courses must be monitored for the infestation of alien and invader plants and measures must be implemented to eradicate such plants.</li> </ul>	<b>Low</b>
<b>Groundwater</b>	Dewatering Operational activities – Seepage from Waste Rock Dumps	<ul style="list-style-type: none"> <li>Potential impact on aquifer yield</li> <li>No groundwater users (as per hydrocensus) is located within impacted zone.</li> </ul>	<b>High</b>	<ul style="list-style-type: none"> <li>Implement mitigation as per the Geohydrology Assessment.</li> <li>Implement a complaints management procedure.</li> <li>Monitor and record dewatering volumes.</li> <li>Dewatering volumes must not exceed authorised volumes.</li> <li>Groundwater levels should be monitored on-site as well as on surrounding farms.</li> <li>The groundwater flow model should be updated on a regular basis and prior to closure phase with the latest water level data.</li> <li>All leaks must be reported and repaired timeously.</li> </ul>	<b>Moderate</b>
		<ul style="list-style-type: none"> <li>Potential pollution/Contamination of groundwater</li> <li>No groundwater users (as per hydrocensus) is located within impacted zone.</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Establish a Class D liner (base preparation layer) for WRDs.</li> <li>Implement mitigation as per the Geohydrology Assessment.</li> <li>Concurrent rehabilitation of WRDs as per rehabilitation and closure plan.</li> <li>Undertake groundwater quality monitoring according to the monitoring programme in the EMP.</li> <li>Only competent employees to manage sewage packaging plant.</li> <li>Any sewage spills must be cleaned timeously and appropriately.</li> <li>Installation of PCD liner as per design report.</li> </ul>	<b>Low</b>

Impact Category	Phase	Impact Description	Significance Pre-Mitigation	Mitigation Measures	Significance With Mitigation
<b>Waste Management</b>	Construction activities	<ul style="list-style-type: none"> <li>Waste/Land Pollution Impacts on Groundwater and Surface Water</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Provide designated labelled bins and skips at strategic positions for the placement of general and hazardous waste, separately. These containers must not be overfilled.</li> <li>Good housekeeping practices must be implemented at the waste storage area.</li> <li>No littering must be allowed on site. Investigate measures to separate and recycle different waste types.</li> <li>All hydrocarbon contaminated material (rags, PPE, containers etc.) must be placed in a labelled, skip and disposed at a licenced facility.</li> <li>Contaminated soil must be managed as hazardous waste.</li> <li>Construction waste must be stored in a designated area and disposed at a licenced facility.</li> </ul>	<b>Low</b>
<b>Land use and land capability</b>	Construction and operations	<ul style="list-style-type: none"> <li>Loss of grazing land and change in land use</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Rehabilitation to be undertaken in terms of the Closure and Rehabilitation Plan.</li> <li>Refer to section related to impacts on vegetation and soil.</li> </ul>	<b>Low</b>
<b>Traffic</b>	Construction and operations	<ul style="list-style-type: none"> <li>Poor visibility - increased safety risk for road users</li> <li>Additional dust from construction vehicles driving on provincial road.</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Implement dust suppression on provincial road.</li> <li>Avoid crossing N14 during peak traffic periods.</li> <li>All drivers must have valid driver's licences.</li> <li>Risk of crossing the N14 must be clearly communicated to divers and included in Safety Risk Assessments.</li> </ul>	<b>Low</b>
<b>Heritage</b>	Construction and operations	<ul style="list-style-type: none"> <li>Impact on burial ground and graves</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Implement a chance find procedure during construction in case where possible heritage/fossil finds are uncovered.</li> <li>In the event that any of the identified archaeological sites will be impacted, a Phase 2 archaeological mitigation process must be implemented. A permit issued under s35 of the NHRA will be required to conduct such work.</li> </ul>	<b>Low</b>
<b>Air quality</b>	Operations	<ul style="list-style-type: none"> <li>Increased dust fall and nuisance conditions due to drilling, blasting and hauling.</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Implement blasting procedures. Implement strict speed limits on all roads/exposed areas.</li> <li>Dust suppression on roads and exposed areas according to a schedule.</li> <li>Dust fall monitoring in the area surrounding the property according to the National Dust Control Regulations.</li> <li>Implement a community grievances and complaints management procedure.</li> <li>All complaints must be investigated and responded to. Maintain mining machinery and vehicles to ensure emissions are kept to a minimum.</li> </ul>	<b>Low</b>
<b>Socio-economic (All Properties)</b>					

Impact Category	Phase	Impact Description	Significance Pre-Mitigation	Mitigation Measures	Significance With Mitigation
Socio-economic	Construction	<ul style="list-style-type: none"> <li>Employment opportunities during construction</li> </ul>	Positive High	<ul style="list-style-type: none"> <li>Maximise the employment of local persons (unemployed youth) by contractors.</li> </ul>	Low
Socio-economic	Construction	<ul style="list-style-type: none"> <li>Action from community due to failed expectations</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Stakeholder engagement aimed at transparency regarding employment and procurement opportunities.</li> </ul>	Low
Socio-economic	Construction and operations	<ul style="list-style-type: none"> <li>Increased pressure on infrastructure and services linked to influx of job seekers and workers</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Develop, communicate, and implement an employment strategy focused on local employment.</li> <li>Information regarding employment needs should be communicated well in advance of each phase of the project in which employees will be required.</li> <li>Hiring at both construction and operation phase should take place formally in accordance with relevant legislative requirements and nationally acceptable methods. No recruitment should take place 'at the gate.</li> <li>Project information should be effectively communicated throughout all stages of the project to ensure that expectations of all stakeholders are managed.</li> </ul>	Low
Socio-economic	Construction and operations	<ul style="list-style-type: none"> <li>Increased social pathologies linked to influx of workers and job seekers.</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>To mitigate the potential increase in HIV/AIDS prevalence and the spread of sexually transmitted diseases, Zama Mining should develop a HIV/AIDS management strategy prior to construction.</li> <li>Develop and implement a Code of Conduct (CoC) to address drug and alcohol abuse.</li> <li>Establish a wellness programme that provides training on stress management and healthy living.</li> </ul>	Low
Socio-economic	Construction and operations	<ul style="list-style-type: none"> <li>Enhanced local skills</li> </ul>	Positive Moderate	<ul style="list-style-type: none"> <li>As per the Mining Charter, the mine should implement a Human Resource Development (HRD) programme.</li> <li>In order to maximise impact and ensure that the right individuals are being targeted for training interventions, prior to implementation of the HRD programme.</li> <li>Mine and contractors should identify the specific skills needed at operation and build skills by recruiting community members and developing their skills by enrolling them at relevant training institutions with the view of appointing them when required. This is more viable for semi-skilled positions, as the lead time for the development of advanced skills may be too short.</li> <li>Zama Mining should make each effort to prioritise local community members in its skills development interventions. This is more viable for semi-skilled positions, as the lead time for the development of advanced skills may be too short.</li> <li>On the job training should be encouraged and be a prerequisite, where possible.</li> </ul>	Positive Moderate



Impact Category	Phase	Impact Description	Significance Pre-Mitigation	Mitigation Measures	Significance With Mitigation
Socio-economic	Operations	<ul style="list-style-type: none"> <li>Change in sense of place and nuisance factor due to mining and prospecting activities</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>To limit air quality impacts, noise impacts, and impacts of traffic the recommendations of the respective specialist impact assessments should be followed.</li> </ul>	Low
Socio-economic	Operations	<ul style="list-style-type: none"> <li>Permanent Employment- Employment of local persons during operations</li> </ul>	Positive Moderate	<ul style="list-style-type: none"> <li>Maximise the employment of local persons.</li> </ul>	Positive Moderate

## 1.6 Concluding Statement

The following provides a summary of the pertinent outcomes of the EIA study:

- No fatal flaws or unacceptable risks were identified as part of the impact assessment. The main risks relate to impacts on biodiversity habitat units with high ecological value as several plant and animal species that are nationally and provincially protected were recorded from the MaCarthy project area. However, the area that will be disturbed is relatively small and the implementation of the proposed mitigation measures is sufficient to reduce the risk to a moderate significance. It is therefore, not deemed as a fatal flaw. Due to the fact that the residual impact on biodiversity is considered moderate, the development of a Biodiversity Offset Report is recommended prior to the commencement of construction activity.
- Even though the latent risk on biodiversity is rated as moderate, the biodiversity study states that "*provided that all mitigation and monitoring measures presented within this report are fully implemented, the specialists are of the opinion that the significance of residual impacts can be reduced*".
- The dewatering activities will result in potential high impacts on the aquifer yield prior to the implementation of mitigation measures, however the groundwater model suggest that no private groundwater users will be affected.
- Potential seepage from the Waste Rock Dumps and backfilled pits has the potential to cause groundwater pollution. However, the waste assessment indicated that the waste rock material has low polluting potential and the pollution plume model showed that no private boreholes (except monitoring locations) are located in the pollution plume domain.
- The implementation of the mitigated layout and adherence to the associated no-go buffers will ensure the prevention of impacts on water courses and associated aquatic biodiversity.
- Impacts related to visual intrusion, traffic, air pollution, increased noise levels were assessed to be insignificant.
- The proposed mining and prospecting activities will provide socio-economic benefits in terms of job creation, local procurement and purchasing of local goods and services to a community where high unemployment is prevalent. Implementation of SLP related projects will also provide benefits to the local community.
- The identified impacts can effectively manage to acceptable levels with the implementation of the mitigation measures stipulated in the EMPr.

Based on the outcome of the Environmental Impact Assessment (“EIA”) and specialist studies undertaken, it is the Environmental Assessment Practitioner’s (“EAP”) opinion that the Environmental Authorisation (“EA”) for the proposed mining right be granted based on the reasons stated above, provided that the recommendations and mitigation measures stipulated in the Environmental Management Programmes (“EMPr”) (Part B of this document) are implemented to the fullest diligence and complied with.



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## ACRONYMS AND ABBREVIATIONS

Acronyms /Abbreviations	Definition
BID	Background Information Document
BIF	Banded Iron Formations
CA	Competent Authority
CBA	Critical Biodiversity Area
C-Plan	Conservation Plan
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
ESA	Ecological Support Area
EXM	EXM Advisory Services (Pty) Ltd
FEPA	Freshwater Ecosystem Priority Areas
GNR	Government Notice Regulation
IAP	Interested and Affected Party
mamsl	Metres above mean sea level
NDCR	National Dust Control Regulations
NEMA	National Environmental Management Act
NEM: AQA	National Environmental Management: Air Quality Act
NEM: BA	National Environmental Management: Biodiversity Act
NEM: WA	National Environmental Management: Waste Act
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resources Act
NWA	National Water Act
PES	Present Ecological State
REC	Recommended Ecological Category
SACNASP	South African Council for Natural & Scientific Professionals
SAHRA	South African Heritage Resource Agency
SANS	South African National Standards
SCC	Species of Conservation Concern

## **2. INTRODUCTION**

### **2.1 Project Background**

Zama Mining Resources (Pty) Ltd ("Zama Mining") is in the process of applying for a Mining Right at the Department of Mineral Resources and Energy ("DMRE") for iron ore, manganese and other minerals on the properties listed in Table 1-1. The extent of the application area is shown in Figure 4-1 and the individual properties are included in the land tenure map as shown in Figure 10-18. The required Environmental Authorisation ("EA") processes are currently undertaken in accordance with relevant legislation in support of the Mining Right application.

The mining right area covers approximately 43 557.5 hectares ("ha") and includes properties on which Zama Mining has held a prospecting right since 2013. For the purposes of the Zama Mining Project, the mining right application area has been divided into two (2) sections, including MaCarthy and the Western Properties.

Open pit mining activities for the extraction of Iron Ore are currently only planned for the MaCarthy Section supported by the development of workshops, administration areas, roads, sewage treatment and photovoltaic (PV) solar facilities. The infrastructure associated with the MaCarthy Section will cover approximately 90 hectares and details of the project is provided in Section 5 of this report. Prospecting activities are planned on the Prospecting Priority Areas of the Western Section of the application area as shown in Figure 4-1 which will entail diamond and percussion prospecting drilling.

### **2.2 Environmental Authorisations Required**

#### **2.2.1 Environmental Impact Assessment Process**

The proposed mining and prospecting activities trigger activities (detailed in Section 5 of this report) published in Listing Notice 1 (GN R. 327) and Listing Notice 2 (GN R. 325), promulgated in terms of the National Environmental Management Act (No. 107 of 1998) ("NEMA"). A full Scoping and Environmental Impact Assessment ("EIA") process in terms of the EIA Regulations (GN R. 326 of 2017) is therefore undertaken to obtain Environmental Authorisation ("EA") prior to commencement. The scoping phase of the EIA has been completed and the final Scoping Report was submitted to the CA on the 10<sup>th</sup> of February 2023 and accepted on the 20<sup>th</sup> of February 2023.

It should be noted that a separate EIA with supporting public participation will have to be undertaken if future mining activities will be conducted on any properties other than the Remaining Extent of the Farm MaCarthy.

### **2.2.2 Waste Management Licence Application**

The proposed establishment of Waste Rock Dumps (“WRDs”) as well as backfilling into the open pits as part of the proposed mining operations on the MaCarthy Section triggers activities listed in Category B in GN.R. 921 published in terms of the National Environmental Management Waste Act (No. 59 of 2008) (“NEM:WA”) (detailed in Section 5 of this report). Therefore, a Waste Management Licence (“WML”) is required prior to commencement. An Integrated EA application is therefore undertaken to obtain authorisation for NEMA and NEM:WA listed activities.

### **2.2.3 Water Use Licence Application**

Undertaking Activities listed in Section 21 of the National Water Act (No. 36 of 1998) (“NWA”) requires a Water Use Licence (“WUL”) prior to commencement. The proposed Open Pit Mining Activities triggers the following activities of the NWA:

**Table 2-1: NWA Section 21 Water Use Activities**

<b>Activity</b>	<b>Description</b>
Activities (c)&(i)	Altering beds, banks, and flow of a watercourse.
Activities (g)	Disposing of waste in a manner which may detrimentally impact on a water resources.
Activities (j)	Dewatering of mine pits to allow for safe mining conditions

An Integrated WUL application (DWS Reference: WU26789) is undertaken in parallel to the EIA process for the MaCarthy Section to obtain authorisation for the above-mentioned proposed water uses. No water uses are currently planned or applied for the prospecting activities at the Western Properties.

It should be noted that a separate WUL will be required if future mining activities will be conducted on any other properties than the Farm MaCarthy RE.

### **2.3 Objectives and Purpose of the Environmental Impact Report (“EIR”)**

This Environmental Impact Report (“EIR”) has been developed according to the requirements of the EIA regulations (GN R. 326 of 2017). The content of this report, as required by the aforementioned regulations, and where each requirement is addressed within this report is provided in **Part A: Appendix D**. The purpose of the impact assessment phase of the EIA and the supporting report is as following:

- Identify the relevant policies and legislation relevant to the proposed activity.
- Motivate the need and desirability of the proposed activity.
- Identify, confirm, and assess preliminary project alternatives.



- Identify and confirm the preferred site location, based on the preliminary identification of impacts in terms of the baseline environmental description.
- Identify the key issues to be addressed in the EMP together with mitigation measures for each potential impact.
- Identify preliminary suitable mitigation measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks.
- Summarise comments and responses from IAP's.
- Summarise specialist study findings.
- Includes an environmental impact assessment.

## **2.4 Public participation**

A public participation process ("PPP") is conducted in terms of the Chapter 6 of NEMA and the EIA regulations and the Regulations regarding the Procedural Requirements for Water Use Licence Applications and Appeals (GN.R. 267). A consolidated PPP is undertaken in support of the EIA, WML and WUL applications. The purpose of the public participation process is to inform all the identified Interested and Affected Parties ("IAPs") of the proposed mining/prosecting project and associated application processes and allow them to raise comments/concerns.

The draft scoping report was made available for public review from **Friday, 9 September to Monday, 10 October 2022** (30 calendar days, excluding one public holiday) in accordance with Section 40 (3) of the 2014 EIA regulations. The final scoping report was submitted to the CA on the 10th of February 2023 and accepted on the 20th of February 2023. The draft EIR was made available for public review from **Wednesday 26th of July 2023 to Saturday 26th of August 2023** (30 calendar days, excluding one public holiday).

All written comments and responses received to date are provided in Table 9-1. The final EIR is now being submitted to the CA for decision making.

## **3. ENVIRONMENTAL ASSESSMENT PRACTITIONER**

This section provides details of the Independent Environmental Assessment Practitioner ("EAP") that is responsible to facilitate the EIA, WUL application and public consultation processes in line with NEMA and the EIA Regulations (GN R. 326 of 2017).

### **3.1 Details of EAP**

Table 3-2 below contains details of the EAP responsible to facilitate the EIA and public consultation process.

**Table 3-1: Details of the Independent EAP**

<b>Name of The Practitioner</b>	Trevor Hallatt
<b>Affiliation</b>	EAP/Senior Environmental Scientist at EXM Advisory Services (Pty) Ltd
<b>Professional registration</b>	EAPASA (Reg. nr. 2019/1758) & SACNASP (Reg. nr. 300123/15)
<b>Tel No</b>	071 689 2229
<b>E-mail address</b>	<a href="mailto:trevor@exm.co.za">trevor@exm.co.za</a>

### **3.2 Qualifications and Experience**

Trevor obtained a B.Sc. degree from the North-West University (Potchefstroom campus) in Geography, Zoology and Tourism in 2010. This degree provided him with a sound base and understanding of the environment and human impacts on the environment. He also obtained an honours degree (*cum laude*) in Environmental Management at the NWU in 2011. Furthermore, Trevor obtained a master's degree in environmental management (*cum laude*) in 2014.

Trevor Hallatt has more than 12 years of environmental management experience in mining, power generating, industrial and local government sectors. His duties entail the planning and execution of projects related to environmental management, including and legal compliance audits, EIA, compilation of Environmental Management Programmes, Environmental Risk Assessments and Environmental Management Systems. Trevor is registered with the South African Council for Natural Scientific Professions (Reg nr: 300123/15) as well as the Environmental Assessment Practitioners Association of South Africa (EAPASA Reg nr. 2019/1758).


### **3.3 Declaration of Independence**

I, Trevor Hallatt, 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 take into account the requirements of the EIA regulations as published in Government Notice R326 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.
- 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.

**Table 3-2: Declaration of EAP**

Name	Affiliation	Designation	Signature	Date
Trevor Hallatt	EXM Environmental Advisory (Pty) Ltd	Senior Environmental Scientist EAP		2023/09/06

#### **4. PROJECT LOCATION AND PROPERTY DESCRIPTION**

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 in Table 4-1 below.

**Table 4-1: Property Details**

Farm Name	Portion Number	21-digit Surveyor General Code	Application area (Ha)
<b>Mining Right Area</b>			
Compass 665	Remaining Extent	C0410000000066500000	2343.483
Cox 571	Portion 2	C0410000000057100002	429.718
Cox 571	Remaining Extent	C0410000000057100000	1101.863
Cox 571	Portion 1	C0410000000057100001	1320.317
Cox 571	Portion 3	C0410000000057100003	127.605
Crossley 660	Remaining Extent	C0410000000066000000	1883.551
Dikepeng 661	Portion 1	C0410000000066100001	1018.65
Dikepeng 661	Portion 2	C0410000000066100002	151.49
Dikepeng 661	Portion 4	C0410000000066100004	972.129
Gamaliets 659	Remaining Extent	C0410000000065900000	1314.266
Gamaliets 659	Portion 1	C0410000000065900001	1337.879
Gaston 650	Remaining Extent	C0410000000065000000	1052.748
Gaston 650	Portion 1	C0410000000065000001	1234.104

Farm Name	Portion Number	21-digit Surveyor General Code	Application area (Ha)
Groot Venn 777	Remaining Extent	C04100000000077700000	3507.405
Hartley 573	Remaining Extent	C04100000000057300000	2641.604
Hilliard 664	Remaining Extent	C04100000000066400000	1580.437
Hilliard 664	Portion 1	C04100000000066400001	1039.809
Knapp 658	Remaining Extent	C04100000000065800000	723.265
Knapp 658	Portion 1	C04100000000065800001	818.433
Knapp 658	Portion 2	C04100000000065800002	429.45
Knapp 658	Portion 3	C04100000000065800003	420.195
Knapp 658	Portion 4	C04100000000065800004	9.302
Knapp 658	Portion 5	C04100000000065800005	30.035
Knapp 658	Portion 7	C04100000000065800007	2.371
Lucknow 652	Remaining Extent	C04100000000065200000	2422.442
Makala 646	Remaining Extent	C04100000000064600000	1775.93
Makala 646	Portion 1	C04100000000064600001	996.989
Mamaghodi 654	Portion 1	C04100000000065400001	12.391
Mamaghodi 654	Remaining Extent	C04100000000065400000	2617.4
Mamatlun 651	Portion 2	C04100000000065100002	1194.387
Mamatlun 651	Remaining Extent	C04100000000065100000	1185.964
Tomkins 657	Remaining Extent	C04100000000065700000	1194.152
Tomkins 657	Portion 1	C04100000000065700001	641.983
Tomkins 657	Portion 2	C04100000000065700002	677.83
Tomkins 657	Portion 3	C04100000000065700003	150.96
Uys 663	Portion 1	C04100000000066300001	744.056
Uys 663	Portion 2	C04100000000066300002	745.664
Uys 663	Portion 3	C04100000000066300003	1442.121
Uys 663	Portion 4	C04100000000066300004	742.097
Uys 663	Portion 6	C04100000000066300006	753.537
MaCarthy 559	Remaining Extent	C04100000000055900000	769.553
<b>Total mining right area</b>			<b>43 557.57 Ha</b>

**Table 4-2: General Area Description**

<b>Application area (Ha):</b>	Total mining right area: 43 557.57 Ha
<b>Magisterial district:</b>	ZF Mgcawu Magisterial District John Taolo Gaetsewe Magisterial District
<b>Distance and direction from nearest town</b>	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.
<b>Locality map</b>	Refer to Figure 4-1 below

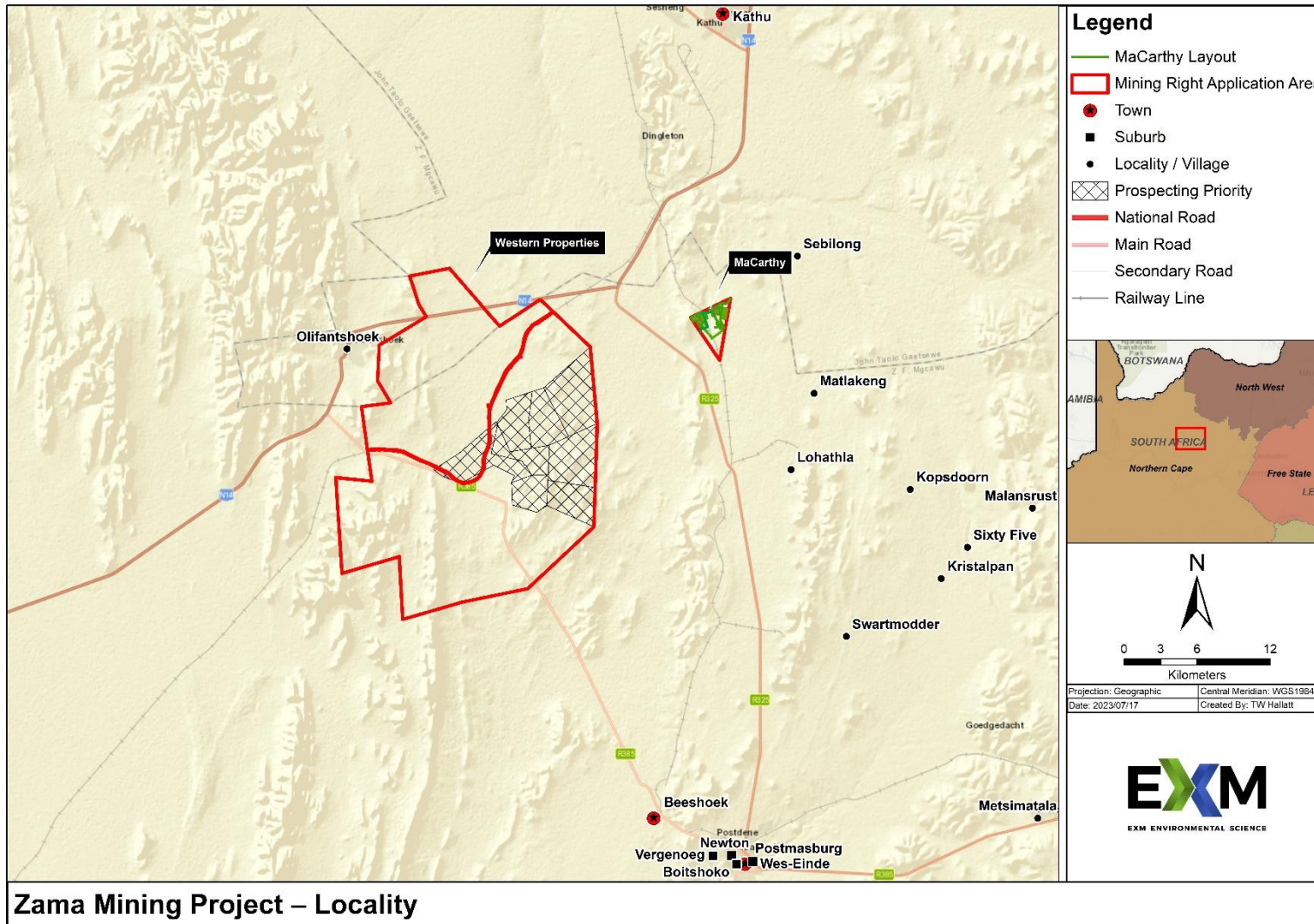


Figure 4-1: Regional Locality Map

## 5. DESCRIPTION OF THE SCOPE OF THE PROPOSED ACTIVITY

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

### 5.1 Listed and specified activities

Table 5-1 contains the listed activities in terms of Listing Notices 1 (GN. 327), 2 (GN. 325) and 3 (GN. 324) that are triggered by the proposed project. A full Scoping and EIA process in terms of the EIA Regulations (GN R326 of 2017) is therefore undertaken to obtain an EA prior to commencement of the project.

**Table 5-1: NEMA activities triggered by the proposed project.**

Applicable Regulation		Applicability to proposed project
<b><u>Listing Notice 1 (GN R. 327)</u></b>		
<b>Activity 1</b>	The development of facilities or infrastructure for the generation of electricity from a renewable resource where— (i) the electricity output is more than 10 megawatts but less than 20 megawatts; or (ii) the output is 10 megawatts or less, but the total extent of the facility covers an area in excess of 1 hectare. excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs— (a) within an urban area; or (b) on existing infrastructure.	The development of two Solar PV farms at the western and eastern infrastructure of the mining operations.
<b>Activity 9</b>	The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water— (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more. excluding where— (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.	The development of a new pipeline to be established from the Sedibeng pipeline to the internal distribution lines.
<b>Activity 10</b>	The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, wastewater, return water, industrial discharge, or slimes – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more. excluding where— (a) such infrastructure is for the bulk transportation of sewage, effluent, process water, wastewater, return water, industrial discharge, or slimes inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.	The development of dirty water canals.

Applicable Regulation		Applicability to proposed project
<b>Activity 12</b>	The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres: or (ii) infrastructure or structures with a physical footprint of 100 square metres or more, where such development occurs— (a) within a watercourse. (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse	Development of infrastructure near/across water courses, including water supply pipelines and road crossings.
<b>Activity 14</b>	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic Metres or more but not exceeding 500 cubic Metres.	Fuel will be stored on site in two tanks will have a combined capacity of 320 m <sup>3</sup> .
<b>Activity 27</b>	The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Clearance of vegetation for the establishment of infrastructure development.
<b>Activity 56</b>	The widening of a road by more than 6 Metres, or the lengthening of a road by more than 1 kilometer— (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 Metres. excluding where widening or lengthening occur inside urban areas.	Roads (access road, haul roads and LDV roads)
<b><u>Listing Notice 2 (GN R. 325)</u></b>		
<b>Activity 4</b>	The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.	Storage of Bulk Fuel Storage (dangerous goods)
<b>Activity 6</b>	The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution, or effluent	Waste Licence for <ul style="list-style-type: none"> <li>• Pollution Control Dam</li> <li>• Waste Rock Dumps</li> </ul>
<b>Activity 15</b>	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Clearance of vegetation for <ul style="list-style-type: none"> <li>• Prospecting</li> <li>• Solar PV Power Facilities Plants</li> <li>• Pollution Control Dam</li> <li>• Infrastructure Areas</li> <li>• Manganese Ore Open Cast Pit</li> <li>• Waste Rock Dumps</li> <li>• Open Cast Iron Ore Pits</li> </ul>



Applicable Regulation		Applicability to proposed project
<b>Activity 17</b>	Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including— (a) associated infrastructure, structures, and earthworks, directly related to the extraction of a mineral resource	Mining right for manganese ore open cast pit
<b>Activity 27</b>	The development of a road— (i) [a national road as defined in section 40 of the South African National Roads Agency Limited and National Roads Act, 1998 (Act No. 7 of 1998);] (ii) [a road administered by a provincial authority. (iii) [a road] with a reserve wider than 30 metres; or (iv) [a road] catering for more than one lane of traffic in both directions.	Development of Access and Haul Roads
<b>Waste Management Listed Activities (GN R. 921)</b>		
<b>Category B:</b>		
<b>Activity 7</b>	The disposal of any quantity of hazardous waste to land.	<ul style="list-style-type: none"> <li>• Pit Backfilling</li> <li>• Waste Rock Dumps</li> </ul>
<b>Activity 10</b>	The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity).	<ul style="list-style-type: none"> <li>• Pit Backfilling</li> <li>• Waste Rock Dumps</li> </ul>
<b>Activity 11</b>	The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	<ul style="list-style-type: none"> <li>• Pit Backfilling</li> <li>• Waste Rock Dumps</li> </ul>

## 5.2 Description of Activities to be Undertaken

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 which is now being converted to a mining right.

The application area has been divided into two sections (see Figure 5-3), namely MaCarthy currently the only property designated for mining activities, and the Western Properties with areas prioritised for prospecting activities as described below.

The mining activities are described in Section 5.2.1 and the prospecting activities are described in Section 5.2.2 below:

### 5.2.1 MaCarthy Mining Operations

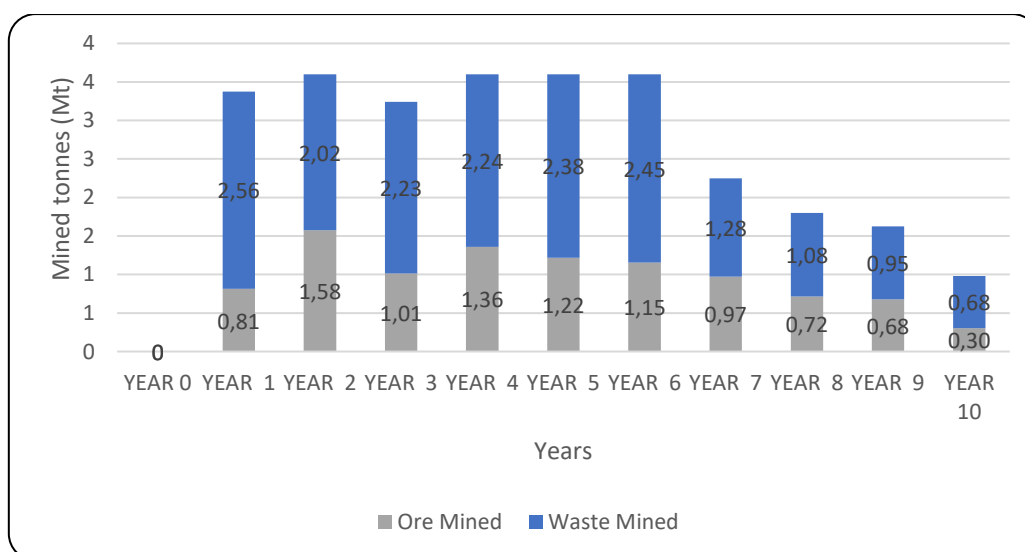
The project entails the development of an open cast mining operation on the Remaining Extent of the Farm MaCarthy 559 approximately 24 km south of the town of Kathu (2.7 km north of the R325 regional road) for the extraction of iron ore.

#### 5.2.1.1 *Life of Mine (“LoM”) Planning*

The mine planning phase has commenced and will continue until the end of 2023. Activities at the MaCarthy Section are planned for 12-years, including a construction phase during 2024 (“Year 0”). Current mine planning and production forecasts have scheduled the production Life of Mine (“LoM”) for 10 years from 2025 (“Year 1”) until at least 2034 (“Year 10”). The mine closure and rehabilitation phase will commence in 2035 (“Year 11”). The LoM is however subject to change, based on ongoing prospecting activities and updated resource statements.

#### 5.2.1.2 *Estimated Reserves and Production Rates*

The production schedule for the LoM is provided in Figure 5-1. The schedule details tonnages of ore that will be mined and waste that will be produced. The production scheduling strategy is to maintain an Fe-product production rate of 800 kilo tonnes per annum (“ktpa”). A product with a weighted average Fe grade of 66.6% will be produced over the LoM. The waste stripping will commence in 2025. The production build up has been planned for a period of one year to reach steady state production of approximately 980 ktpa ore. Steady state production will be maintained for a period of six years. Run of Mine (“RoM”) production will peak at 1.58 million tonnes (“Mt”) in 2026 and steadily decline to 0.68 Mt in 2034.



**Figure 5-1: MaCarthy Production Schedule**

### 5.2.1.3. Opencast Pits and Mining Method

Five (5) opencast pits will be developed as part of the mining operations from where ore will be extracted, as summarised in Table 5-2. Pits 1 & 2 will be developed on the western section and Pits 3, 4 & 5 on the eastern section of the property (refer to Figure 5-3).

**Table 5-2: Summary of Opencast Pits**

Pit	Surface area	Years to be mined
Pit 1	2 ha	2025 to 2033
Pit 2	21 ha	2025 to 2027
Pit 3	6.2 ha	2025 to 2030
Pit 4	1 ha	2025
Pit 5	1 ha	2033

Iron ore will be extracted from the pits by means of conventional open-pit mining methods entailing drilling and blasting at a rate of approximately 1 million ton per annum. The ore will be temporarily placed in a product stockpile area near the pit, whereafter it will be loaded and hauled for off-site processing. No processing is currently planned to be undertaken at the MaCarthy Section and iron ore will be trucked/hailed to offsite customers where it will be beneficiated.

### 5.2.1.3 Waste Rock Dumps

Overburden/waste rock that will be removed during the development of the pits to gain access to the ore body will either be used for the backfilling (described in the section below) of the pits or taken to Waste Rock Dumps ("WRD") for disposal. Zama Mining proposes to establish two (2) WRDs in the Western Section and one (1) WRD in the Eastern Section as summarised in the Table 5-3.

**Table 5-3: Summary of Waste Rock Dumps**

Waste Rock Dump	Volume	Surface area	Year to be established
WRD 1	2 889 049 m <sup>3</sup>	10 ha	2026
WRD 2	5 927 047 m <sup>3</sup>	16 ha	2024
WRD 3	5 036 140 m <sup>3</sup>	15 ha	2026

### 5.2.1.4 Backfilling

Backfilling of the pits will be undertaken concurrently with the mining activities. The main purpose of backfilling is to reduce the surface area that is required for WRD development. The exact extent that the pits will be backfilled has not been determined as yet. However, according to the current mine plan Pit 2 which is by far the largest pit will be completely backfilled at LoM, and the remainder of the pits will be partially backfilled with partial void remaining.

#### **5.2.1.5 Internal, Access and Haul Roads**

Internal haul roads with a width of 30 meters will be established to transport ore from the pits towards the provincial road (MN 14146) which connects to the northern section of the property as illustrated in Figure 5-2. From here the ore will be transported north and connect to the provincial road (DR 03333) approximately 8km from the site. The route will then cross the N14, and the ore will be off-loaded at the southern section of Sishen Mine for processing. The provincial roads will also be used by construction vehicles and Light Driving Vehicles ("LDV") to gain access to the site. Other internal roads will also be established to connect the western infrastructure with the eastern section.

#### **5.2.1.6 Other infrastructure**

Other infrastructure includes a guard house, ablution facilities and change house. Detailed layouts are included in appendix a of the design engineering reports (Part C: Appendix K).

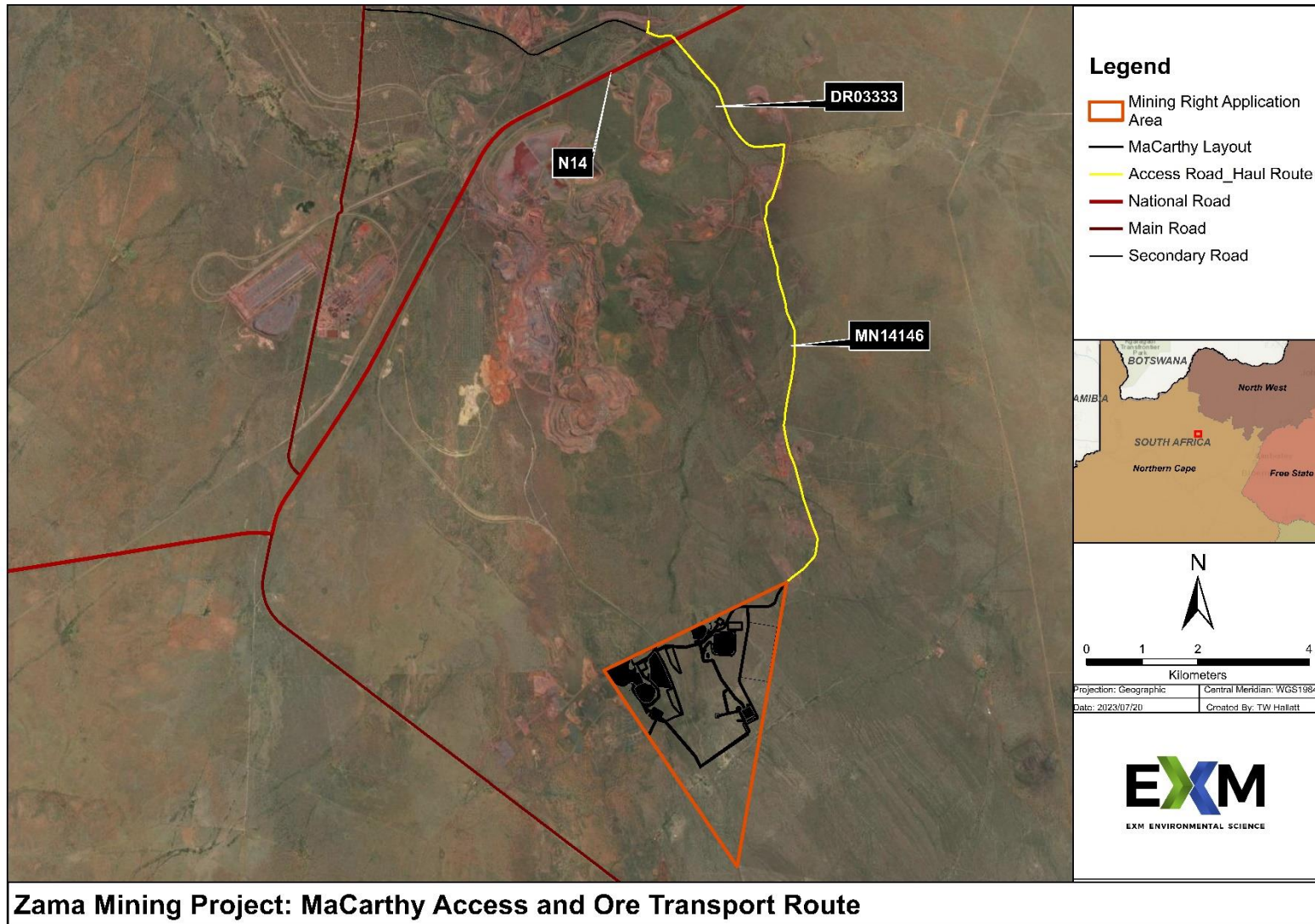


Figure 5-2: Access Road/Haul Routes

### 5.2.1.7 Water Requirements and Supply

Table 5-4 provides a summary of the mine's water requirements. The facility will require approximately 305 188 m<sup>3</sup> of water per annum or 836 m<sup>3</sup> per day. The water will initially be obtained from a water pipeline that will connect to the Vaal-Gamagara water supply scheme. The Sedibeng pipeline to which the supply pipeline will connect runs to the west of the R325 regional road. Therefore, a new pipeline will have to be established from the Sedibeng pipeline to the internal distribution lines. A servitude will need to be established on an adjacent property to establish the new pipeline and will include a servitude of 5 meters sides. Three options for a pipeline route and connection to the Sedibeng pipeline is currently considered as discussed in Section 8.

Internal pipelines on the Farm MaCarthy RE, as indicated in Figure 5-3, will be established which will be used to distribute water from the external supply line to the respective operational units. The internal diameter of the supply line will be 0.11m and the peak throughput will be is approximately 5.5l/s. Water will be stored in two tanks prior to distribution with a storage capacity of 318 m<sup>3</sup> and 79.5 m<sup>3</sup>, respectively.

The abstraction of groundwater to supply the mining operations will be considered in future as mining progresses after the required studies & authorisation processes have been undertaken.

**Table 5-4: MaCarthy Water Requirements**

<b>Total Annual Water Requirements</b>		
<b>Items</b>	<b>Volumes (m3/annum)</b>	<b>Volumes (m3/day)</b>
Dust suppression	270,121	740
Potable Water Usage	10,074	28
Fire Water Required	21,000	58
Solar Panel Wash Water	48	0.13
Washbay Water Usage	3,564	10
<b>Total</b>	<b>305,188</b>	<b>836</b>

### 5.2.1.8 Dirty Water and Stormwater Management

A Stormwater Management Plan and Engineering Design Report was developed by Nurizon Consulting Engineers (2023) which stipulates measures for the separation of clean and dirty water. The following infrastructure will be developed for the containment of contaminated runoff and to manage potential erosion:

- Pollution Control Dams (PCDs) at the Eastern infrastructure area;
- Silt Traps;

- Clean water channels; and
- Dirty water channels.

#### **5.2.1.9 Electricity Supply**

Zama Mining is planning to establish two Photovoltaic ("PV") Solar Facilities at both the eastern and western infrastructure areas on MaCarthy. The PV panels will have a generating capacity of 1312 kilowatts ("kW") with six (6) 120 kW inverters. A second option will be investigated, if the PV facility does not provide sufficient electricity supply. This option will entail the establishment of electricity transmission lines to connect to the Eskom grid adjacent to the R325 regional road. The line will have a transmission capacity below 33 kilovolts (kV) and will include a servitude of 10 meters on both sides. The alternative routes for the transmission line are discussed in Section 8.

#### **5.2.1.10 Sewage Management**

A sewage packaging plant with a treatment capacity of 25 m<sup>3</sup> per day will be established on site at the Eastern infrastructure area and a septic tank will be used to store sewerage in a septic tank at the Western infrastructure area.

At the sewage packaging plant, the sewage will firstly be inserted in a septic tank to break down organic solids, by means of microbial digestion, into soluble organic compounds which will then be flushed into the final chamber of the septic tank as sewage effluent with little or no solids. The effluent will then be delivered to the biological filter. The biological filter uses aeration techniques to clean the effluent of the remaining biomass.

The effluent will then be re-circulated and oxygenated on an hourly basis in order to maximise the refinement process. Finally, the treated effluent will be passed through a Bio-Ozonation process which disinfects the effluent for the removal of pathogens and any remaining bacteria. The choice of final disinfection would be dependent on-site specific requirements. Effluent from the treatment process will be used for dust suppression on roads.

#### **5.2.1.11 Explosives Management**

A standard shipping container, equipped, security and access controlled according to the Mine Health and Safety Act ("MHSA"), is provided for storage of blasting accessories. No explosives will be stored on site. Explosives will be supplied as required for blasting events. All explosives will be charged directly to blast holes by the explosive's supplier.



## **5.2.2 Fuel Storage**

Fuel will be stored on site in two tanks with a combined capacity of 320 m<sup>3</sup> at the eastern infrastructure area. Appropriately sized bunds will be established to place the tanks with sumps in place. A specific area will be allocated for refuelling purposes at the eastern infrastructure area with containment measures in place. Runoff from this area will be diverted to the PCD.

### **5.2.2.1 Soil Stockpiling**

Topsoil that will be stripped as part of the mining development will be stored at strategic locations as indicated on Figure 5-3. Sufficient space has been allowed for the stockpiles not to exceed 2 meters in height. A total area of 20 hectares has been allocated for soil stockpiling, based on the availability of topsoil in the area and to accommodate a maximum height of 2 meters. The topsoil will be used for concurrent rehabilitation of the WRDs.

### **5.2.2.2 Future Infrastructure Area**

An area has been identified on the eastern section of the property for the development of a future processing facility. The development of the facility will be dependent on market demand. The technology and details of the infrastructure is not available at this stage and the implementation of the processing facility may require future amendments to the EA/EMPr.

## **5.2.3 Dewatering Volume and Infrastructure**

According to the Geohydrological Assessment (Gradient, 2023), dewatering of ground water that will accumulate in the eastern pits will be required. The outcome of the study showed that average dewatering volumes will be approximately 3 970 m<sup>3</sup>/day from year 3/4 onwards. The study assessed different scenarios to check the dewatering effectiveness of establishing less boreholes with high abstraction rates vs establishing a higher quantity of boreholes with moderate abstraction rates. The study concluded that the establishment of 15 boreholes around pits 3, 4 and 5 would be the best option for optimum dewatering. Dewatering will entail the abstraction of 400m<sup>3</sup>/day from each borehole.

A total of 15 boreholes will therefore be drilled and installed to intercept groundwater upstream of the pits before groundwater will flow into the pits. It is currently proposed to supply the water via a pipeline to the Vaal-Gamagara water supply scheme. A new pipeline will be required to connect to the Sedibeng pipeline and will include a servitude of 5 meters sides. It is essential to monitor dewatering volumes on an ongoing basis.

### **5.2.3.1 Supporting infrastructure**

Other supporting infrastructure will include administrative buildings, staff quarters, security fencing, and a guard house. A workshop will be developed within the eastern infrastructure area for the servicing of vehicles and machinery. Other hydrocarbon material that will be stored at the workshop will include, i.e., oil and grease. Appropriate containment will be provided to capture any spillages. The workshop will be developed in the dirty water management area and runoff will be diverted to the PCD.

### **5.2.3.2 Waste management**

General and hazardous waste from the workshop, staff buildings, canteen, operations will be temporarily stored on site in a designated area before being removed from site for recycling or off-site disposal.

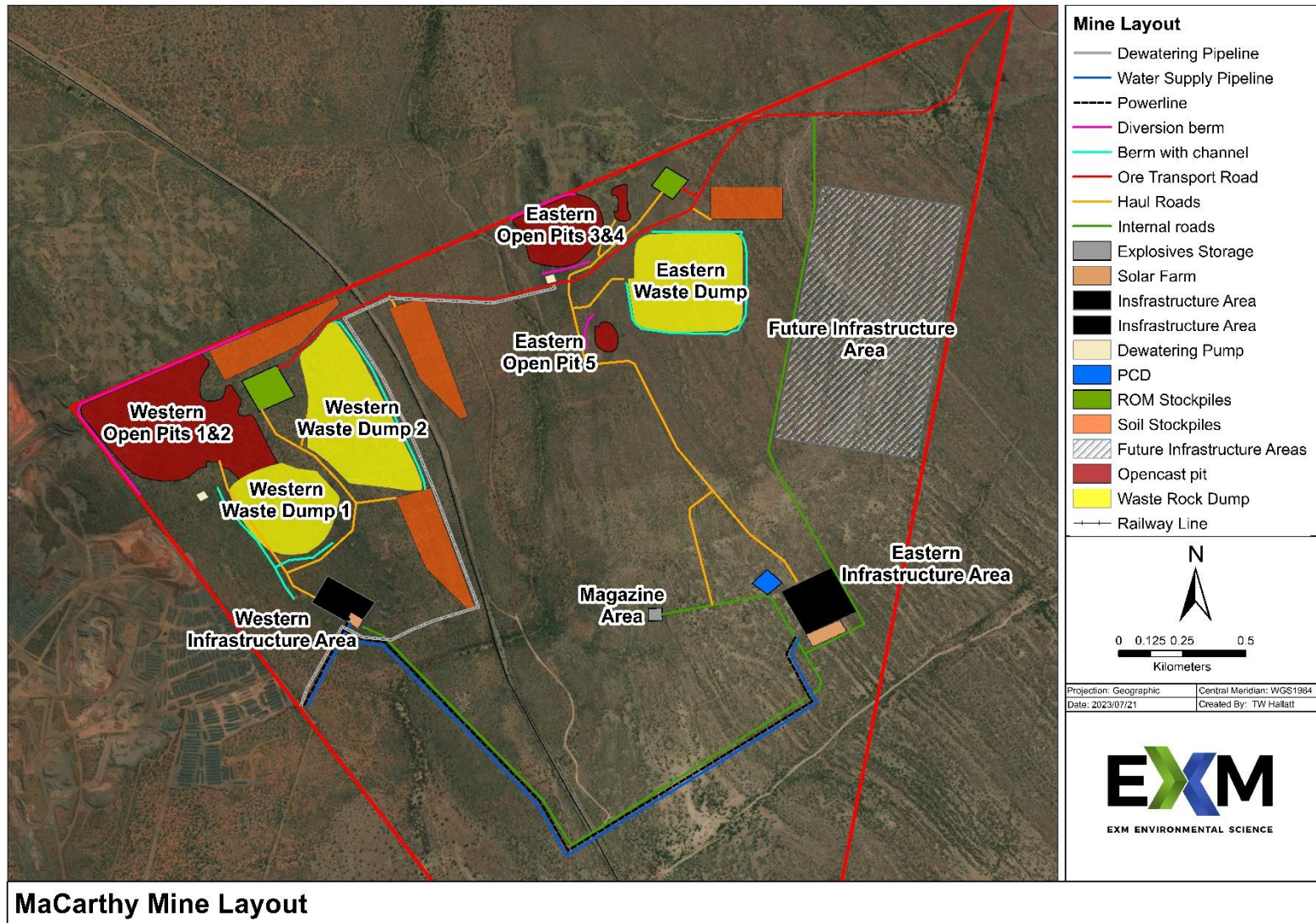


Figure 5-3: MaCarthy Mine Layout

#### **5.2.4 Western Properties (Prospecting Activities)**

This section provides a description of the prospecting activities that will be undertaken on the Prospecting Priority Area.

##### **5.2.4.1 Background**

Prospecting activities are planned for the Western Properties. The following properties are being prioritised for prospecting and a prospecting work programme has been included as part of the mining right application. The location of the Prospecting Priority Area is indicated in Figure 5-3.

- Hilliard RE/664
- Hilliard 1/664
- Uys 3/663
- Uys 4/663
- Uys 6/663
- Crossley RE/660
- Dikepeng 1/661
- Dikepeng 4/661

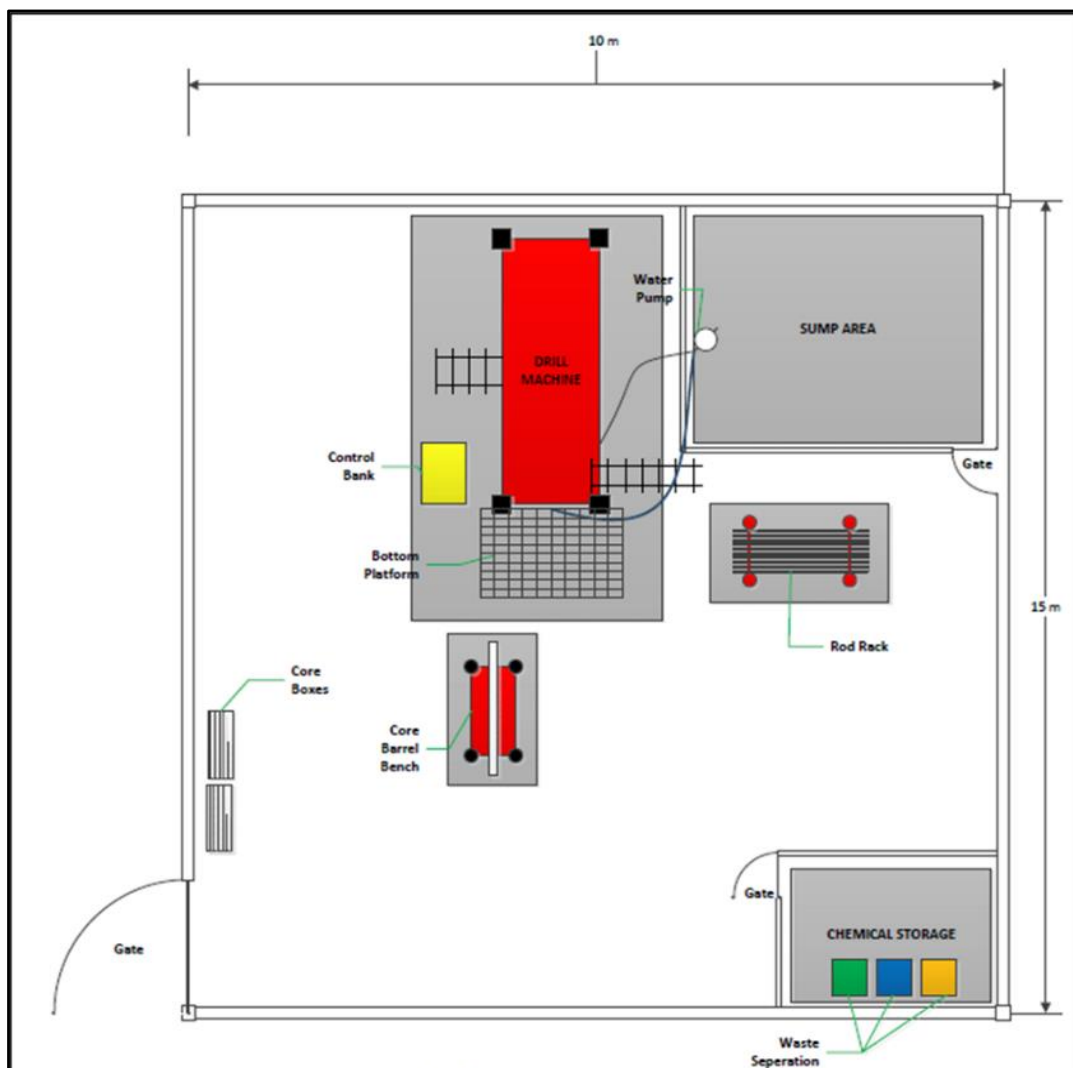
Specialist studies (heritage, biodiversity, and freshwater aquatic) has been undertaken for the Prospecting Priority Areas. The outcome the specialist studies has established site sensitivity and will be used to guide the planning of the prospecting activities. The specialist studies were also used as a basis to provide input to the impact assessment.

##### **5.2.4.2 Description of Drilling Operations**

Prospecting will involve diamond and percussion drilling. The layout of a typical drill site is given in **Figure 5-4**. The boreholes that will be drilled as part of the prospecting activities are characterised as follows.

- All borehole sites are identified based on environmental sensitivities at each drill site (e.g., protected trees and proximity to wetlands) and the area is clearly demarcated to limit disturbance. The selection is made by the environmental officer and drill manager. Mobile sumps will be used, and no excavations will be required.
- A grid will be developed with the approximate locations of potential borehole sites. The boreholes on the grid will be 100m spaced and will exclude sensitive features and areas within the WUL regulated zones.

- Plastic sheeting with temporary bunds is put in place in areas where drill fluids (hydrocarbons) and fuel are placed. Designated bins are also provided for waste generated on site.
- The operational area is fenced off (10 m x 10 m) to limit access.
- Cores are removed to the core shed located near the main offices.
- During decommissioning all infrastructure (waste bins, fencing) is removed from site for placement at the next site.
- The borehole is cased in a concrete slab and the hole is capped over the protruding casing.
- Chemical toilets are provided at each drill site.



**Figure 5-4: Conceptual/Typical Drill Site Layout**

#### **5.2.4.3 Rehabilitation measures**

Concurrent rehabilitation will be undertaken at all the identified areas allocated for prospecting. As soon as a drill site is decommissioned, it will be scheduled for rehabilitation.

Rehabilitation will entail the remediation of any spillages, ripping of compacted areas, placement of brush (from cleared vegetation), to augment vegetation establishment and vegetation is left to establish naturally. Access roads (if any) are only ripped once all exploration activities have ceased, as it may be necessary to access drill sites at any time during the operational phase of the exploration right. Vegetation establishment is monitored annually after the rainy season.

#### **5.2.4.4 Water Supply**

Water supply for drilling activities will include the trucking of water to the respective site. Relevant authorisations will need to be obtained if groundwater will be used for prospecting activities.

#### **5.2.4.5 Waste Management**

General (domestic) and hazardous waste emanating from the prospecting sites will be stored in a dedicated area in covered bins. The waste will be collected and provided to a recycling facility or disposed at a licenced facility.

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 disposal facility within the area. Should on-site disposal be preferred this will require licensing under the NWA and NEM: WA and will need to be appropriately designed and managed dependent on the pollution potential of the material.

## **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 requirements of the NEMA and the EIA Regulations. This section outlines the key environmental 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 (No. 28 of 2002) ("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 4-1. Zama Mining has been the holder of prospecting rights for iron ore and manganese on these properties since 2013.

**The project will require a mining right in terms of Section 22 of the MPRDA for iron ore, manganese and other minerals on the properties listed in Table 4-1.**

## **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 also been submitted as part of the application and has guided the planning for the EIA process for the project.

### **6.2.2 EIA Regulations**

Section 24 of NEMA provides for the Minister of Environmental Affairs to publish activities that require Environmental Authorisation ("EA") prior to commencement. This has resulted in the promulgation of Listing Notices 1 (GN. 327), 2 (GN. 325) and 3 (GN. 324) with the EIA Regulations (GN R. 326 of 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 in order to obtain EA prior to commencement.

The project triggers activities listed in Listing Notice 1 (GN. 327) and Listing Notice 2 (GN. 325) and thus the application for EA requires the completion of a Scoping and EIA process. The complete description of all activities triggered are provided in Section 4.1 of this report.

**Authorisation is required for activities applicable to the development of the mine in terms of the EIA Listing Notices 1, and 2 of GNR. 327-324.**

### **6.2.3 Financial Provision Regulations**

Financial provision and its updates were previously regulated under the Mineral and Petroleum Resources Development Act (MPRDA) and its Regulations (GN R. 527 of 2004). In September 2014, all provision related to environmental management in the MPRDA was removed and included in section 24 of the National Environmental Management Act (No 107 of 1998) (NEMA). 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).

A Final Closure and Rehabilitation plan has been developed in terms of the closure plan requirements under the EIA Regulations as well as Regulation 10 of NEMA Financial Provisioning Regulations in support of the EA application.

**A Final Closure and Rehabilitation plan has been developed and is included as Part C: Appendix K**

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

In terms of the National Environmental Management: Waste Act (NEM: WA) (No. 59 of 2008)), waste management activities that are listed in regulations published under NEM: WA may not be undertaken without a Waste Management License (WML). The listed activities for which a WML is required are contained in Government Notice (GN 921). Category A activities require a WML, and a Basic Impact Assessment (BA) process must be conducted, and Category B activities require a WML, 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 establishment of the new WRDs trigger Activities 10 (construction of a waste management activity) and 11 (residue stockpiles or residue deposits) under Category B of GNR 921.

**The project will require a Waste Management License in term of NEM: WA which forms part of this integrated environmental authorisation process.**

### **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. However, the storage capacity at MaCarthy will only entail a volume of 340 cubic metres.



A AEL in terms of the NEM: AQA is therefore not required for the Zama Mining Project as no activities listed are triggered.

Mining at MaCarthy and the prospecting at Western Properties are 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 PM<sub>10</sub> and dust fallout in residential and industrial areas.

**The project will not trigger activities listed in GN 893 and an AEL is not required, however air quality monitoring would be required.**

### **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") during the clearance of vegetation.

**A permit application will be submitted for the removal of protected tree species within the application footprints.**

### **6.6 National Forests Act (No. 94 of 1998)**

Sections 12 and 15 of the National Forests (No.94 of 1998) 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 Forestry, Fisheries and Environment (DFFE) to do so.

**An application will be submitted for the removal of protected tree species within the application footprints.**

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

Section 49 and 50 of the Northern Cape Nature Conservation Act (No. 9 of 2009) 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 Department of Agriculture, Environmental Affairs, Rural Development and Land Reform. Application will need to be made for the necessary permits prior to the commencement of site clearance in areas where protected plants are present. The permit applications will be supported by an Ecological Impact Assessment specialist study.

**An application will be submitted for the removal/disturbance of protected species within the application footprints.**

### **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**

<b>Section 21 Water Use</b>	<b>Possible Activities</b>
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.

**The project will require a Water Use License from the Northern Cape Department of Water and Sanitation ("DWS").**

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.

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

## **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.

**The project will not require a permit for the disturbance of heritage resources in terms of the NHRA.**

## **7. NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES**

### **7.1 Expansion of Regional Mining Development**

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 which will contribute to the development of mining development in the region. 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 mining right application will also be explored. The prospecting operations will therefore contribute to potential expansion of mining development which will unlock associated socio-economic benefits in terms of job creation, procurement, and local economic development.

## **7.2 Employment Opportunities and Human Resource Development**

Unemployment is a concern in both Tsantsabane LM and Gamagara LM with unemployment rates at 29.7% and 17.7% respectively. The immediate mining activities at MaCarthy will provide employment for approximately 300 persons during the operational phase. It is estimated that 100-150 persons will be involved in construction. Approximately 40 persons will at any time be involved in prospecting activities planned for the Western Properties. According to the Socio-Economic Impact Assessment, using the most recent average household size of 3.4 persons per household, we can deduce that the mine could directly support a maximum of 510 persons during the construction phase and 1 020 persons during mining.

It is estimated that 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, will be recruited from elsewhere in South Africa.
- Recruitment focus will be on the Tsantsabane and Gamagara Municipal areas.
- Historically Disadvantaged Individuals 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)

Employment opportunities will likely bring about increased disposable incomes for those who are employed due to the project. An increase in disposable income is often associated with enhanced standards of living.

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

## **7.3 Other Socio-Economic Contributions**

Zama Mining has, through their Draft Social and Labour Plan committed to a Local Economic Development spend of R16.9 million within 5 years after issuance of the mining right. Most of this expenditure will be targeted at infrastructure development for

communities, in collaboration with the local municipalities. Some of the projects include the following:

- Refurbishment of a school;
- Drilling of and equipping of boreholes for water supply;
- Co-funding the upgrading of a sewer pump station;
- Upgrade of selected internal streets;
- Extension of infrastructure for water supply; and
- Co-fund operation of Disability Centre.

Other contribution to economic development will be related to the following:

- The purchasing of local goods and services during construction and operations (fuel, food, cleaning services, maintenance, building material, etc.).

## **8. ALTERNATIVE IDENTIFICATION AND ASSESSMENT**

### **8.1 Initial Layout Planning**

The layout planning of the MaCarthy Section commenced with a desktop study to map environmental sensitive areas to assist with initial planning of the mine. The following factors were considered during the initial layout planning, the results are shown in Figure 8-1.

#### **8.1.1 Hydrological Features**

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

For the purposes of layout planning, all wetland areas and other watercourses (such as drainage features) were regarded as highly sensitive. This includes 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).

### **8.1.2 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.

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 has heritage significance (see Section 10.10). An agreement would still have to be entered into with the landowner should authorisation be granted for the project.

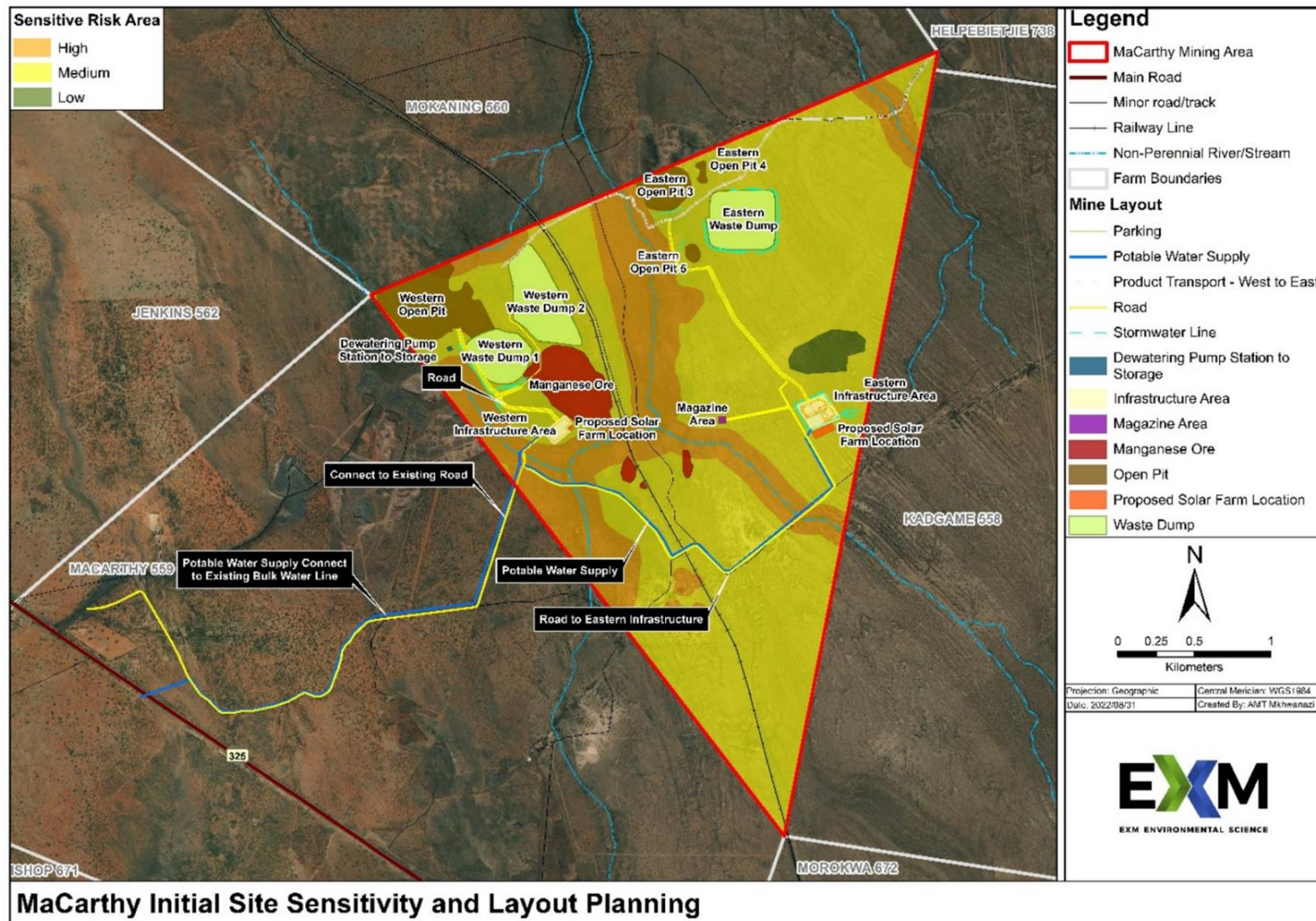


Figure 8-1: MaCarthy Initial Layout Planning in relation to Site Sensitivities.

## **8.2 MaCarthy Ore Transport Route Options**

Three alternatives were considered for the transport of iron ore from the site to Sishen mine as discussed below and illustrated in Figure 8-2.

### **8.2.1 Option 1 (R325 and N14)**

This option entails the transportation of iron ore via an access route through the adjacent Salene mine, linking to the R325 and then to Sishen mine (customer) via the N14 (Figure 8-2). Sishen could possibly be accessed via the Lylyveld North mining area, using the Dingleton Road (DR03333). This option would mean that there will be additional road truck traffic on the R325 and N14 which already have high traffic volumes. This route was originally under consideration, however, establishing an access road through Salene is not feasible. This is due to potential mining expansion activities at Salene. This route option may be considered in future. Additional environmental permitting requirements may also be applicable.

### **8.2.2 Option 2 (Minor Roads DR03333 and MN14146 – level crossing)**

The second and preferred option is to transport the ore via provincial gravel roads (DR03333 and MN14146) which then crosses the N14 towards the south of Sishen Mine (Figure 8-2). 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 Helpebietjie mine and the use of the road will require an agreement for trucks to pass through the Helpebietjie mining right area. The gravel roads are currently in good condition as adequate dust suppression and maintenance is conducted.

The trucks would however need to cross the N14 with a level crossing to access Sishen mine via Lylyveld North and this presents a safety risk. The trucks will then turn right at a second intersection where the DR03333 and the Lylyveld haul route cross. The Traffic Impact Assessment (J&G Kalahari, 2023) indicated that the risk will not increase significantly due to the additional trucks passing the N14 intersection and that vehicles crossing the N14 have less impact than vehicles leaving and entering the N14. This is due to the gap requirement for acceleration to safely join the N14. This option is preferred as no additional vegetation will need to be cleared and no additional traffic will be placed on public roads, except for the N14 crossing. The additional safety risk to existing road users due to dust and deterioration of roads is also low.

### **8.2.3 Option 3 (Minor Roads DR03333 and MN14146 - underpass)**

This option will follow the same route as Option 2, however, the option of using the river bridge as an underpass to eliminate a level crossing at the N14 was considered. This option



was not considered feasible due to additional environmental impacts on river systems and additional environmental permitting requirements, including WUL activities. The route will cross both SANRAL and Transnet servitudes as well as land tenure and proximity to mining related activities.

### **8.3 MaCarthy Internal Road Layout Alternatives**

The original (unmitigated) route that connects the eastern and western infrastructure areas has been revised in terms of the delineated water courses (Figure 8-3). The original route followed the existing farm track to avoid vegetation clearance to a certain extent. However, this route would be situated close to the microhabitats identified by the Freshwater Aquatic Assessment and potentially result in either direct impacts or edge effects. The new mitigated route will be situated outside the 100m buffer from the water courses and further away from the microhabitats identified. Even though the alternative route will entail more vegetation clearance, the area does not have high biodiversity value.

### **8.4 Electricity Supply Transmission Lines and Water Supply Pipelines**

As discussed in Section 5, water supply for the mining operations will initially be obtained from a water pipeline that will connect to the Vaal-Gamagara water supply scheme. The Sedibeng pipeline to which the supply pipeline will connect runs to the west of the R325 regional road. Therefore, a new pipeline will have to be established from the Sedibeng pipeline to the internal distribution lines. A servitude will need to be registered on an adjacent property to establish the new pipeline.

Zama Mining is planning to establish two Photovoltaic ("PV") Solar Facilities at both the eastern and western infrastructure areas on MaCarthy. A second option will be investigated, if the PV facility does not provide sufficient electricity supply. This option will entail the establishment of electricity transmission lines to connect to the Eskom grid adjacent to the R325 regional road. The three route options for the transmission line will run adjacent to the water supply pipelines and a servitude will also be required.

The three options for a pipeline/transmission line route are shown in Figure 8-4. Option 1 will run on the border of the western section Salene mine and Jenkins mine. An existing transmission line is situated in this area and interactions therewith must be considered. Option 2 will run straight through the Salene mining operations and interaction with mining activities will have to be considered. The third option will run on the border of Boskop mine and the eastern border of Salene mine. Although no infrastructure is located in this area, environmental impacts need to be considered.

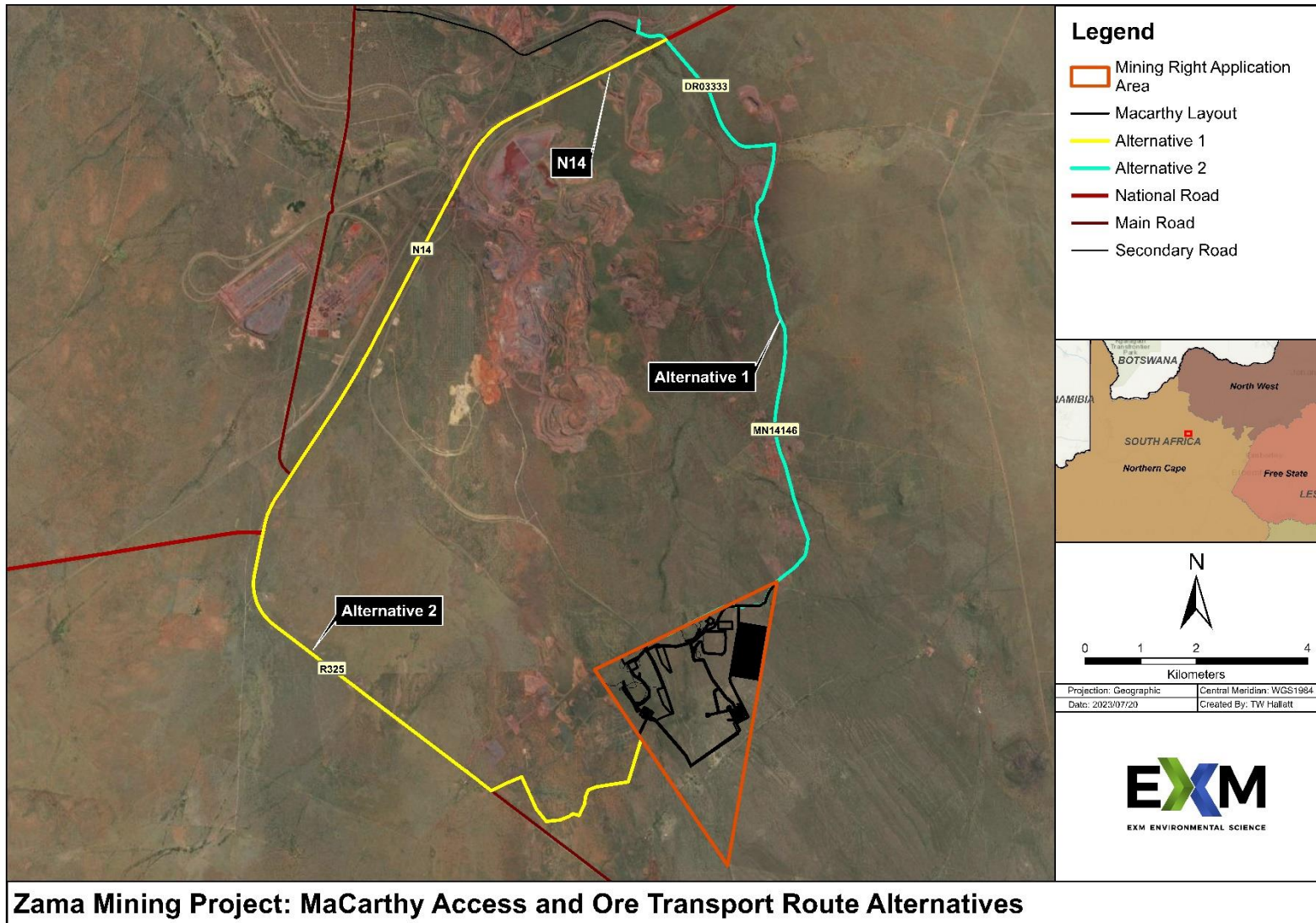


Figure 8-2: MaCarthy Ore Transport Route Options



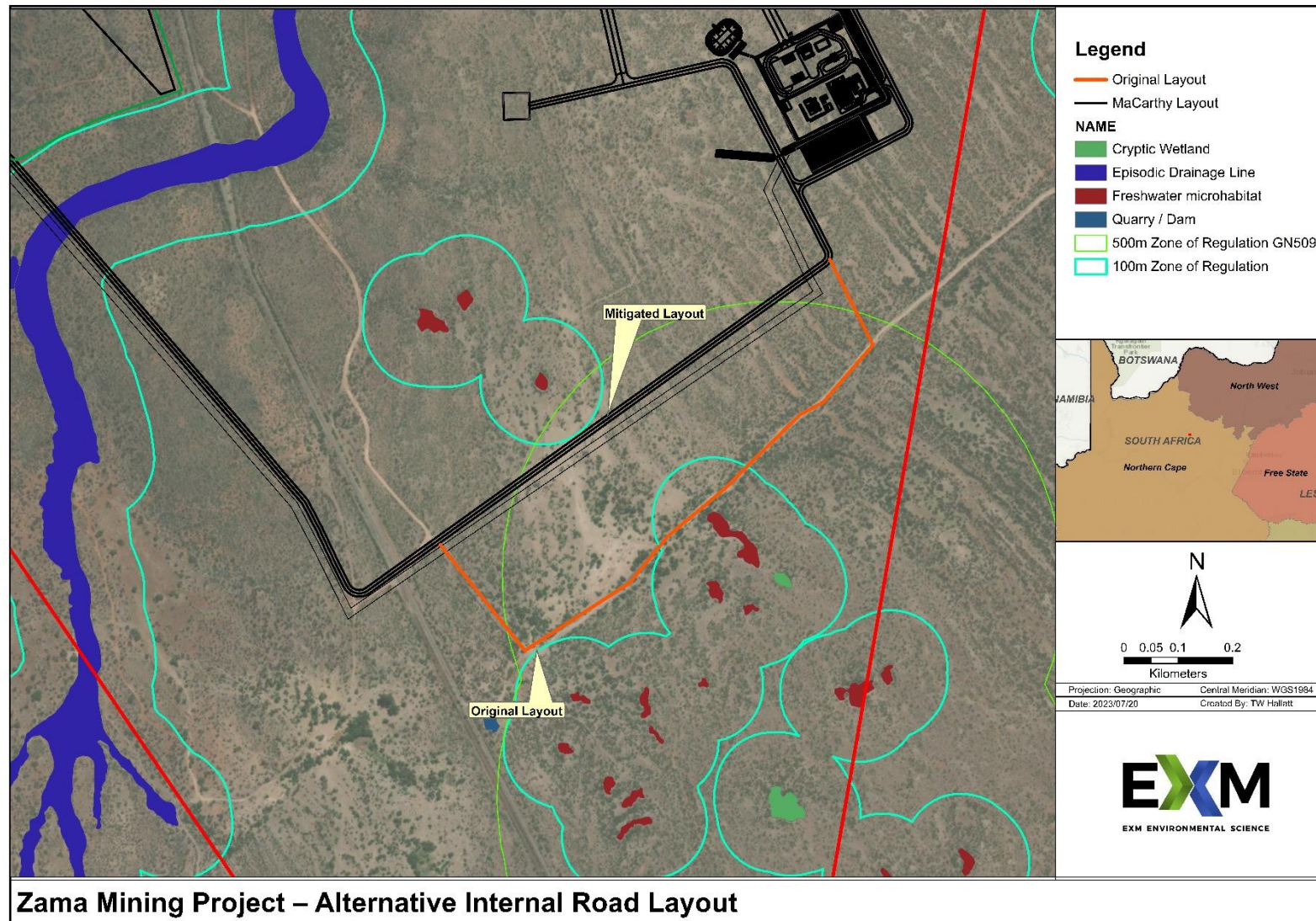


Figure 8-3: Internal Road Layout Alternative



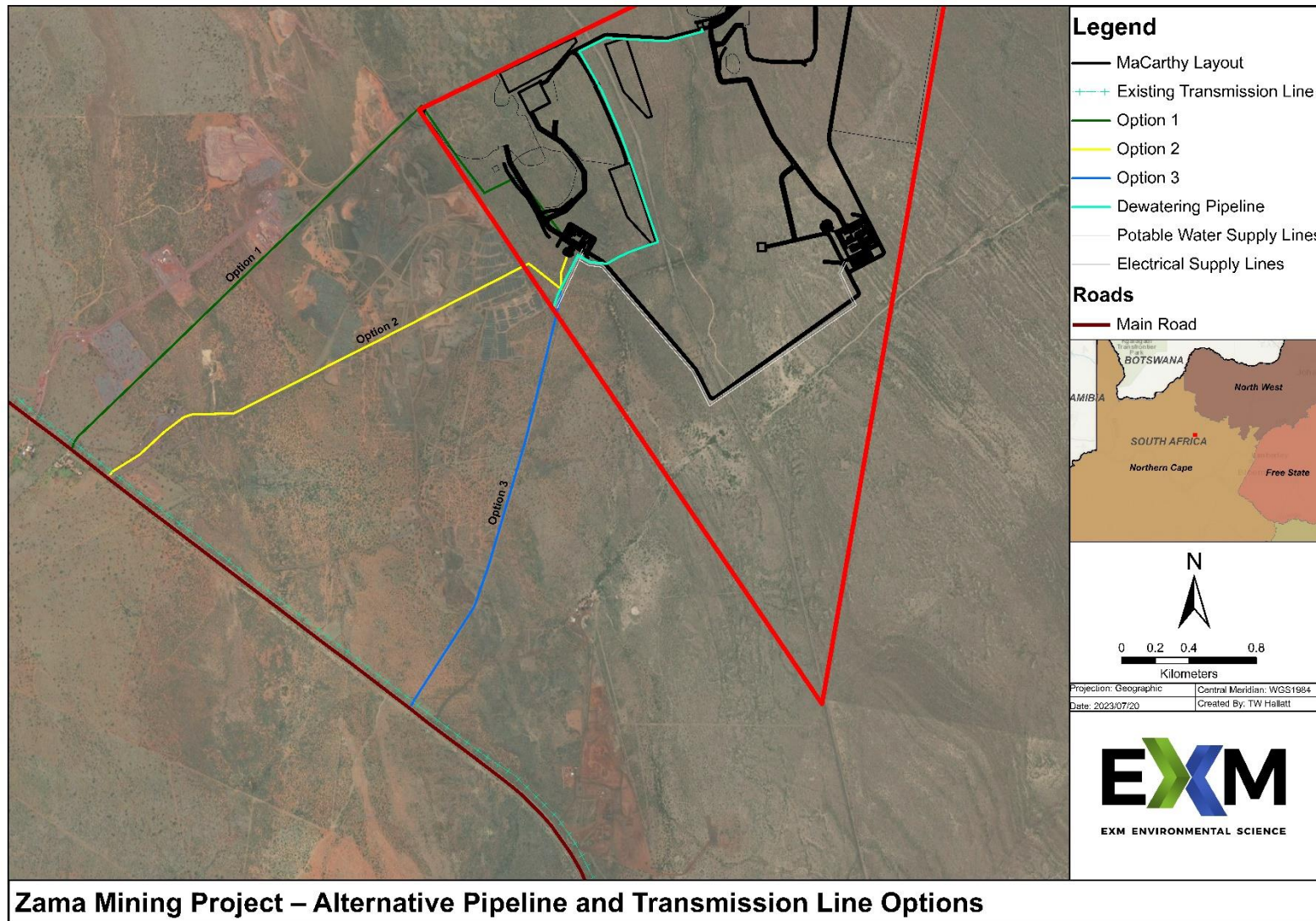


Figure 8-4: Alternatives for Water Supply Pipelines and Transmission Lines

## **8.5 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 authorised by a WUL application process.

## **8.6 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 disposal facility within the area. Should on-site disposal be preferred this will require licensing under the NWA and NEM: WA and will need to be appropriately designed and managed dependent on the pollution potential of the material.

## **8.7 Option of Not Implementing the Activity**

In accordance with the NEMA Regulations, the no-go alternative is required to be investigated and assessed. The no-go alternative would entail the non-continuation of the proposed mining project. This would mean that the socio-economic benefits associated with the project will be negated. The status quo will remain, and the no-go alternative would prevent any potential negative environmental impacts associated with the proposed expansion project, including the disturbance of surface water resources, removal of vegetation and associated biodiversity impacts, potential contribution to dust and noise generation, soil erosion, etc.

# **9. DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED**

A public participation process is conducted in terms of the Chapter 6 of NEMA and the EIA regulations. The purpose of the public participation process is to inform all the identified. Interested and Affected Parties ("IAPs") of the proposed development and associated EA application process and allow them to raise comments/concerns.

## **9.1 Identification of interested and affected parties**

An IAP database (**Appendix B1**) has been created for the purposes of this project.

Potential IAPs were identified based on the definition of IAPs in the EIA regulations:

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 was 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 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:
  - Northern Cape: Department of Fisheries & Forestry
  - Northern Cape: Department of Mineral Resources and Energy
  - Northern Cape: Department of Land Reform and Rural Development
  - South African Heritage Resources Council
  - Northern Cape: Department of Water & Sanitation
  - Vaal River Proto - CMA
  - Northern Cape: Department of Fisheries & Forestry
  - Northern Cape: Department of Land Reform and Rural Development
  - Northern Cape: Department of Economic Development and Tourism
  - Department of Roads and Public Works
  - Department of Social Development

- South African Heritage Resources Council
- Civil Aviation Authority
- Northern Cape Department: Co-Operative Governance, Human Settlements and Traditional Affairs
- Northern Cape Department of Agriculture
- Department Of Environment and Nature Conservation
- Northern Cape: Department of Water & Sanitation
- Persons who responded to the Background Information Document (BID), press advertisements and site posters.

The BID/Notification letter is provided in **Appendix B2**.

## **9.2 Notification of Interested and Affected Parties**

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 notifications are provided in **Appendix B5**. Persons on the IAP database was notified of the project by:

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

## **9.3 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- **Appendix B4**) 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 and Kathu on Wednesday, 7 September 2022.

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

#### **9.4 Public and authority meetings**

A meeting was held with the landowners on the 8<sup>th</sup> of November 2023 to share information regarding the project and also to allow the IAPs to raise comments and concerns. A subsequent meeting was held with the Kumba Iron Ore Land Management Department to discuss potential impacts on specific farms under their control. The minutes of the meetings is included in **Appendix B7**.

An open public information-sharing meeting will be held during the EIA phase of this project.

#### **9.5 Review of Scoping Report and EIR**

The draft scoping report was 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. The final scoping report was also provided to all IAPs, identified since the first commenting period, during January and February 2023. The draft EIR was also made available for public review from **Wednesday, 26<sup>th</sup> July 2023 to Saturday, 26<sup>th</sup> August 2023** (30 calendar days, excluding one public holiday).

Written comments and responses received to date are provided in Table 9-1 and proof of these notifications are provided in **Appendix B7**.



## 9.6 Summary of issues raised by IAPs.

The following only provides a summary of the comments received and responses provided. Please refer to Appendix B6, for the full comments and correspondence with IAPs and authorities.

**Table 9-1: Summary of Comments / Issues raised by IAPs.**

Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
<b>Background Information Document (BID) Phase</b>			
25 May 2022	Mnr Maritz	Landowner unaware of prospecting rights on his land.	EAP noted comment and ensured landowner would receive all future correspondence.
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.
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.
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.
9 July 2022	DF Malan	Landowner requested more information about the applicant.	EAP sent information document and maps to landowner.
2 September 2022	Elize Nel	Elize, from Tshiping, identified themselves as an interested party, and requested to be notified throughout the project.	Contact details have been added to the IAP database. BID was sent.
2 September 2022	JC Wessels	Requested further information.	EAP provided further details, as requested. BID was sent.
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.
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.
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.
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.
6 September 2022	Albertus Viljoen	Requested to be registered as an IAP.	Confirmed receipt of email and added details to IAP database. BID was sent.
8 September 2022	Tanja Jooste (M And S Consulting (Pty) Ltd	Requested to be registered as an IAP.	Confirmed receipt of email and added details to IAP database. BID was sent.
8 September 2022	Leon Venter	Requested a copy of the draft Scoping Report	Draft Scoping Report was sent.

Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
8 September 2022	AB Van Der Walt	Requested a copy of the draft Scoping Report	Draft Scoping Report was sent.
9 & 14 September 2022	Marc Caplan	Provided a detailed list of questions	Initial response provided to queries on 4 November 2022. See appendix B6.2.2.
12 September 2022	Thato Rapelang Gamagara Municipality	Local Requested clarity on the: Social and Labour Plan; Local Enterprise Development; & Capacity Development Programme.	It was clarified that there is ongoing consultation with the Gamagara Local Municipality with regards to the LED initiatives. in which the party was already a participant.
14 September 2022	Willie Uys	Registered as an IAP and indicated that the prospecting right has already been renewed and thus the law does not allow for a prospecting right to be issued.	Responded on 14 September 2022 and committed to meeting with the landowner. A meeting was held with Mr Uys, Kerry Fairley (of EXM) and Charl Gous (of Kumba Geosciences) at his home on 13 October 2022. At the meeting Mr Uys's queries were addressed.
15 & 20 September 2022	DF Malan	Requested a copy of the Draft Scoping Report. Comments were provided on the 20 <sup>th</sup> of September 2022. He expressed concern regarding the financial impact on his business Langberg Stene which is within the mining right area as well as the impact on farming activities and small businesses. He indicated his intention to oppose the application.	The scoping report was resent on 15 September 2022 (it has been sent on 8 September 2022). It was indicated that the concerns raised with respect to livelihoods and local business would be further assessed in the EIA. It was also reiterated that the mining activities would be limited to the Farm MaCarthy, and prospecting would only take place within the prospecting priority areas, and this would be in agreement with the landowner. It was explained that should the right not be granted; the rights revert to the state and there may be future applications for prospecting or mining on the properties. Opposing the application thus does not necessary remove the risk of an application for a right on the properties.
20 September 2022	Deon Kotze	Indicated that all correspondence for Ntsu Trading, a neighbouring mining operation needs to be forwarded to him.	It was confirmed that the details had been captured accordingly.
21 September 2022	Dirk Coetzee	Provided details of the persons to be contacted as the landowners of affected property.	The request was acknowledged, and the details updated accordingly.
26 September 2022	Arthur Williams	Raised concerns regarding the impacts of mining activities and indicated that water levels should be monitored, the impact of dust on the health of persons, animals, and plants as well as the need to maintain fencing. He indicated that roads would need to be maintained. He indicated that monitoring should be done through a forum that is put in place by the mine. He also indicated that the social impacts need to be considered. He suggested that these were only the initial comments.	It was indicated that the impacts noted would be considered through specialist studies to be undertaken as part of the EIA process. The suggestion of a monitoring forum will also be considered.
10 October 2022	Welda Fourie	Clarification was sought as to how Zama Mining still held a valid prospecting right, given that the right was issued in 2013 for 5 years and had been renewed for a further 3 years. It was requested that they be part of all further	It was explained that the period can be longer due to the time taken for the renewal to be issued by the DMRE. As a landowner and registered IAP, Mrs Fourie will be privy to all communication.

Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
		communication. Several concerns were raised about access to the land and the handling of such access and any impacts that prospecting may have on the land.	It was indicated that no access will take place without an agreement in place which will clearly address the concerns.
3 November 2022	Japie Van Zyl Attorneys on Behalf of Ollie Smith	<p>Objected against the Mining Right application:            Raised concerns that the applicant did not notify Mr. Ollie Smith in writing of the Mining Right Application. Was not provided with an opportunity to submit comments on the scoping report. Was not notified of the public participation process. Was not provided with the information in relation to the application.            Requested a list of information.            The full objection letter is included in Appendix B6.</p>	<p>A preliminary response was provided to the letter received. The requested information was proved. It was advised that all other documents related to the EIA and WUL will be provided as the process continues and the final scoping report will be provided during the process. Preliminary proof of consultation will be included in the scoping report and proof of further consultation will be included in the final scoping report and EIA report. It was explained that the public consultation process in support of the EIA is on-going and all documents in support of the EIA will be provided for comment as the process continues.</p> <p><b>7 NOVEMBER 2022</b>            Good day Ms Jordaan            We hereby acknowledge receipt of your email and objections, dated the 3rd of November 2022, and confirm that we will respond formally.</p> <p>Please find attached hereto the documents that have been communicated on the project to date.            Please take note of the meeting that will take place tomorrow to discuss the Zama mining right application.            The details of the meeting are as follows:            Date: Tuesday 8 November 2022            Time: 15h00-17h00            Location: Glosam Mine.            The formal invitation to the meeting will be send to you via email. Please don't hesitate to contact us if you have any questions in this regard.            KIND REGARDS</p> <p><b>19 DECEMBER 2022</b>            Good day,            The letter received on the 3rd of November 2022 relating to the Mining Right Application for Zama Mining Resources (Pty) Ltd has reference. Herewith, please find attached a preliminary reply to the letter and a detailed reply will be provided in due course. Also find attached information requested. The Regulation 2(2) plan can be obtained from the link below with a list of properties. Please note that all other documents related to the EIA and WUL will be provided as the process continues. As per the previous communication, the draft scoping report was sent on the 7th of</p>

Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
			November 2022 and the final report will be provided during the process. Preliminary proof of consultation was included in the scoping report and proof of further consultation will be included in the final scoping report and EIA report. Regulation 2(2) Kind Regards Trevor
3 November 2022	Izak Potgieter – Duncan – Rothman Attorneys	Requested the status of the mining right application	It was advised that the mining rights application has been submitted and we are awaiting feedback from the DMRE. The EIA process is currently in the Scoping phase and that the status of the project will be further discussed at the meeting.
3 November 2022	Julian Combrinck – Milnex Environmental Consultants	Requested to be registered as an I&AP. Requested the following documents: 1. Mining Program. 2. The relevant reports. 3. Acceptance letter from the DMR. 4. Recognition of the environmental authorization application. 5. Any other relevant documents related to the said application.	It was confirmed that Milnex will be registered as an I&AP. The requested information was provided via email. It was explained that Zama Mining is still waiting acceptance of the mining right and environmental authorisation. The water use licence application process has commenced. The mine works programme is not part of the environmental authorisation process and were thus unable to share it.
<b>Draft Scoping Report Phase</b>			
13 January 2023	Samuel Willemse	Requested an electronic version of the EIA	IAP was advised that only the BID and draft scoping report was available at that stage, which was sent to him, and that he would receive the EIR in due course.
23 January 2023	Jaco Lambrechts and Dawie Smit Kumba Iron Ore – Land Management	A teams meeting was held with representative of Kumba Iron Ore – Land Management. Concerns was raised why they were only informed of the project at this stage. It was stated that it is important that Zama should understand that Mamaghodi needs to continue with their activities. Zama should acknowledge that Mamaghodi will proceed with their activities and future developments and will not object to it. It was further stated that the KIO – Land Managements objections needs to be noted in the agreement with Zama. It was suggested that EXM should provide the list of activities and expansions on Mamaghodi, the expansions potential as well as the 5-year plan to Zama and include it in the agreement.	It was agreed that it is important to ensure that the rights of the land user are protected in the EIA processes and also that the I&APs are updated on a regular basis. It was confirmed that Kumba Land Management will be informed as the process continues and will be provided opportunity to comment on all documents (Appendix B5.1).

Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
14 March 2023	Pierre De Ath	Requested an electronic version of the reports.	All reports to date have been sent to Mr. De Ath.
14 March 2023	Natasha Higgitt	Requested all reports and specialist studies be submitted on SAHRIS.	All reports and specialist studies to date has been submitted on SAHRIS, with the initial application made on the 15 <sup>th</sup> of May 2023. The draft EIR, heritage and palaeontology study have also been submitted.
14 March 2023	Welda Fourie	Requested an electronic version of the reports.	All reports to date have been sent to Mrs. Fourie
<b>Draft EIR Phase</b>			
15 August 2023	Julian Combrinck – Milnex Environmental Consultants	<p>Provided a detailed list of questions.</p> <p>1. MaCarthy Mine Layout and Zama Mining Project Layout  1.1. Figure 3.1 (Page 9 of the draft scoping report) – the “MaCarthy Mine Layout” does show a layout of the mining infrastructure, however, Figure 5.1 (Page 17 of the draft scoping report) – “Typical Drill Site Layout” does not show a layout of mining infrastructure on the relevant site, to properly assess what will take place on site and what the drill layout will look like in relation to other infrastructure like the mentioned sump area, chemical storage area, vehicle parking area and the Wendy house. This current map will not enable the responsible authority to make a properly informed decision of the described impacts. It also does not show the reader what the extent of physical disturbance will be.</p> <p>2. MaCarthy Open Pit Mine (Equipment)  2.1. Page 13 of the Scoping Report (SR)  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:</p> <ul style="list-style-type: none"> <li>• Bush clearing and topsoil removal.</li> <li>• Drilling and Blasting</li> <li>• Overburden Removal (pre-stripping &amp; internal waste) and hauling to the waste rock dumps.</li> <li>• Drilling and blasting of ore and hauling to the ore rehandling areas for loading onto road trucks.</li> </ul> <p>(a) Comment:  The above statement is made highlighting the steps in the mining process to be followed at the MaCarthy Open Pit Mine, however the volumes of hazardous goods and liquids as well as the number of diesel machines to work on the site is not mentioned. It is not stated where these machines will refuel and what volume of fuel will be needed or how much of this will be stored on site including</p>	<p>1. The MaCarthy mine layout (Figure 5.3 on Page 20) as well as the project description provided in the Environmental Impact Report (“EIR”) provides sufficient details of the project to ensure the associated impacts were identified and assessed. Comprehensive mitigation measures were included in the Environmental Management Programme (“EMPr”) to ensure that the impacts are adequately managed. The extent of the physical disturbance is clearly shown as per the layout. The Typical Drill Site Layout (Figure 5.4 on Page 22). provides a conceptual layout of the drill sites and the description of the drilling sites and process in Section 5.2.4 of the EIR provides more details which is sufficient to identify and assess associated impacts.</p> <p>2. The EIR (Section 5.2.2) contains the volumes of diesel that will be stored on site and does include a description of the refueling that will be undertaken at the eastern infrastructure area. Approximately 320 m3 of diesel will be stored on site at the eastern infrastructure area in two separate tanks which will be placed in appropriately banded areas to capture any spillages. The refueling bay will be located in the dirty water area and all runoff will be diverted to the Pollution Control Dam (“PCD”)</p> <p>3. This comment is noted. Comments regarding the listed activities are address in Appendix A of this letter.  The EIR (Table 5.4) contains the volumes of water that will be required for the MaCarthy mining development. The reference number (DWS Reference: WU26789) for the WUL application is provided in Section 1.2.3 of the EIR as proof of the process being undertaken. All IAPs are also informed of the WUL application process and will be informed of the decision from the Department of Water and Sanitation (“DWS”).</p> <p>4. Section 11.2.1 of the EIR as well as the atmospheric impact report (inclusive of a dispersion model) (Airshed, 2023) has described and assessed the potential emissions and associated impacts as a result of the project. The study found that exceedances of the National Ambient Air Quality Standards (“NAAQS”) and National Dust Control Regulations are not</p>

Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
		<p>volumes of hazardous goods and liquids to be stored on site.</p> <p>3. Listed and Specified Activities</p> <p>3.1. Pages 3, 11, 12, 13 &amp; 14 of the Scoping Report (SR)</p> <p>The EAP in their report refers to the following listed activities:</p> <ul style="list-style-type: none"> <li>• Environmental Impact Assessment Regulations (GNR. 982 of 4 December 2014, as amended) for Activities 1, 9, 10, 14, 14, 17, 27 &amp; 56 of Listing Notice 1 (GNR 983) and Activities 4, 6, 15, 17 &amp; 27 of Listing Notice 2 (GNR 984).</li> <li>• 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.</li> <li>• Section 2(a), (c&amp;i), (g) and (j) of the National Water Act (No. 36 of 1998) for water uses associated with the mining activities.</li> </ul> <p>(a) Comment Listing Notice 1 (GNR 327), Activity 24: Proposed activities included for the mining right within the scoping report is the creation of access roads/export-import pipelines and servitudes, site roads, internal roads, and site access roads. However, the following listing activity which is applicable was not applied for.</p> <p>(b) Comment Listing Notice 2 (GNR 325), Activity 19 (Amended GNR 517: 2021): Zama Mining Resources (Pty) Ltd (Zama Mining) is applying for a mining right for the mining and removal of Iron Ore, Manganese, Diamonds, Including Base Metals: Copper, Lead, Zinc, Aluminium, Nickel, Tin, Rare Earth Elements and Barium on various properties, however the following listed activity which is applicable was not applied for:</p> <p>(c) Comment Listing Notice 3 GNR 324, Activity 4: The creation of access roads/export-import pipelines and servitudes, site roads, internal roads and site access roads will be created in a Critical Biodiversity Area (CBA), however the following listed activity which is applicable was not applied for;</p> <p>(d) Comment Listing Notice 3 (GNR 324), Activity 12: The proposed development has the potential to result in the loss of indigenous vegetation because of utilising articulated dump trucks and diesel hydraulic excavators</p>	<p>expected at any of the identified receptors. No significant air quality related impacts are expected as a result of the mining and prospecting activities. The mitigation included in the EMPr is sufficient to manage potential air quality impacts.</p> <p>5. Section 11.2.2 of the EIR as well as the noise impact report (inclusive a model) (Airshed, 2023) has described and assessed the potential increase in noise levels and associated impacts as a result of the project. Noise levels due to project operations are predicted to be within the day- and night-time International Finance Corporation ("IFC") noise guideline for residential and industrial areas at all residential receptors within the study area. (Figure 11 4 and Figure 11 5).</p> <p>Noise impacts associated with the proposed MaCarthy mining project has a significance rating of medium prior to the implementation of mitigation measures and will be reduced to a low impact significance after mitigation has been considered. The mitigation included in the EMPr is sufficient to manage potential noise related impacts. The closure plan and mitigation included in the EMPr has addressed socio-economic impacts due to mine closure after the project life span has been completed.</p> <p>6. The alternative assessment in Section 8.2 of the EIR revealed that the preferred and chosen alternative is to utilise the provincial roads (MN 14146 and DR 03333) north of the site. The route will cross the N14 at one point. The Traffic Impact Assessment revealed that the additional trucks on the provincial roads and crossing the N14 will not result in significant impacts on road users or road conditions.</p> <p>7. A Geohydrological Assessment (Gradient, 2023) was undertaken by Gradient (2023) to determine the impact of the dewatering activities associated with MaCarthy on the aquifer yield. The study also focused on potential impacts related to seepage from Waste Rock Dumps ("WRDs") and groundwater quality. The impact assessment (impact ratings) indicates that the dewatering activities has the potential to have a high impact significance on the aquifer yield during the operational phase. However, it was found that no groundwater users (identified in the hydrocensus) are located within the impact zone that could be affected by the dewatering activities. The potential impacts associated with seepage from the WRDs and backfilled areas will have a moderate significance.</p> <p>The study also found that the mining development does not pose a significant risk in terms of groundwater quality. The study included a pollution plume model in the groundwater assessment</p>

Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
		<p>in addition to bush clearing and topsoil removal as well as drilling and blasting. Therefore, the following listed activity which is applicable was not applied for;</p> <p>(e) Comment Listing Notice 3 (GNR 985), Activity 14: The proposed development has infrastructure or structures with a physical footprint of 10 square metres or more. The total extent of mining activities is ±43 557.57 hectares, mining activities will occur (a) within 32m of a water course, (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. Therefore, the following listed activities which are applicable were not applied for;</p> <p>3.2. Pages 4 &amp; 21 of the Scoping Report (SR) Water Use Licence Application The scoping report (SR) mentions an application for a water use licence. 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 (Table 6-1: Possible Water Use Activities for mining at MaCarthy)</p> <p>(a) Comment No indication of the expected water volumes to be used is made or whether the volumes of water needed are indeed available for the above-mentioned water uses. Furthermore, no mention of the location as well as source in which water will be obtained is provided/mentioned keeping in mind a second adjacent prospecting area (Western Properties). No mention about the quantity of water needed for dust suppression and whether such volume of water is in fact available. No water balance is available in the document.</p> <p>In addition, proof of submitting an application with the Department of Water and Sanitation for a water use licence is omitted from this scoping report. In the event that no registration / authorization exists, an application for a Water Use License should be applied for before the commencement of a water use in accordance of the NWA of 1998.</p> <p>4. Air Quality 4.1. Page 20 of the Scoping Report (SR) 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</p>	<p>which indicated that the groundwater plume will not affect any receptors (groundwater users identified in the hydrocensus) and concentrations are not expected to be of concern post-closure. The EMPr and groundwater assessment contains measures to monitor potential impacts on groundwater users in the area.</p>

Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
		<p>Standards (NAAQS, GNR. 1210 of 24 December 2009). The regulations/standards provide limits for PM10 and dust fallout in residential and industrial areas.</p> <p>Page 53 of the Scoping Report (SR)</p> <p>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.</p> <p>(a) Comment</p> <p>No indication is given of what levels of dust emissions can typically be expected or what sources of dust emissions will be on site e.g.: vehicle traffic, blasting, wind erosion from stockpiles, etc. No mention is made of whether iron ore dust from the site might be harmful to health or the health hazards that arise due to exposures to the ore and the possibility to cause damage to vehicles. Keeping in mind not only Iron Ore is expected to be mined, but in addition to Iron, other minerals like Manganese, Diamonds, Including Base Metals: Copper, Lead, Zinc, Aluminium, Nickel, Tin, Rare Earth Elements and Barium are all expected to be mined.</p> <p>5. Noise</p> <p>5.1. Page 14 of the Scoping Report (SR)</p> <p>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. -</p> <p>Page 55 of the Scoping Report (SR)</p> <p>Table 11-1: Noise Levels recorded near MaCarthy.</p> <p>(a) Comment:</p> <p>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 as per the above Table 11-1, however the scoping report does not provide noise levels at the MaCarthy site specifically night-time and day-time noise to be generated. Furthermore, based on the above noise levels at neighbouring receptors the scoping report does not state whether</p>	



Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
		<p>operations at MaCarthy are expected to be a 24/7 mining operation or a during the day mining operation.</p> <p>There is no indication to the planned or proposed shifts for employees based on the above night-time and day-time noise levels. A shift work system or a work schedule that is performed in rotations. For example, while some employees might fill a role during the day, others might work night or early morning shifts.</p> <p>(b) Comment: The higher number of job opportunities are only for operational activities, based on the rules for having a mining right approved and extended. It does not state what happens after that to the land or the job opportunities created after closure.</p> <p>6. MaCarthy Ore Transport Route Options 6.1. Page 55 of the Scoping Report (SR) 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.</p> <p>(a) Comment: If the product/ore will be trucked via an existing road linking to the R325 and via the N14 and the Dingleton Road (DR03333), the probability to experience high traffic volumes is likely to be high. This impact is not assessed under the operational phase. If other mines are using the same road for trucking, the cumulative impact will be significant and probably very high. In addition to this, the safety risk to road users due to interaction with large trucks is not discussed and thoroughly assessed. We contest that the traffic impact will be high under operational conditions and a cumulative impact will also be high.</p> <p>7. Groundwater 7.1. Groundwater Vulnerability Page 55 of the Scoping Report (SR)</p>	

Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
		<p>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).</p> <p>7.2. Aquifer Type Page 55 of the Scoping Report (SR)</p> <p>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.</p> <p>(a) Comment We contest that the potential impact on groundwater is potentially high if a groundwater study to be conducted cannot prove the contrary. It is not clear how aquifers will be protected.</p>	
15 August 2023	Marc Caplan	Queried if an avifaunal study was undertaken as he is about the cumulative effects of all the mines in the watershed.	Mr Caplan was informed that an individual avifaunal study was not undertaken but that the biodiversity studies included aspects of avifaunal species.
21 August 2023	E Swart- DAEARDLR	<p>Provided a list of recommendations. Comments on the MaCarthy-Zama mining project proposed for the Remaining portion of the Farm MaCarthy 559:</p> <p>1.1 This department strongly opposes the decision to rate the significance of the impact on biodiversity flora in the Environmental Impact Assessment Report (EIR) as low post mitigation due to the following reasons:</p> <p>1.1.1 The activities (i.e., 5 open pits of 31.2 hectares in total, 3 waste rock dumps of 41 hectares in total and additional mining infrastructure) planned for the mining area, of</p>	<p>A formal response was provided on in August 2023. This can be found under the proof of notifications.</p> <p>1. Impact significance ratings The comments and recommendations regarding the significance ratings on Biodiversity (Flora) is duly noted. The significance ratings in the executive summary of the Environmental Impact Assessment Report ("EIR") do not reflect the outcome of the detailed assessment as indicated in Table 12.4 on Page 145. The significance rating has been determined as Moderate post mitigation as per the outcome of the Biodiversity Specialist Study.</p>

Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
		<p>which the majority is classed as either being of medium or high (site) ecological importance (Fig. 1 &amp; Fig. 2), will lead to the direct loss of intact, functional, special habitats (e.g. "koppies" identified as habitats for specialist species that also provide climate change refugium), keystone species (e.g. <i>Boscia albitrunca</i>, <i>Vachellia erioloba</i>, <i>Olea europaea</i> subsp. <i>africana</i>) and endemic species (e.g. <i>Searsia tridactyla</i> and <i>Tarchonanthus obovatus</i>) species.</p> <p>1.1.2. Furthermore, the department is of the opinion that the corresponding mitigation measures (e.g., "Clearly demarcate construction footprint prior to commencement; vegetation clearance only allowed in demarcated and approved footprints; obtain permits for the removal/relocation of protected species, etc.") will hardly render the ambitiously anticipated "low impacts" given the fact that irreversible impacts will be imposed on these habitats of high ecological significance.</p> <p>1.1.3. Moreover, the EIR failed to quantify the impacts of the proposed mining project on the special habitats as well as the keystone and endemic species mentioned under 1.1.1, i.e., the specialist reports have not provided significant scientific context to assist decision making in this regard as no interpretation of species function, ecosystem function and landscape functionality have been considered or discussed in an interrogative manner to guide sound impact evaluations.</p> <p>1.1.4. As a result of the above, residual impacts* due to habitat fragmentation and cumulative impacts on biodiversity, ecological corridors, ecological infrastructure, important habitats, unique ecological features, strategic water source areas, etc. has been under assessed and this department is of the opinion that the current proposed mitigation measures appear to be somewhat inadequate in sufficiently addressing the proposed impacts on biodiversity.</p> <p>1.2. Recent spatial analysis done by this department has revealed that the eastern part of the Northern Cape, more specifically the Kuruman Mountain Bushveld and Kuruman Thornveld vegetation types that is associated with the proposed mining area (Fig. 1), is under higher land transformation pressures than reflected in the National Biodiversity Assessment report (2018), Mucina &amp; Rutherford (2006) and the 2016 CBA map (which is currently been</p>	<p>This was due to the fact that the area provides important niche habitat for floral and faunal species and several plant (more than 20) and animal species that are nationally and provincially protected were recorded in the MaCarthy project area. The majority of the project area is also located on an Ecological Support Area ("ESA"). The executive summary of the EIR has been corrected to reflect the outcome of the EIA.</p> <p>2. Biodiversity Offsets</p> <p>The recommendations regarding the development of a Biodiversity Offset Report was assessed in detail. Section 11.4 of the EIR has been updated to elaborate on the characteristics of the residual impacts related to the presence of the ESA and Special Biodiversity Features ("SBF") on site that will be impacted as a result of the mining development. The EIR concluded that there is a need for a biodiversity offset in line with the National Biodiversity Offset Guideline (2023), as a result of the residual impact on biodiversity being moderate. A recommendation has been added to the EMPr to develop and implement a biodiversity offset in line with the Biodiversity Offset Guideline and the EIR contains a recommendation to include a biodiversity offset as a condition in the Environmental Authorisation ("EA"). A detailed memorandum will be provided to the Department to clarify the rationale and extent of biodiversity offsetting for the project.</p> <p>3. Groundwater Impacts</p> <p>The Groundwater Assessment (Gradient, 2023) indicated that there are temporary perched, riverbed aquifers present on the site which is located in the riparian zone surrounding the drainage lines and rivers. This primary alluvial sand aquifer is directly recharged during rainfall events and is limited to a zone of variable width and depth, largely determined by the depth and extent of the calcrete and pebble beds. From the local groundwater levels and subsurface lithology, it is assumed that this aquifer only contributes to river flow directly following significant rainfall events. Loss in contribution to baseflow will be minimal as the current groundwater contribution to baseflow is insignificant. The dewatering at MaCarthy will not impact on the temporary perched, riverbed aquifers, only on the deep and intermediate deep aquifer system. Biodiversity associated with the drainage systems will therefore not be affected by the dewatering activities.</p> <p>Please do not hesitate to contact me should you have further comments/enquiries.</p>

Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
		<p>reviewed). It should further be noted that the references used for ecosystem (vegetation units) conservation status and extent of transformation are thus outdated, and it's important to acknowledge that significant developments have transpired since the time of its publication. Furthermore, the fact that land degradation was excluded during the analyses of the ecosystem conservation status assessments (ref. NBA 2018) means it does not encompass the entirety of the situation, warranting a more comprehensive analysis during the Environmental Impact Assessment (EIA) process (ref. Figure 3).</p> <p>1.3. The proposed mining area is associated with a tributary of the Ga-Mogara River and several pan systems comprising +47 ha of the total extent of the property. What is quite worrisome is that this proposed mining project will further contribute to the quite severe, existing, impacts of mining downstream on the on the Ga-Mogara (which flows into the Kuruman). Even though stringent mitigation measures (which includes buffer areas around these surface water resources) is proposed, this department is of the opinion that the impact of dust settling on the surface water resources, which are often very limited within these arid regions, will still be quite severe.</p> <p>1.3.1. In arid regions, small changes in sediment dynamics and hydrology can have significant consequences. Dust settling can affect water flow patterns and sediment transport in water bodies.</p> <p>1.3.2 Mining activities can contribute to soil erosion, and dust settling can exacerbate erosion and sediment runoff, potentially impacting downstream water bodies.</p> <p>1.3.3 The cumulative effects of multiple mining operations in arid regions can intensify the impact of dust settling on surface water resources. The scarcity of water resources in arid regions can make these impacts more pronounced.</p> <p>1.3.4 It is thus important to conduct region-specific studies to understand the unique interactions between mining activities, dust settling, and surface water resources in the dry, arid Northern Cape.</p> <p>EAP Response:</p> <p>2. Comments on the Western Prospecting Priority Areas-Zama mining project proposed several properties as indicated in</p>	

Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
		<p>2.1 This department strongly opposes the decision to rate the (site) ecological importance (SEI) of the <i>Vachellia erioloba</i> – <i>Stipagrostis uniplumis</i> woodland (Fig. 4) as Medium (Fig. 5) even though it received similar high rankings as the other 3 identified habitat units for the categories:</p> <p>Conservation Importance, Functional Integrity &amp; Biodiversity Importance. The lower ranking is justified to the fact that its resilience to receptors is regarded as seemingly higher as opposed to the other habitat units.</p> <p>2.1.1 <i>Vachellia erioloba</i>, together with <i>V. haematoxylon</i> which also occurs in the area, are known keystone species and plays a critical role in the ecological system in terms of the following:</p> <ul style="list-style-type: none"> <li>• Their canopies provide shelter for a variety of birds, insects, and mammals. Birds often build nests in its branches, contributing to local avian diversity.</li> <li>• The species' presence supports a range of animal species, from insects and reptiles to mammals and birds. It contributes to the overall biodiversity and ecological balance of arid ecosystems.</li> <li>• The species' contribution to soils nutrient level influences towards more fertile surface soils.</li> </ul> <p>2.1.2 Although these protected trees will not be physically removed from the system during prospecting, the impacts that drilling and noise will have on the functional benefits of the trees to local faunal population (as mentioned above) will be heavily impacted on as the latter is not as "resilient" as regarded.</p> <p>2.1.3 If mining is to be pursued post prospecting, the former will have devastating impacts on the wider ecological function of the above-mentioned species and a Biodiversity Offset will be inevitable.</p> <p>2.2 In addition to the surface water concerns highlighted for the McCarthy project (under 1.3 above), the same applies to that of the Priority Prospecting Area (see Fig. 4).</p> <p>2.3 Even though the proposed prospecting area is associated with a Strategic Water Source Area (Sishen / Kathu), the specialist failed to incorporate the latter into the assessment and hence a decision made based on the current information as per the EIA will be one based on incomplete information.</p> <p>Recommendations:</p>	

Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
		<p>a) A specialist report must be provided on the aquifer systems' inter-connectivity, its catchment area and recharge rate, and the impact zone should the mining activities continue.</p> <p>b) This department is of the opinion that the residual impacts for the proposed MaCarthy mining projects is more significant than what is anticipated and hence a Biodiversity Offset Report must be done. The Biodiversity Offset Report should quantify the impacts as mentioned above by using the recent published National Biodiversity Offset Guideline and consider all, but not limited to, the above-mentioned environmental features.</p> <p>c) The FEIR should incorporate the impacts of the proposed prospecting development on the associated Strategic Water Source Area for the decision-making process to be adequately informed.</p> <p>d) A Biodiversity Offset would be needed if mining is pursued on the Priority Prospecting Areas.</p>	
Initial IAP Comment: 3 November 2022	Japie Van Zyl Attorneys on Behalf of Ollie Smith	<p>Objected against the Mining Right application: Raised concerns that the applicant did not notify Mr. Ollie Smith in writing of the Mining Right Application. Was not provided with an opportunity to submit comments on the scoping report. Was not notified of the public participation process. Was not provided with the information in relation to the application.</p> <p>Requested a list of information.</p> <p>The full objection letter is included in Appendix B6.</p> <p>1. We confirm that we act on behalf of Mr. Ollie Smith (ID nr: 9708135089083) ("Our client") and hereby register our client as an interested and affected party.</p> <p>2. Our client is the surface owner of the Remaining Extent of the Farm Cox 571, Registration Division: Kuruman, Northern Cape Province, Extent 1102.7393 hectares, held under Title Deed: T3058/2007.</p> <p>3. Our client objects against the application of Zama Mining Resources (Pty) Ltd ("the Applicant") for a mining right to mine for iron ore and other minerals on the farms Compass 665, Cox 571, Crossley 660, Dikepeng 661, Gamaliets 659, Gadton 650, Groot Venn 777, Hartley 573, Hilliard 664, Knapp 658, and other, Northern Cape Province.</p> <p>4. We attach hereto an objection against the application</p>	<p>1. This comment is noted</p> <p>2. This comment is noted</p> <p>3. This comment is noted and will be submitted as such to the DMRE being the competent authority for the subject application.</p> <p>4. This comment is noted</p> <p>5-7. The public consultation process undertaken in support of the Environmental Impact Assessment ("EIA") is undertaken according to Chapter 6 of the National Environmental Management Act (No. 107 of 1998) ("NEMA") and the Environmental Impact Assessment ("EIA") Regulations (GN.R. 326 of 2017). The process entailed the notification of all Interested and Affected Parties ("IAPs") (including landowners) of the Mining Right ("MR"), Water Use Licence ("WUL") and Environmental Authorisation ("EA") Applications. After a request was submitted for contact information for Ollie Smith as one of the landowners, it was confirmed that all correspondence must be submitted to Japie van Zyl Attorneys (Appendix A) as his representative.</p> <p>The initial documentation provided to Japie van Zyl Attorneys included a Background Information Document ("BID") and the draft Scoping Report which provided information regarding the project, the MR Application, as well as the WUL and EIA processes (Appendix A). Invitations were also provided to attend a focus meeting with the landowners (including Japie van Zyl Attorneys) on the 8th of November 2022. The draft Environmental Impact</p>

Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
		<p>for the mining right sent to the Department of Mineral Resources and Energy.</p> <p>5. The Constitutional Court has held in the Bengwenyama Minerals (Pty) Ltd case that consultation regarding a prospecting right, means:</p> <p>"The constitutional process required by section 16(4)(b) of the act thus requires that the applicant must:</p> <p>(a) Inform the landowner in writing that his application for prospecting rights on the owners land has been accepted for consideration by the Regional Manager concerned.</p> <p>(b) Inform the landowner in sufficient detail of what the prospecting operation will entail on the land, in order for the landowner to assess what impact the mining will have on the landowners use of the land.</p> <p>(c) Consult with the landowner with a view to reach an agreement to the satisfaction of both parties in regard to the impact of the proposed mining operations.</p> <p>6. The above is also applicable where applications for mining rights are submitted.</p> <p>7. The applicant did not notify our client as an interested and affected party in writing of the application for the mining right nor did the applicant consult with our client. There was thus non-compliance with the obligation to notify in writing and to consult with interested and affected parties as stipulated in the MPRDA and interpreted in the above-mentioned court case.</p> <p>8. In terms of the environmental impact assessment regulations published in GNR982 of 4 December 2014 in the Government Gazette nr: 38282 ("the Gazette"), all interested and affected parties must be provided an opportunity to submit comments on each of the scoping report, Environmental Management Programme, etc. the public participation process contemplated in Regulation 40 must be provide interested an affected parties access to all information that reasonably has or may have the potential to influence any decision with regard to an application for a mining right. The applicant has to comply with Regulation 40 and the obligation to follow a process of public participation. This was not done by the applicant.</p> <p>9. In terms of Regulation 41 of the Gazette a person conducting a public participation process must give notice to all potential interested and affected parties of</p>	<p>Report ("EIR") was provided for review which included a detailed project description, including the potential prospecting activities that will be undertaken. The consultation process undertaken to date is in line with the relevant legal requirements and your client has been offered the opportunity during the regulated EIA processes to raise their questions and concerns.</p> <p>A public meeting was held on the 16th of August 2023 which was attended by George Smith, the father of Ollie Smith which further supports the fact that meaningful consultation was undertaken in support of the EIA and MR application.</p> <p>8. Please refer to the response provided under points 5 to 7. The public consultation process undertaken in support of the Environmental Impact Assessment ("EIA") is undertaken according to Chapter 6 of the National Environmental Management Act (No. 107 of 1998) ("NEMA") and the Environmental Impact Assessment ("EIA") Regulations (GN.R. 326 of 2017). Your client has been included in the registered as interested and affected party and thus been offered the opportunity during the regulated EIA processes to raise their questions and concerns.</p> <p>9. Regulation 41(2)(b) requires that written notice must be provided to all the specified IAPs, including land owners which was undertaken as stipulated in the response under points 5 to 8.</p> <p>10. The Environmental Impact Report ("EIR") that was distributed to all IAPs for a 30 day review period contained the details regarding the process undertaken to identify, assess, and rank the impacts associated with the project. The significance of all potential impacts was provided in the EIR and included the mitigation measures that will be implemented to reduce/prevent impacts on specific environmental features. The Life of Mine ("LoM") was described in the EIR.</p> <p>11. All relevant information (including the draft EIR) was provided as stipulated in the responses under points 5 to 10. Your client has thus been provided opportunity to raise their question and concerns during the public participation process undertaken in support of the application. The significance of all potential impacts was provided in the EIR and specialist studies undertaken. The Environmental Management Programme ("EMPr") included the mitigation measures that will be implemented to reduce/prevent impacts on specific environmental features.</p> <p>12-13. This comment is noted. Please refer to the response provided under points 5 to 7. The public consultation process undertaken in support of the Environmental Impact Assessment</p>

Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
		<p>an application which is subject to a public participation process. Regulation 41 (2)(b) of the Gazette specifically provides that written notice must be given to interested and affected parties. It is our instructions that there was non-compliance with Regulation 41 (2)(b).</p> <p>10. In an application for an environmental authorization, the applicant and its environmental assessment practitioner must comply with appendix 1 of the regulations as published in the Gazette and more particularly should have given a full description of the process undertaken to identify, assess, and rank the impact the activity will impose on the environment, the interested and affected parties and indicate the life of the activity. The applicant must also assess and identify potential and significant impacts or risks of the project.</p> <p>11. Our client has not been provided with the information in relation to the application and the processes followed. Our client wants to appoint their own third-party consultants to assess the impacts or determine if the aspects as referred to in regulation 3 of appendix 1 of the Gazette have been addressed and if the impact of the activities will result in unacceptable pollution, ecological degradation or damage to the environment. Our client cannot do this because our client was not provided with the necessary information. Our client could also not assess how the impacts may be avoided, managed, or mitigated. In all likelihood, the envisaged activities will have a negative impact as our client is likely to suffer losses and damages as a result of the mining operations.</p> <p>12. In the matter of Earthlife Africa (Cape Town) vs Director-General: Department of Environmental Affairs and Tourism the court reviewed and set aside the issuance of an Environmental Authorisation where there has been lack of or insufficient public participation. It was held that failure to afford interested and affected parties an opportunity to comment on the Environmental Impact Assessment report is procedurally unfair.</p> <p>13. The High Court of South Africa (Gauteng Division, Pretoria) has also in the case of PE Convenience Centre (Pty) Ltd held that a decision should be set aside where the concept of procedural fairness (the obligation to consult with) has not been complied with.</p> <p>14. It is the Applicant's responsibility to consult with our</p>	<p>("EIA") is undertaken according to Chapter 6 of the National Environmental Management Act (No. 107 of 1998) ("NEMA") and the Environmental Impact Assessment ("EIA") Regulations (GN.R. 326 of 2017). All relevant information was provided for review and comment. Your client has thus been provided opportunity to raise their question and concerns during the public participation process undertaken in support of the application.</p> <p>14. Reply to points 14 and 15. The following documents were provided on the 19th of December 2022 (Appendix B):</p> <ul style="list-style-type: none"> <li>• Regulation 2(2) map</li> <li>• Mine Works Programme</li> <li>• Proof of notifications included in the Scoping Report and EIR that was provided for review.</li> <li>• Proof of WUL submission.</li> <li>• Scoping report</li> <li>• EIR with a list of the properties over which the right was applied for</li> <li>• Copy of MR Application Acceptance Letter.</li> </ul> <p>The MR Application was submitted electronically on the SAMRAD online platform.</p> <p>16-18. These comments are noted, and relevant information has been provided for comment.</p>



Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
		<p>client as an interested and affected party. This obligation includes that you must provide us with all information and documents in relation to the application for the Mining Right. We then kindly request that you provide us with the following information:</p> <p>14.1 a copy of the application document for the mining right</p> <p>14.2 a copy of proof of the date of submission of the application for the mining right</p> <p>14.3 a copy of the regulation 2(2) map</p> <p>14.4 a copy of the mining work programme</p> <p>14.5 copies of proof of notification and consultation with the interested and affected parties in terms of section 22(4)(b) of the MPRDA</p> <p>14.6 a copy of the environmental management procedure</p> <p>14.7 a copy of the water use authorisation/ water license</p> <p>14.8 a copy of the financing plan as submitted of proof of financial capability of the applicant</p> <p>14.9 a copy of proof of technical capability of the applicant</p> <p>14.10 copy of the scoping report</p> <p>14.11 copy of the environmental impact study</p> <p>14.12 a copy of the acceptance letter of the application</p> <p>14.13 a list of the properties over which the right was applied for</p> <p>14.14 a copy of the mining right, when executed.</p> <p>15. According to the High Court of South Africa, Gauteng Division, Pretoria, ruling in the matter of Duduzele Baleni that interested and affected parties are intitled in terms of the Mineral and Petroleum Resources Development Act (MPRDA) to be furnished copies an application. The court ruled out as follows:</p> <p>[117.1] It is declared that interested and affected parties as contemplated by the Mineral and Resources Development Act 20 of 2002 ("the MPRDA") are entitled by sections 10(1) and 22(4) of the MPRDA, on request to the relevant Regional Manager of the Department of Mineral Resources and Energy ("the Department"), to be furnished with a copy of an application for a Mining Right as contemplated by section 22 of the MPRDA, subject to the right of the applicant and/or the department to redact financially sensitive aspects of the application.</p>	

Date	Name	Correspondence Received	EAPS Response to Issues as Mandated by the Applicant
		<p>16. It shall be highly appreciated if you can provide us with this information as requested.</p> <p>17. It is in any event part of your obligation to consult with interested and affected parties to provide the information.</p> <p>18. Please note that the objection is a preliminary document and that it shall be amplified once we receive all the information as requested from the Department of Mineral Resources and Energy.</p>	
26 August 2023	SAHRIS	<p>SAHRA requests that a field based Paleontological Impact Assessment be conducted for the McCarthy project and a desktop PIA for the Western Project. The PIAs must comply with the 2012 Minimum Standards: Paleontological Components of Heritage Impact Assessments and be conducted as part of the EA application. The applicant is advised to extend the EA process in terms of section 23(1)b of the NEMA EIA Regulations in order to address this comment. Further comments will be issued upon receipt of the above requested studies.</p>	<p>Good day,</p> <p>The comments regarding the McCarthy project is duly noted. A field-based Palaeontological Impact Assessment will be conducted for the MacCarthy Mining Area. The study will be submitted to SAHRA for comment. The attached desktop PIA covered the portion of the western project that is earmarked for prospecting.</p> <p>Kind Regards Trevor</p>

## 10. THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITES

### 10.1 Climate

The description of the baseline climatic conditions has been sourced from the Air Quality Impact Assessment undertaken by Airshed Planning Professionals in November 2022 (**Part C: Appendix A**).

#### 10.1.1 Temperature

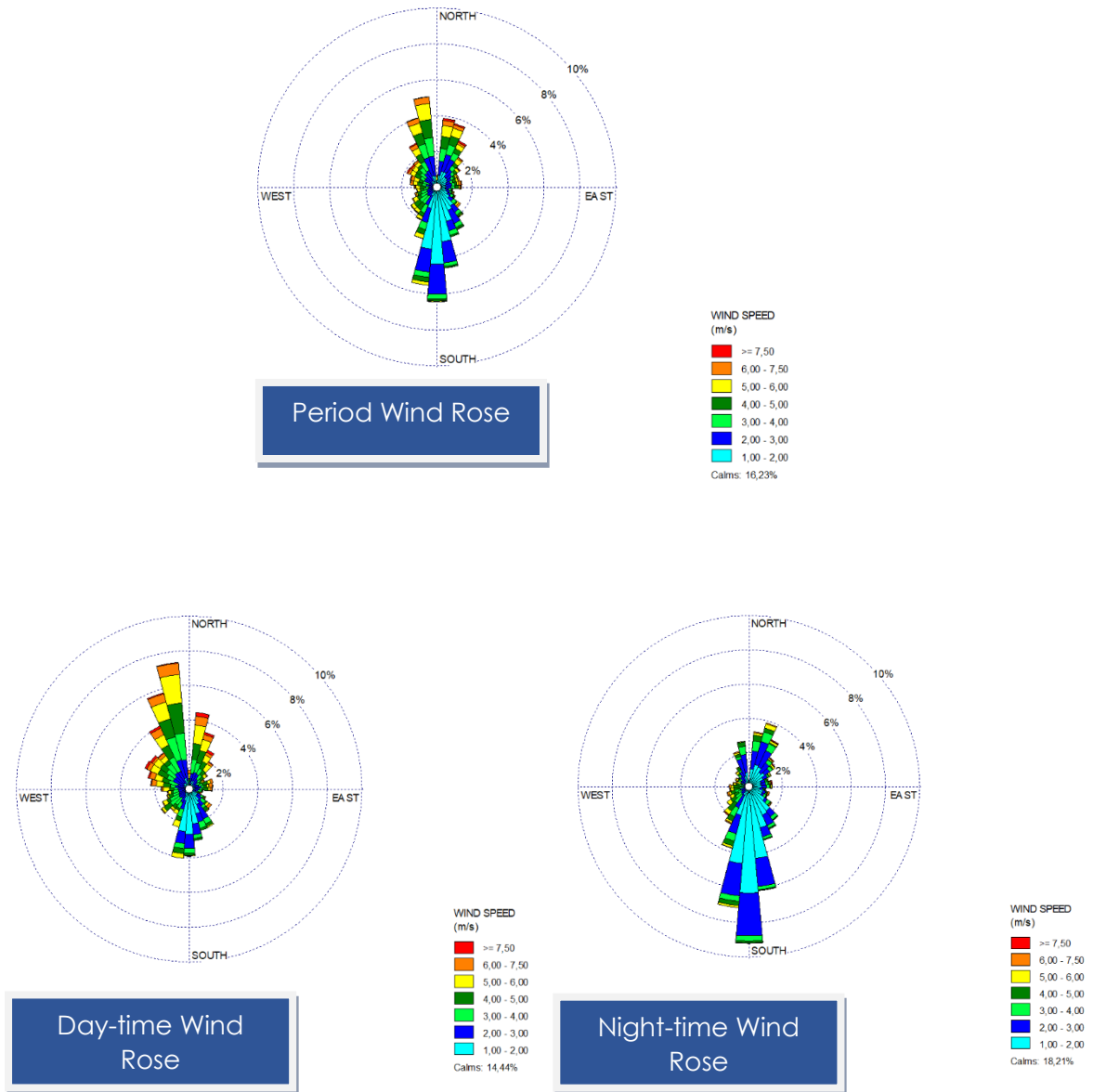
Monthly mean and hourly maximum and minimum temperatures for the area are provided in Table 10-1. Temperatures ranges between -7°C and 38°C. The highest temperatures occur in December and the lowest in July. During the day, temperatures increase to reach maximum at around 14:00 in the afternoon. Ambient air temperatures decrease to reach a minimum at around 06:00, i.e., just before sunrise.

**Table 10-1: Monthly temperature summary (Airshed, 2022)**

Hourly Minimum, Hourly Maximum and Monthly Average Temperatures (°C)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Minimum</b>	10.7	12.4	6.5	3.0	-2.3	-7.1	-4.9	-4.5	-0.3	2.2	6.8	8.4
<b>Maximum</b>	37.9	37.1	36.0	32.2	29.4	26.3	25.9	29.0	34.3	36.9	38.1	36.3
<b>Average</b>	27.4	25.2	24.1	19.0	16.2	11.6	11.5	12.7	18.0	21.7	24.0	24.9

#### 10.1.2 Wind

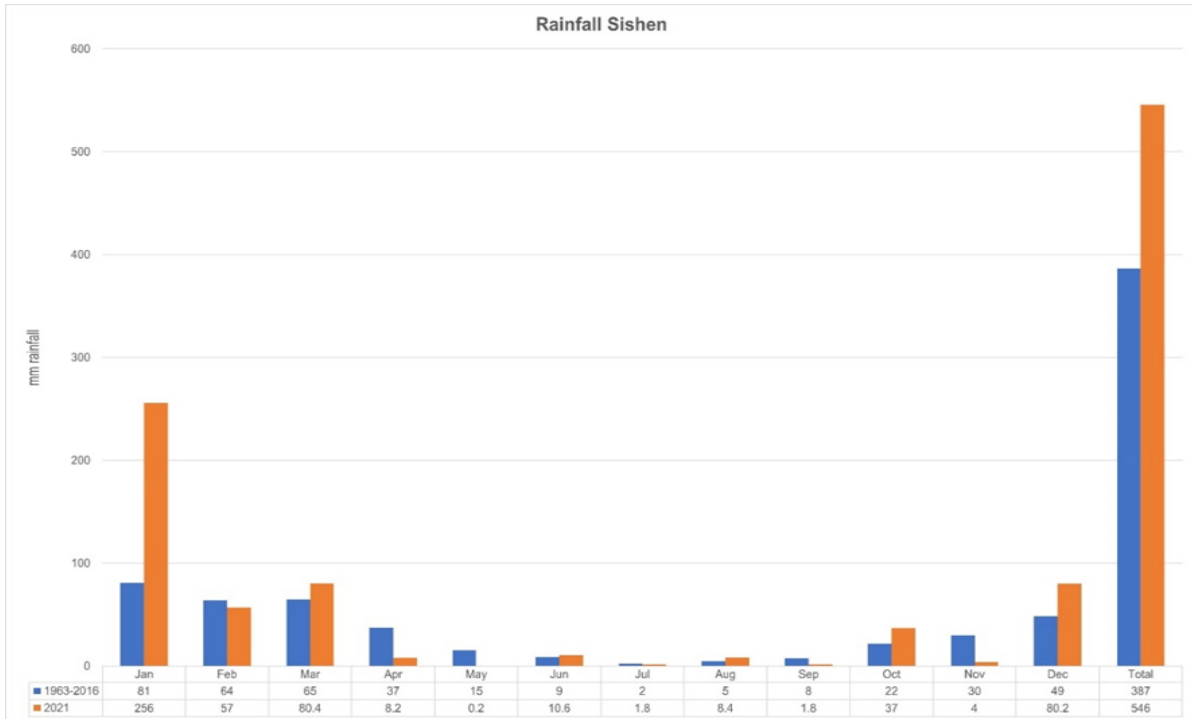
The regional wind direction and speeds are of importance as they provide an indication of the receptors that will experience the greatest impacts resulting from atmospheric emissions and dust. The wind field for Sishen mine is shown in Figure 10-1. During the 2021 period, the wind field was dominated by winds from the south and the north. The strongest winds (>6 m/s) were from the northerly sector. Calm conditions occurred 16% of the time, with the average wind speed over the period calculated as 2.3 m/s. The simulated meteorological data for the Salene air quality impact study also showed predominantly northerly winds. Wind speeds decrease during the night-time conditions with an increase in calms from 14% during the day to 18% during the night.



**Figure 10-1: Period, day- and night-time wind roses for Sishen (on-site data, 2021)**

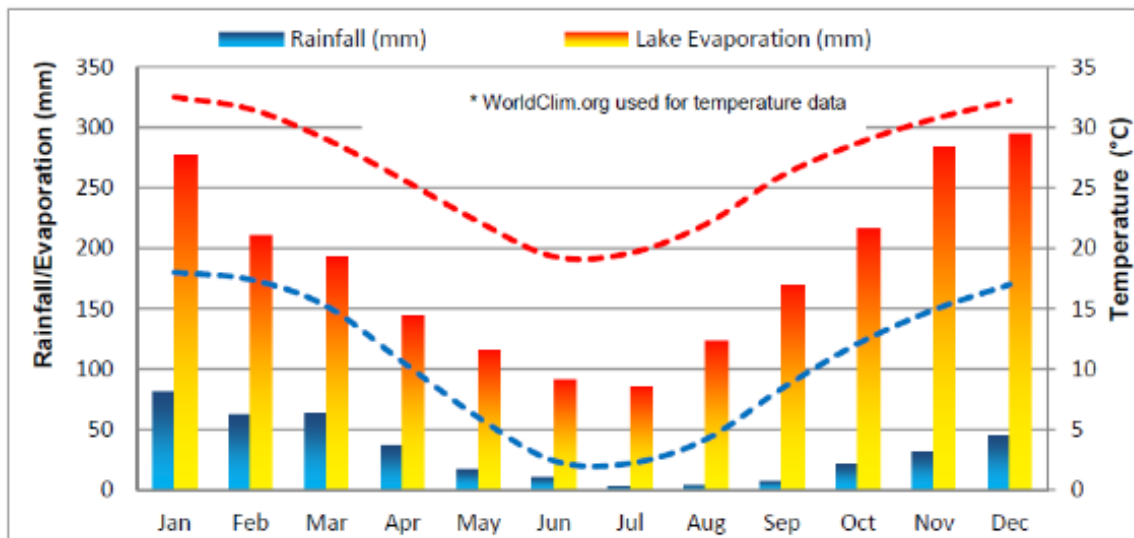
### 10.1.3 Rainfall and Evaporations

Rainfall for the area is shown in Figure 10-2, with 2021 (blue graph) being a particularly wet year compared to historic data (orange graph). Long term trends show the wet season to be from October to April for the Kathu area with typical annual rainfall of approximately 400 mm.



**Figure 10-2: Monthly rainfall at Sishen (Airshed, 2022)**

Figure 10-3 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 10-3: Average Rainfall and Evaporation (Airshed, 2022)**

## 10.2 Air Quality

The description of the air quality has been sourced from the Air Quality Impact Assessment undertaken by Airshed Planning Professionals in November 2022 (**Part C: Appendix A**). 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 northwest, 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 (PM<sub>10</sub> and PM<sub>2.5</sub>) in the area will exceed residential standards.

### **10.3 Noise**

#### **10.3.1 Noise Sensitive Receptors**

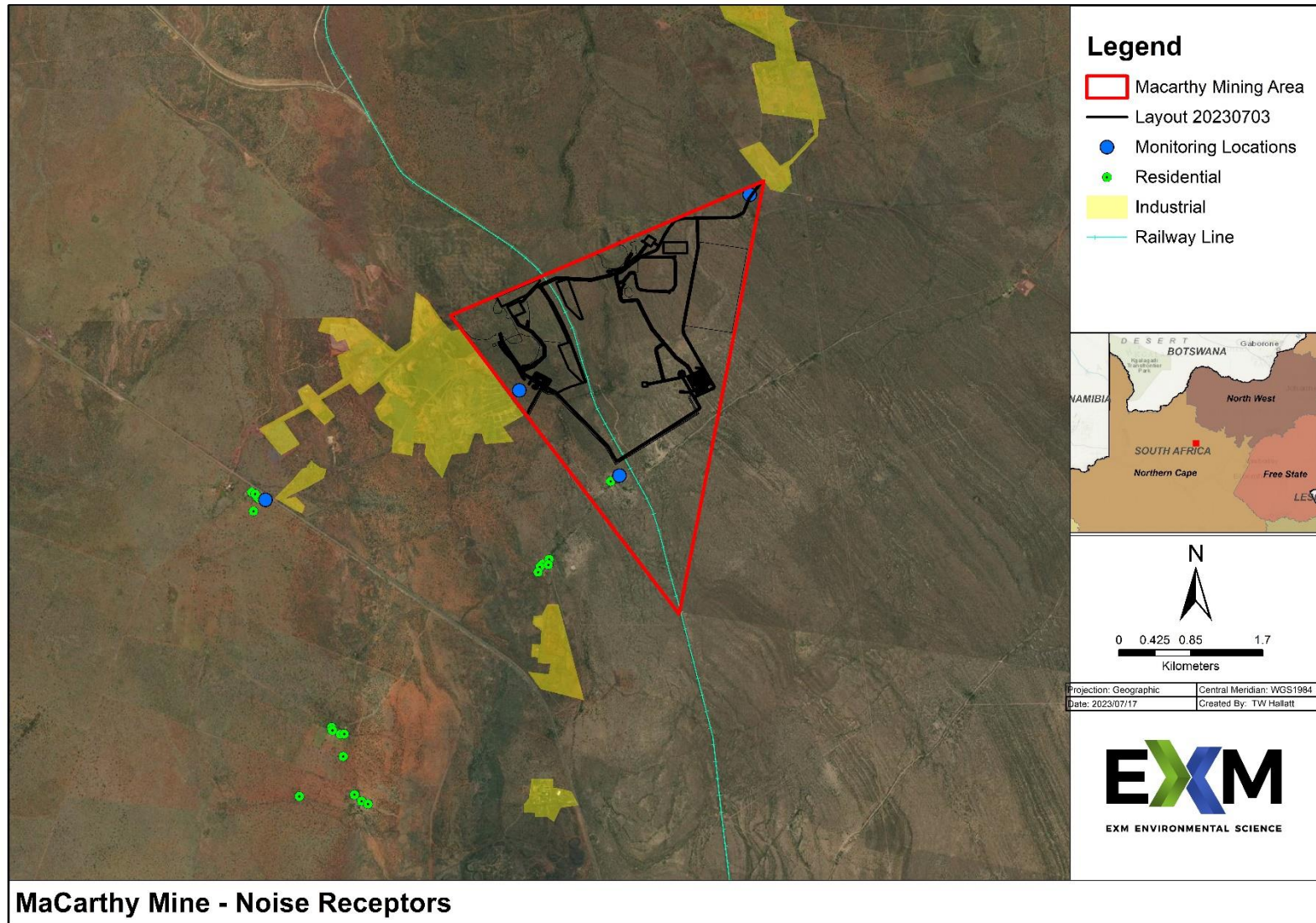
Noise sensitive receptors ("NSR") generally include places of residence and areas where members of the public may be affected by noise generated by mining, processing, and transport activities. The main meteorological parameters affecting the propagation of noise include wind speed, wind direction and temperature. These, along with other parameters such as relative humidity, air pressure, solar radiation, and cloud cover, affect the stability of the atmosphere and the ability of the atmosphere to absorb sound energy. Ground cover was conservatively assumed to be acoustically hard (not conducive to noise attenuation) due to the area's semi-arid nature. The NSR related to the MaCarthy mining operations are indicated in Figure 10-4.

#### **10.3.2 Baseline Noise Levels**

The noise survey conducted by Airshed at the locations indicated in Figure 10-4 revealed that the current noise levels in the surrounding area is below the International Finance Corporation ("IFC") Noise Level Guidelines for Residential Areas (dBA) for day and night, except for the site located closest to the R324 regional road.

### **10.4 Topography and Hydrology**

The regional topography is characterised by flat, gently undulating plains interspersed with hills and mountains (Figure 10-5). 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 (Langberg) occur within the western section of Western Properties which forms a significant topographical high in the region at 1 450 masl. The Prospecting Priority Areas are characterised by a series of low lying koppies. The MaCarthy site has two significant topographical high points located within the north western (1 340 masl) and north eastern (1 270 masl) sections. These koppies are associated with the iron ore bodies that will be mined as part of the project. An extensive valley and river flood plain is situated between the two koppies (1 240 masl) which bisects the proposed MaCarthy mining area. The episodic drainage lines identified by the Freshwater Aquatic study (SAS, 2022) is associated with the valley that bisects the eastern and western infrastructure areas.



**Figure 10-4: Sensitive Receptors and existing Mining Operations in the vicinity of MaCarthy**



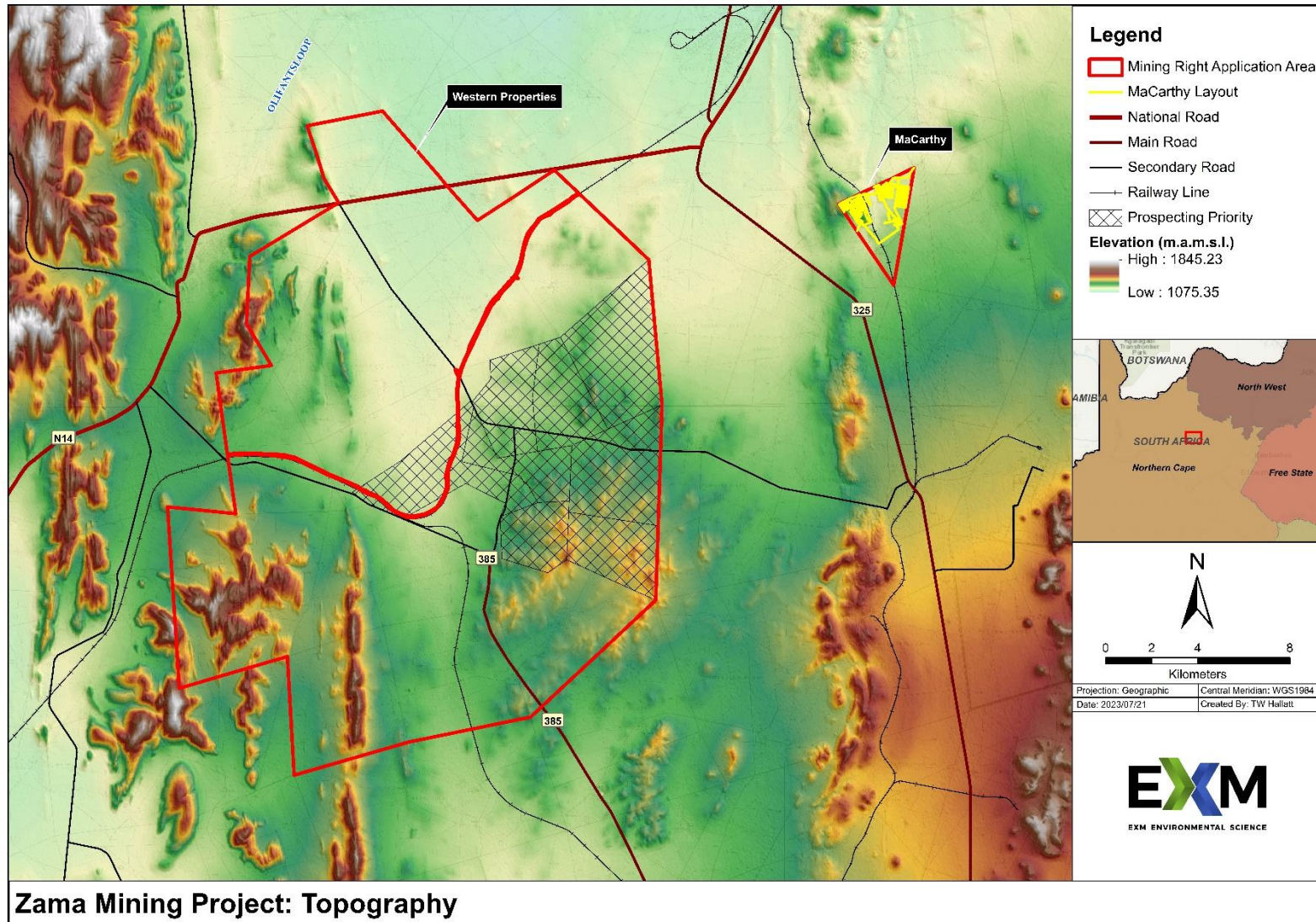


Figure 10-5: Topography Map



## 10.5 Soil Types and Land Capability

### 10.5.1 Dominant Soil Forms (Desktop Findings)

The Soil, Land use and Land Capability Assessment (Zimpande Research Collaborative, January 2023) (**Part C: Appendix B**) focussed on the MaCarthy Section which will be impacted by mining activities. The results of this assessment are discussed in the subsequent section. According to the desktop analysis, the project area is associated with the soil types summarised in Table 10-2 and illustrated in Figure 10-6. The entire MaCarthy section is associated with the LP2 soil type and the majority of the Western Properties are associated with the CM soil type.

**Table 10-2: Soil Types (All Properties)**

Soil type	Description
AR	Red and yellow, well drained sandy soils with high base status.
CM	Red soils with high base status.
LP2	Soils with minimal development, usually shallow, on hard or weathered rock, with or without intermittent diverse soils. Lime generally present in part or most of the landscape.

### 10.5.2 Land Capability (Desktop Assessment)

As shown on Figure 10-7, the majority of the Western Properties as well as the MaCarthy Section is characterised as having a Class VII (non-arable, woodland or wildlife) land capability. According to Zimpande (2023) soil associated with Class VI land capability are not suitable for arable agricultural land use. These soils are, at best, suitable for natural pastures for light grazing and is currently used by wilderness as well as livestock grazing. Certain sections of the Western Properties and a small section of MaCarthy are characterised as having a Class VIII (wilderness) land capability which is not suitable for grazing purposes. This is most probably due to the mountainous nature of the area.

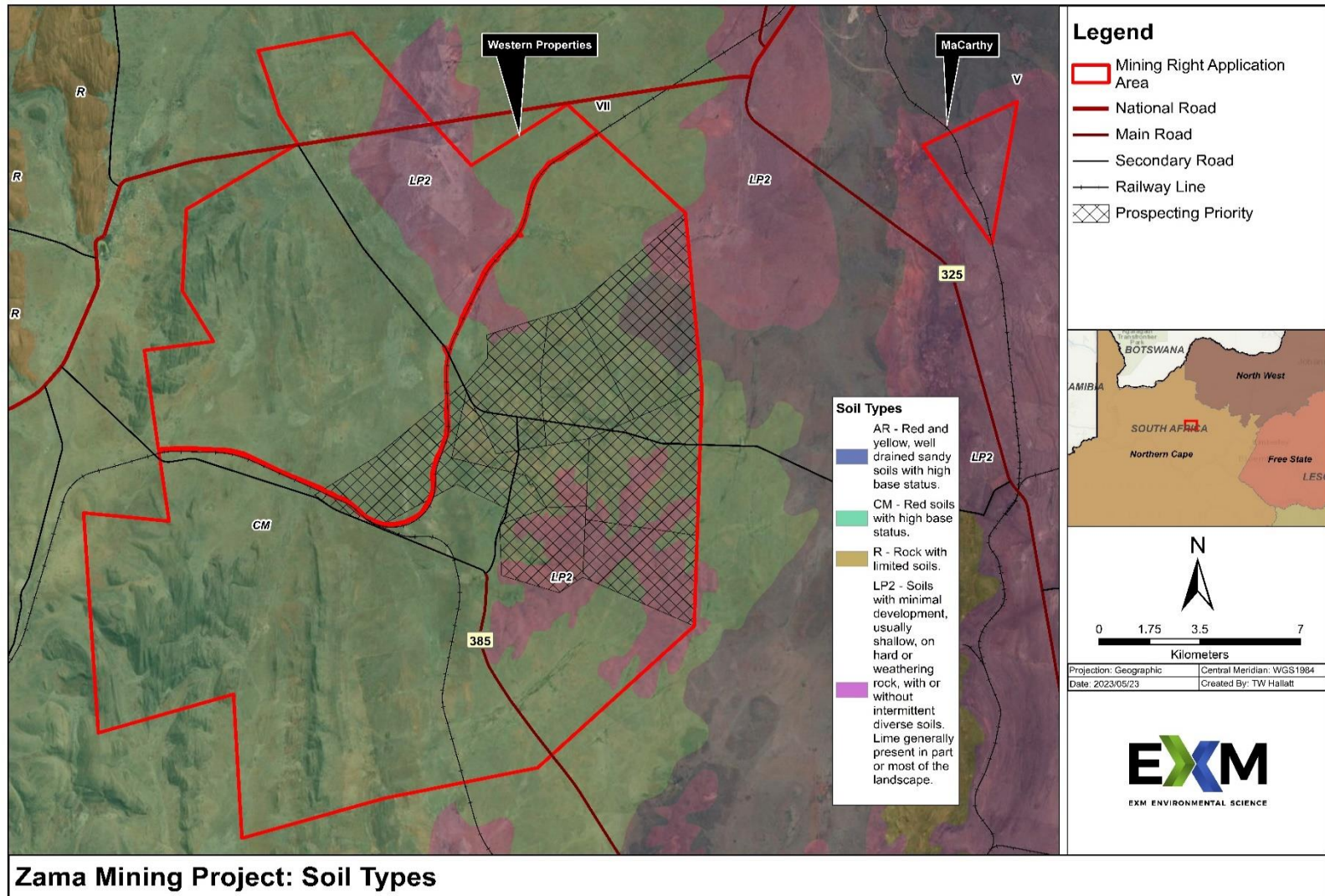


Figure 10-6: Soil Types (All Properties)

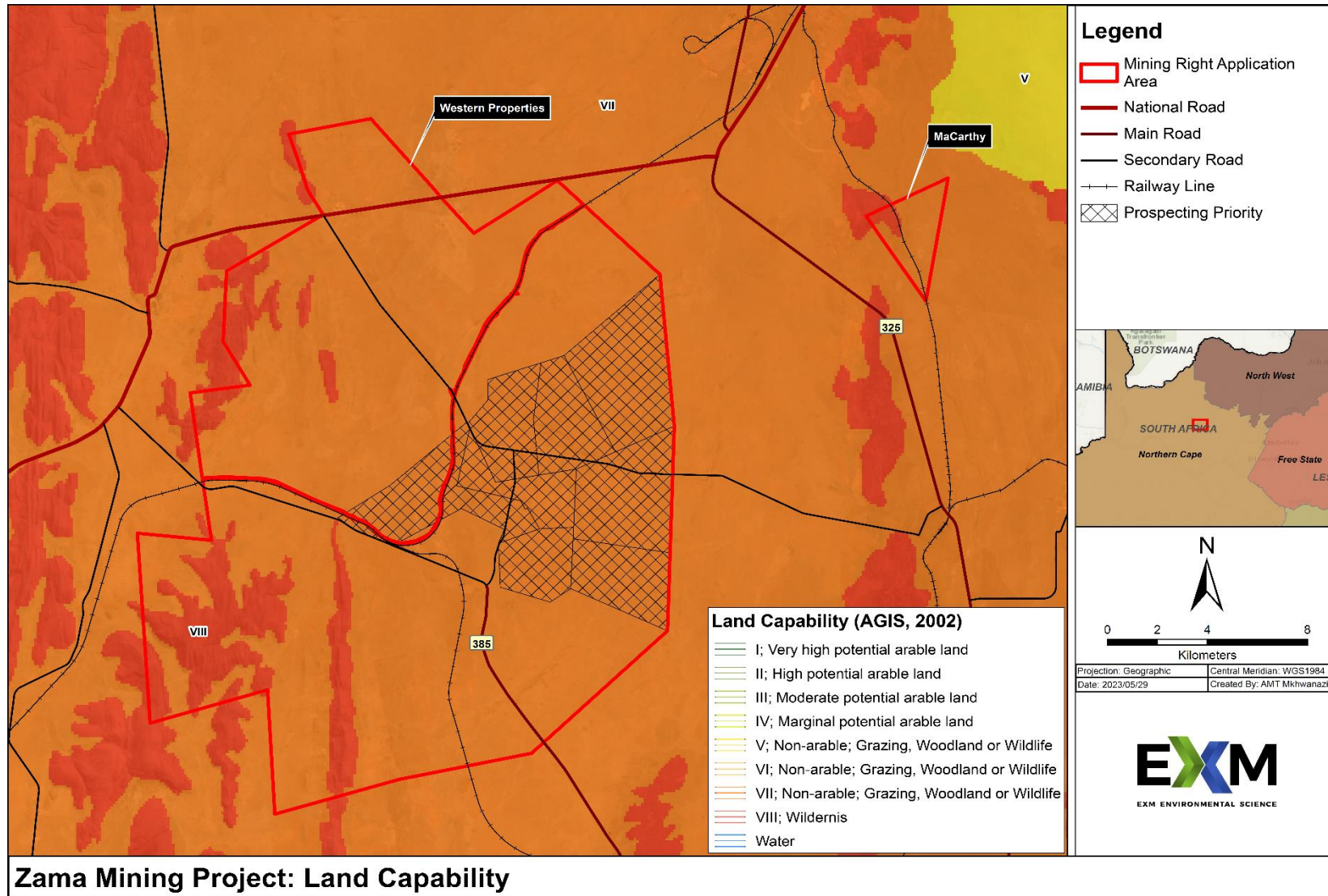


Figure 10-7: Land Capability (All Properties)

### 10.5.3 Dominant Soil Forms (MaCarthy Field Assessment)

According to the Soil, Land use and Land Capability Assessment (Zimpande Research Collaboration, 2022), the identified soil forms within the MaCarthy Section include the soils of Glenrosa/Mispah, Coega/Knersvlakte, Mispah, Dundee and Prieska/Addo formation. The Coega/Knersvlakte and Glenrosa/Mispah soil forms were the most dominant, accounting for approximately for 42.8% and 39.4% of the entire study area respectively. These soil formations which are shallow in nature and thus of restricted potential due to the limited choice of crops to cultivate. In addition, these soils require intense management systems in order to be cultivated such as ripping of subsoil layers which may further increase input cost and thus further limit the area in terms of agricultural potential.

Table 10-3 indicates the dominant soils occurring within the study area, together with the associated land capability and the area covered in hectares (ha). Table 10-4 provides a summary of the Grazing (Class VI) land capability class for the Glenrosa/Mispah, Mispah and Coega/Knersvlakte soil forms.

**Table 10-3: Dominant soil forms and their respective land capability.**


Soil Form	Land Capability	Land Potential	Area (ha)	Percentage (%)
Prieska/Addo	Arable (Class IV)	Restricted Potential (L5)	1,905	0,2
Dundee	Watercourse (Class V)	Very Restricted Potential (L6)	21,217	2,7
Coega/Knersvlakte	Grazing (Class V)		117,56	14,9
Glenrosa/Mispah			311,85	39,4
Mispah			339,05	42,8
<b>Total Enclosed</b>				<b>791.58</b>

### 10.5.4 Land Capability Classification

The identified soils were classified into land capability and land potential classes. The dominant soils Glenrosa/Mispah and Coega/Knersvlakte are classified as Grazing (Class VI) with a Very Restricted Land Potential (L6) as presented in Table 10-4 and Figure 10-7 below. Coega/Knersvlakte, Glenrosa/Mispah and Mispah formations which are shallow in nature and thus of restricted potential due to the limited choice of crops to cultivate. In addition, these soils require intense management systems in order to be cultivated such as ripping of subsoil layers which may further increase input cost and thus further limit the area in terms of agricultural potential.



**Table 10-4: Summary discussion of the Grazing (Class VI) land capability class for the Glenrosa/Mispah, Mispah and Coega/Knersvlakte soil forms.**





Land Capability: Grazing (Class VI)	
	
<b>Soil Form(s)</b>	Glenrosa/Mispah, Mispah and Coega/Knersvlakte
<b>Characteristics</b>	Shallow effective rooting depth is the primary limitation of the land capability of the Glenrosa soil forms, which is due to the occurrence of a rocky layer at relatively shallow depth, which hinders penetration of plant roots.
<b>Land Capability</b>	The identified Glenrosa soil forms are of poor (Class VI) land capability and are not suitable for arable agricultural land use. These soils are, at best, suitable for natural pastures for light grazing. Therefore, these soils are not considered to make a substantial contribution to extensive subsistence farming on a local scale.
<b>Land Potential</b>	Restricted potential: Regular and/or moderate to severe limitations due to soil, slope, temperature, or rainfall.

### 10.5.5 Current Land Use

According to observations made by Zimpane (2022) during the site assessment, the MaCarthy study area predominantly comprises of wilderness land use as well as livestock grazing, with limited anthropogenic impact. At the time of the assessment, no cultivation of crops was observed within the boundaries of the study area as well as in the immediate vicinity. The surrounding areas are characterised by mining and related activities. Figure 10-22 shows the associated land use within the MaCarthy study area.

The Western Properties are characterised by similar land uses and these properties are mostly used for grazing purposes. However, some areas are also used for game breeding, tourism and commercial hunting purposes, as depicted in Table 10-5.

**Table 10-5: Dominant Land Uses**

<b>Dominant Land Uses</b>	
<b>Natural woodland associated with wilderness</b>	<b>Livestock farming</b>
	
<b>Wildlife</b>	<b>Powerline and railway</b>
	

## **10.6 Surface Water Resources**

### **10.6.1 Desktop findings**

Figure 10-8 shows the desktop data for surface water resources within the mining right application area. The 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. The MaCarthy Section 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 are characterised by several drainage lines that incise numerous koppies in this area. Both the Ga-Mogara (as well as the tributary that bisects MaCarthy) and Soutloop Rivers are classified as River Freshwater Ecosystem Priority Area ("FEPA")<sup>1</sup>.

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

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<sup>1</sup> River FEPAs are important to achieve biodiversity targets for river ecosystems, 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 in order to contribute to the biodiversity goals of the country. For river FEPAs the whole sub-quaternary catchment is shown as a FEPA in dark green, although FEPA status applies to the actual river reach shown on the map within such a sub-quaternary catchment.



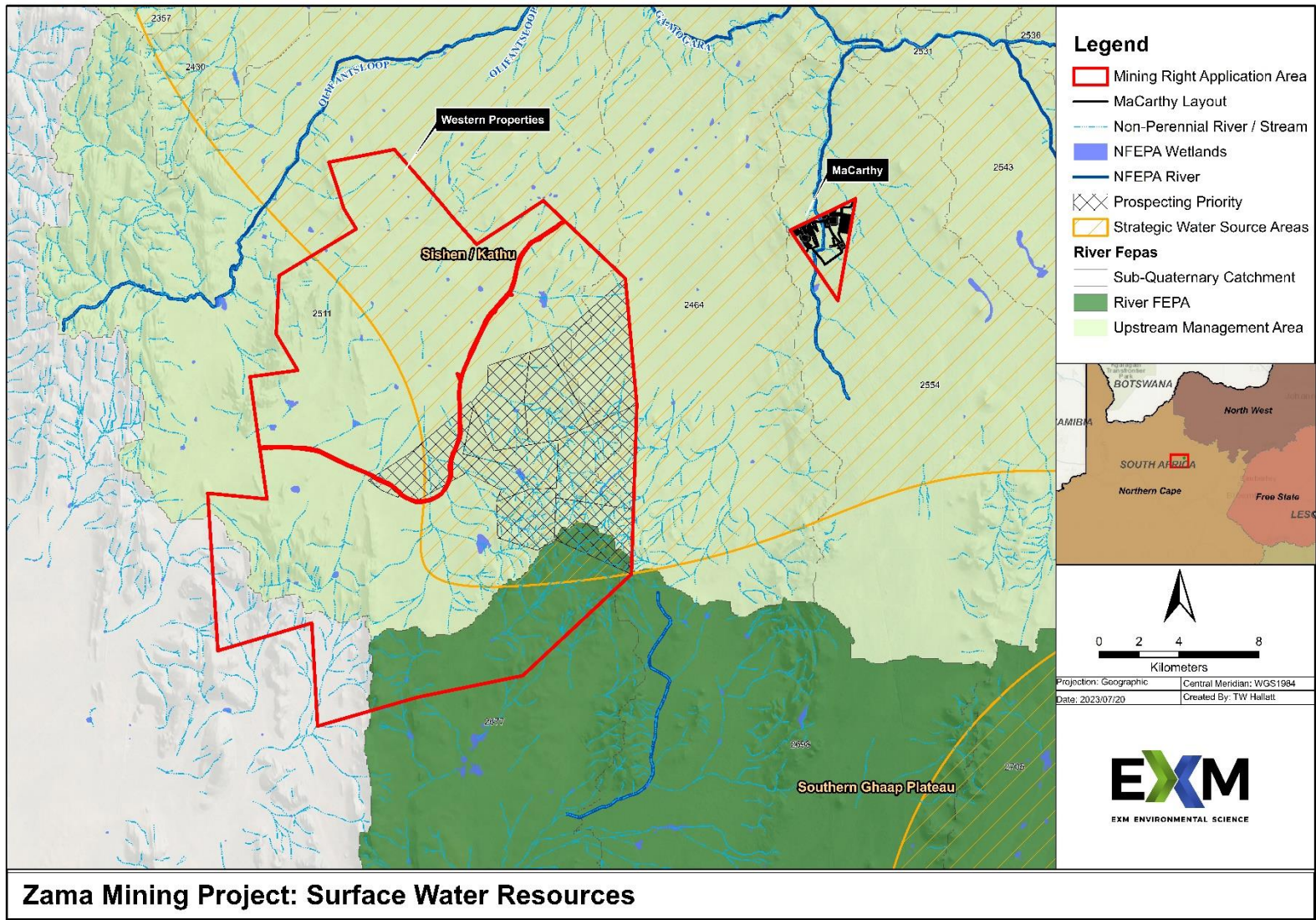


Figure 10-8: Surface Water Resources




### 10.6.2 Field assessment findings (MaCarthy Section)

A site assessment was undertaken by Scientific Aquatic Service (March 2022) (**Part C: Appendix F**) to identify and delineate potential freshwater ecosystems surrounding the MaCarthy Section. As illustrated in Figure 10-9, three episodic drainage lines and two features characterised as 'cryptic wetlands' were identified. Additionally, several freshwater microhabitats which potentially provide important habitat for aquatic macroinvertebrates including *Streptocephalus sp.* (fairy shrimp), and other. Although these features were not defined as watercourses under the NWA as they did not possess other distinctive characteristics of a wetlands, they are nevertheless considered important from an ecological perspective, and it is important that they should be afforded the same protection as the episodic drainage lines (EDLs) and the cryptic wetlands.

Classification of the cryptic wetlands (CWs) and episodic drainage lines was undertaken as per Appendix C of the Freshwater Assessment and summarised in Table 10-6.

**Table 10-6: Summary of Field Assessment Findings (SAS, 2022)**

Summary of the assessment of the episodic drainage line in the far north-eastern corner of the study area.	
<b>PES<sup>2</sup> Category</b>	The episodic drainage line traverses the north-eastern corner of the study area and is in Moderate modified ecological state.
<b>Ecosystem provision</b>	<b>Moderate to very low</b> Due to the semi-arid climate, surface water is intermittently present within the stream, thus reducing the capacity of the system to provide key ecological and socio-cultural services.
<b>EIS<sup>3</sup> Category</b>	<b>High</b> Despite the decreased ecological integrity and low ecological service provision the episodic drainage line is nevertheless considered to be of high EIS, primarily as it is one of the few freshwater ecosystems within the study area.
<b>REC<sup>4</sup> Category</b>	<b>Category: C</b> As one of two linear drainage systems within the study area, protection of the system and maintenance of the PES and EIS is considered important.
<b>Representative photographs of the same reach of the episodic drainage line traversing the north-eastern corner of the study area.</b>	
The episodic drainage line is primarily driven by precipitation and runoff (i.e., surface water inputs), and as such is only in flow when sufficient rainfall is received in the region. It was apparent at the time of the assessment in March 2022 that although ample rain had fallen in the preceding weeks for the stream to flow, ponding occurs along the course of the stream where instream infrastructure such as	

<sup>2</sup> PES: Present Ecological State

<sup>3</sup> EIS: Ecological Importance and Sensitivity

<sup>4</sup> REC: Recommended Ecological Category

the low-level bridge crossing where the assessment was undertaken, is in place. This leads to accumulation of sediment and algal blooms as the water stagnates, potentially affecting aquatic biota as well as water quality. No other modifiers of the hydraulic regime were observed during the assessment.

**Summary of the assessment of the episodic drainage line traversing the south-western portion of the study area.**


<b>PES Category</b>	The episodic drainage line (and a small associated episodic drainage line which drains into the stream from the north-west) has been subjected to various modifications, albeit minimal in extent and severity, over the course of several decades.
<b>Ecosystem provision</b>	<b>Moderate to very low</b> The capacity of the stream to provide key ecological and socio-cultural services is limited by the seasonal availability of water. At the time of assessment, surface water was only present in a small section of the system in the south of the study area where the stream is traversed by the railway line.
<b>EIS Category</b>	<b>High</b> Despite the decreased ecological integrity and low ecological service provision the episodic drainage line is nevertheless considered to be of high EIS, primarily as it is one of the few freshwater ecosystems within the study area.
<b>REC Category</b>	<b>Category: C</b> The PES and EIS of the episodic drainage line must be maintained to ensure ongoing functioning and contribution to the ecological functioning of the downstream system.

<b>Representative photographs of the episodic drainage line (unnamed tributary of the Ga-Mogara River) traversing the south-western portion of the study area, in 2020 (left) and 2022 (right).</b>	
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The most notable modifier of the hydraulic regime are various low-level crossings and the railway crossing (although provision has been made under the latter to allow for through-flow). Although very little surface water was present in the stream at the time of assessment, where water was present, it had ponded due to deposition of sediment and rocks between the railway culvert and a low-level road crossing in the south-west of the study area. This is likely to affect the recharge of the downstream reach of the system, as well as affecting aquatic biota and riparian vegetation. Aside from slight changes to the topography relating to this deposition, no modifiers to the geomorphological regime were observed.

**Summary of the assessment of the cryptic wetlands (CWs) within the study area.**

<b>PES Category</b>	<b>PES Category: A</b> Few modifiers of the cryptic wetlands were noted, with the exception of overgrazing particularly within CW 2, and soil disturbances due to trampling. Thus, the cryptic wetlands are considered to be in a largely natural condition.
<b>Ecosystem provision</b>	<b>Moderate low to very low</b> The relatively small size and episodic availability of water, ecological service provision of the cryptic wetlands is limited. Sediment trapping and assimilation of nutrients is likely albeit at reduced levels as vegetation cover is intermittent and strongly influenced by seasonality and rainfall, and when it is present, is grazed by domestic livestock. However, both wetlands provide habitat for populations of unique macroinvertebrates which are under-researched.
<b>EIS Category</b>	<b>High</b> Although relatively small and strongly reliant on seasonal rainfall, the cryptic wetlands are considered important features within the landscape

	for their contribution to biodiversity maintenance and overall ecological functions within the study area and immediate surrounds.
<b>REC Category</b>	<b>Category: A</b> No proposed mining activities will encroach directly on these cryptic wetlands, nor within 100 m to 200 m thereof.
<b>Representative photographs of CW 1 (left) and CW 2 (right) during the March 2022 assessment. Overgrazing within CW 2 is apparent.</b>	
<p>Few modifiers were observed during the site assessment with the exception of trampling (which was particularly apparent within CW 1 during the June 2020 assessment) and overgrazing by livestock. The cryptic wetlands are driven by surface water inputs, predominantly precipitation, and are therefore sensitive to changes in the timing, pattern, and movement of water in the landscape. Increased water inputs are likely to result in changes to the floral community composition and structure and may influence the life cycle of the macroinvertebrate populations within the wetlands.</p>	



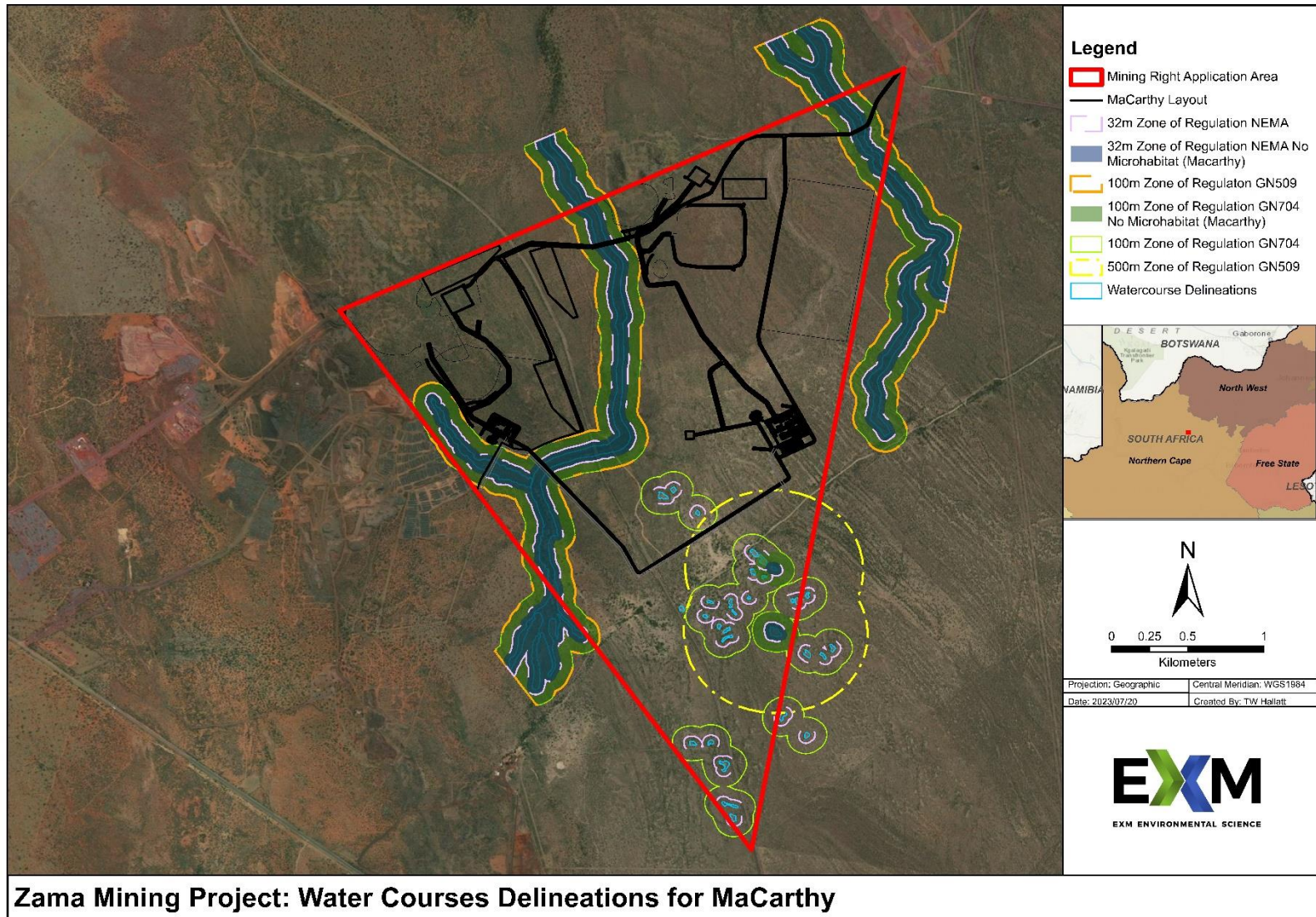


Figure 10-9: Water Course Delineations for MaCarthy Section

### 10.6.3 Field Assessment Findings, Identification and Delineation of Water Courses (Priority Prospecting Properties)

A site assessment was undertaken by SAS in April 2023 to identify and delineate potential freshwater ecosystems of the Priority Prospecting Properties. The delineated water courses are shown in Figure 10-10. During the freshwater assessment (**Part C: Appendix F2**), numerous episodic fluvial systems were identified, which can be described as episodic drainage lines with weakly-defined riparian zones and episodic establishment of instream wetland vegetation when sufficient water is present in the system. Most of these drainage lines form part of a larger drainage system. However, many of the features do not appear to be hydraulically connected to larger drainage systems. This may be a function of the high evapo-transpiration rate as well as soil characteristics and topography, which in tandem lead to surface water, when it is present, evaporating or infiltrate the soil before it reaches the downgradient drainage system.

In addition to the episodic drainage lines, based on visual analysis of digital satellite imagery, topographic data and the NFEPA (2011) database, two potential 'cryptic wetlands' (i.e., depression wetlands) were identified. These were not verified during the site assessment but are indicated in the maps and should nevertheless be considered as 'off limits' during the exploration phase pending detailed investigation. As these features were not ground-truthed, they were excluded from further assessment in this study.

**Table 10-7: Summary of the assessment of the episodic drainage line (EDLs) identified within the study area.**

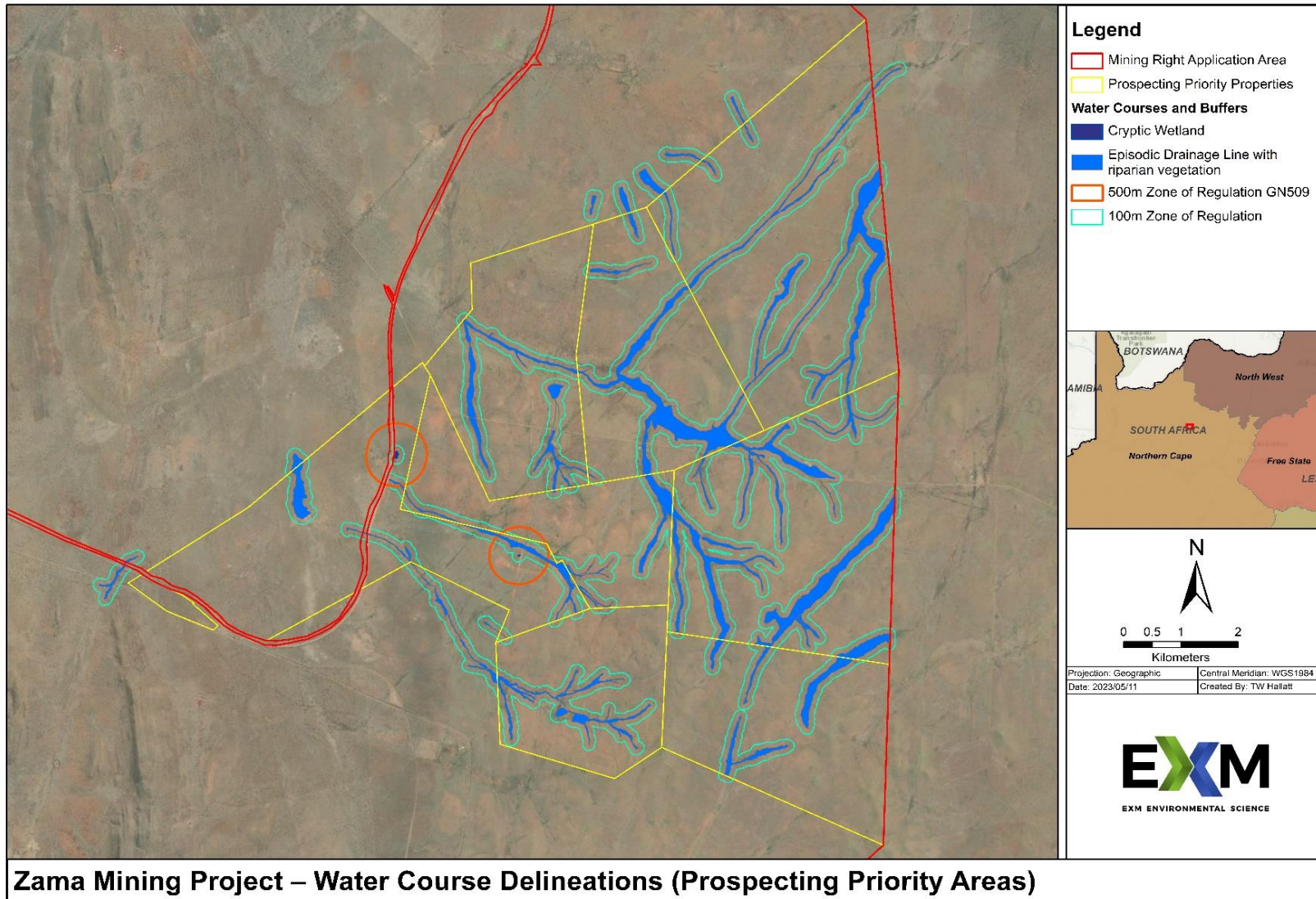
<b>Summary of the assessment of the episodic drainage line (EDLs) identified within the study area.</b>	
<b>PES Category</b>	Overall, the episodic drainage lines are considered to be Moderate modified, largely as a consequence of the effects of intensive sheep husbandry over the course of several decades.
<b>Ecosystem provision</b>	Moderate to very low As surface water is absent from these systems for the majority of the time, their capacity to provide various ecological services, such as sediment trapping, assimilation of excess nutrients and streamflow regulation, is significantly reduced, although the demand for such service provision may be high.
<b>EIS Category</b>	Moderate Collectively, the EDLs are deemed to be of moderate ecological importance and sensitivity. This is attributed to their role in supporting the larger ecosystems within which they occur, such as seasonal water provision and migratory corridors.
<b>REC Category</b>	Category: C The PES must be maintained and no deterioration of the PES or EIS as a result of the proposed mining exploration activities may be permitted.



**Representative photographs of the same reach of the episodic drainage lines which occur within the study area. The photograph on the top right is of systems occurring within RE/664, taken in March 2022 following a period of heavy rainfall and illustrate the response when sufficient water is present.**



The EDLs are characterised by erosion in many locations along their respective reaches, in some cases leading to incised channels, resulting in concentrated flow (which in turn, leads to further erosion). Whilst the soil in the study area is naturally prone to erosion, the natural processes have been exacerbated by decades of agricultural practices, particularly intensive livestock husbandry (sheep, goats, and cattle) which has led to trampling and overgrazing thus increasing susceptibility to erosion. Geomorphological processes, with the exception of sediment distribution and budget related to erosion, were similarly largely unimpacted.



**Figure 10-10: Water Course Delineations for Western Priority Prospecting Properties**

## **10.7 Hydropedology**

Hydropedology is the study of water movement through the soil, basically to assess how the soil in the study area contributes to water flowing into the water courses identified. By understanding the contribution of soil to water flowing into the water courses, it can be determined how the establishment of infrastructure can affect water courses.

According to the Hydropedology Impact Statement (Zimpande, 2023) (**Part C: Appendix L**), the identified soils with the study area have been grouped into hydropedological soil types and are discussed below in order to understand their contribution to wetland recharge. The subsections below present the hydropedological soil types which were identified within the study area during the site assessment.

### **10.7.1 Responsive Soils**

These soils are shallow (including rocky outcrops), loamy sand of poor structure overlying relatively impermeable bedrock/Lithic material. Limited storage capacity results in the generation of overland flow after rain events. Shallow responsive soils lead to a rapid runoff response time during intense rainfall events attributed to their shallow nature which inhibits infiltration.

### **10.7.2 Stagnating Soils**

In these soils the outflow of water is limited or restricted. The A and/or B horizons are permeable but morphological indicators suggest that recharge and interflow are not dominant. These include soils with carbonate accumulations in the subsoil, accumulation and cementation by silica and precipitation of iron as concretions and layers.

The study concluded that the soil types associated with the study area does not contribute to water flowing into the water courses. The Ephemeral Drainage Lines are anticipated to be recharged by direct precipitation and overland flow during the rainy season as they flow episodically. No Hydropedological losses are foreseen for these features as interflow soils were not present within the catchment of these systems.

The outflow in the soils associated with the Cryptic wetlands is limited or restricted. The A and/or B horizons are permeable but morphological indicators suggest that recharge and interflow are not dominant.

## **10.8 Terrestrial Biodiversity**

This section provides a description of the biodiversity associated with the study area, including vegetation types, sensitive biodiversity areas and conservation/protected



areas. A Terrestrial Biodiversity Impact Assessment was conducted by Trogon Biodiversity for MaCarthy (**Part C: Appendix C1**) in November 2022 and, undertaken by The Biodiversity Company for the Western Prospecting Priority Areas in March 2023 (**Part C: Appendix C2**). The results of the desktop and field assessments have been included in the section.

## **10.8.1 Conservation and Sensitive Biodiversity Areas**

### **10.8.1.1 *Sensitive Biodiversity Areas***

As indicated in Figure 10-11, no Critical Biodiversity Areas ("CBAs")<sup>5</sup> have been identified with the mining right application area. The majority of the MaCarthy Section is however regarded as an Ecological Support Area ("ESA")<sup>6</sup>. The mountainous ridges within the Western Properties are also ESAs, with the Langberg ESA lying within the western portion of the Prospecting Priority Areas.

### **10.8.1.2 *Conservation and Protected Areas***

According to the Northern Cape Provincial Spatial Development Framework ("SDF"), 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 Areas. 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.

According to the protected area spatial datasets from SAPAD (2022), the proposed development does not occur within any protected area. As indicated in Figure 10-11, the closest Protected Areas, including the Brook Nature Reserve and Bredenkamp Nature Reserve are located 4 km north of the Western Properties and 15 km north-west of the MaCarthy mining area. These protected areas were promulgated in terms of the National Environmental Protected Areas Act ("NEM:PA") (No. 57 of 2003).

## **10.8.2 Vegetation Types**

The study area falls within the Savanna Biome of the Eastern Kalahari Bioregion. The vegetation comprises an open too dense tree savanna with grassy plains in places.

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<sup>5</sup> Terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems. CBA's are essential to meet biodiversity targets.

<sup>6</sup> Terrestrial and aquatic areas that are not essential for meeting biodiversity targets, but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration.

According to Mucina & Rutherford (2006), the project area is associated with five (5) vegetation types as summarised in Table 10-8 and illustrated in Figure 10-13.

**Table 10-8: Vegetation Types (All properties)**

Vegetation Types	Description
<b>MaCarthy</b>	
<b>Kuruman Mountain Bushveld</b>	<p>Occurs in the Northwest and Northern Cape Provinces on flats, from the vicinity of Postmasburg and Danielskuil in the south extending via Kuruman to Tsineng and Dewar in the north. Occurs at altitudes between 1 100 and 1 500m.</p> <p>Very well-developed, closed shrub layer and well-developed open tree stratum consisting of <i>Vachellia</i> (<i>Acacia</i>) <i>erioloba</i>.</p> <p>Least Threatened, with a conservation target of 16%. No locations where this vegetation type is statutorily conserved exist. Only about 2% of the area has been transformed and erosion is very low.</p>
<b>Kuruman Thornveld</b>	<p>Occurs in the Northern Cape and North-West Provinces from the Asbestos Mountains southwest and northwest of Griekwastad, along the Kuruman Hills north of Danielskuil, passing west of Kuruman and re-emerging as isolated hills, i.e., Makhubung and the hills around Pomfret in the north. Occurs at altitudes between 1 100 and 1 800m.</p> <p>Rolling hills with generally gentle to moderate slopes and hill pediment areas.</p> <p>Open shrubveld with <i>Calobota cuspidosa</i> (=Lebeckia <i>macrantha</i>) prominent in places. The grass layer is well developed.</p> <p>Least Threatened, with a conservation target of 16%. No locations where this vegetation type is statutorily conserved exist. Very little of the area has been transformed and erosion is very low.</p>
<b>Western Priority Prospecting Areas</b>	
<b>Kathu Bushveld</b>	<p>The vegetation type is located on the plains from Kathu and Dibeng in the south, through Hotazel, vicinity of Frylinckspan to the Botswana border roughly between Van Zylsrus and McCarthysrus. Altitude 960–1 300 m. This vegetation type is considered least concern with a target of 16%, with nothing conserved in statutory conservation areas. More than 1% already transformed, including the iron ore mining locality at Sishen, one of the biggest open-cast mines in the world and erosion is very low (Mucina &amp; Rutherford, 2006).</p> <p>The Kathu Bushveld vegetation type has a medium-tall tree layer with <i>Acacia erioloba</i> in places, but is mostly open, with <i>Boscia albitrunca</i> as the predominant trees. Shrub layer generally most important with species such as <i>A. millifera</i>, <i>Diospyros lycioides</i> and <i>Lycium hirsutum</i>. Grass layer is variable in cover (Mucina &amp; Rutherford, 2006).</p>
<b>Kuruman Thornveld</b>	Refer to description above
<b>Olifantshoek Plains Thornveld</b>	<p>It is located in the Northern Cape Province on plains including much of the pedimenty areas of the Korannaberg, Langeberg and Asbestos Mountains as well as some ridges to the west of the Langeberg. It occurs at an altitude of 1 000 to 1 500 m. It is a wide and diverse vegetation type occurring on plains with open tree and shrub layers which include <i>Boscia albitrunca</i> and <i>Searsia tenui-nervis</i> with a usually sparse grass layer. This vegetation type receives summer and autumn rainfall with very dry winters (Mucina &amp; Rutherford, 2006).</p> <p>The Olifantshoek Plains Thornveld vegetation type is classified as <u>Least Threatened</u>.</p>

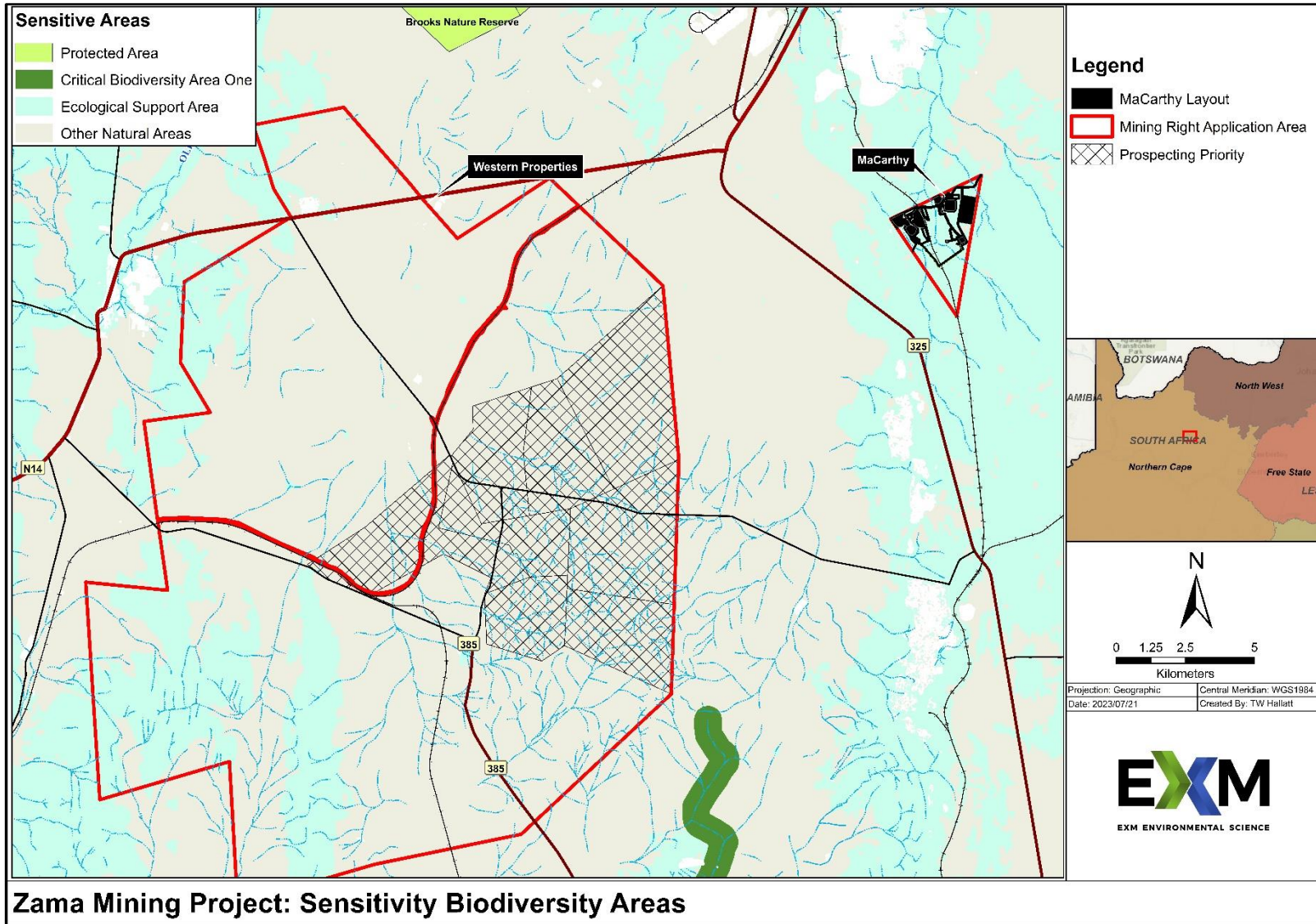


Figure 10-11: Sensitive Biodiversity Areas



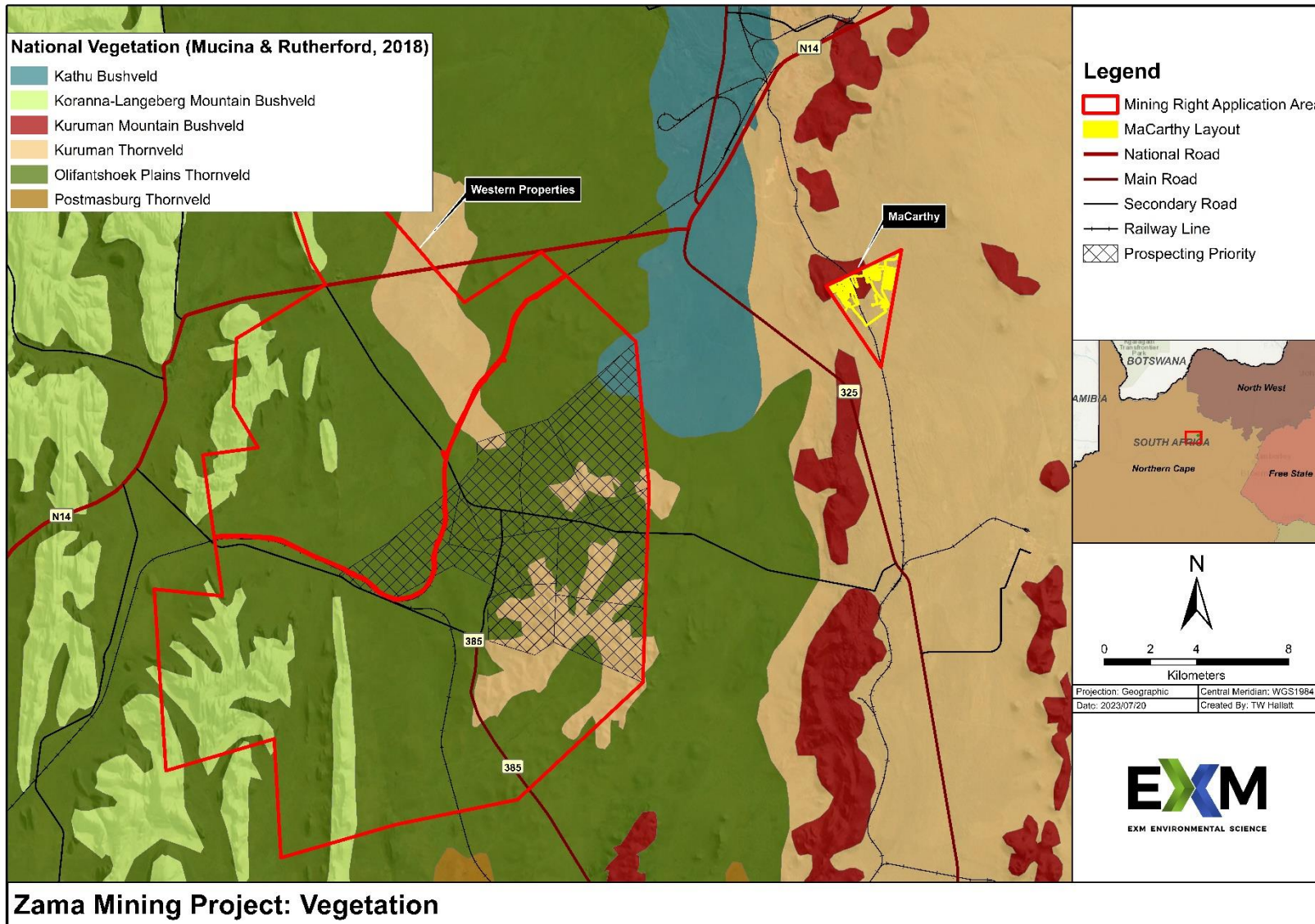


Figure 10-12: Vegetation Types

### 10.8.3 Field Assessment (MaCarthy Section)

A detailed field assessment of the MaCarthy project area was undertaken (April 2022) by Trogon Biodiversity (**Part C: Appendix C1**) to determine the ecological condition of the project area.

#### 10.8.3.1 Priority Floral Species

The occurrence of priority floral species within the project area as recorded during the field assessment, can be summarised as follows:

Occurrence of priority floral species	Species recorded during field assessment
IUCN <sup>7</sup> and SANBI <sup>8</sup> threatened floral species and floral Species of Conservation Concern ("SCC")	No species confirmed and unlikely to occur.
NEMBA Threatened and Protected Species (TOPS) species	<i>Harpagophytum procumbens</i> confirmed from the Kalahari Bushveld habitat unit.
National Forests Act (Act No. 84 of 1998) protected tree species	<i>Vachellia erioloba</i> and <i>Boscia alitrunca</i> confirmed from the Kuruman Mountain Bushveld, Kuruman Thornveld and Kalahari Bushveld habitat units.
Northern Cape Nature Conservation Act (No. 9 of 2009) protected floral species	22 species confirmed.
GWC Endemic and near-endemic species	<i>Searsia tridactyla</i> and <i>Tarchonanthus obovatus</i> confirmed.

No floral SCC were identified for the area by the DFFE Screening Tool, Plants of Southern Africa ("POSA") database and the Botanical Database of Southern Africa (BODATSA).

#### 10.8.3.2 Habitat units

During the field assessment, seven broad habitat units were identified within the project area which were based primarily on floral species composition and vegetation structure, faunal species' habitat provision, the topographical position of the habitat unit in the landscape, as well as the degree of historical and current anthropogenic impact and disturbance within the unit. The terrestrial ecological sensitivity of each habitat unit was also taken into consideration.

The Site Ecological Importance ("SEI") of each habitat unit was determined by considering biodiversity importance (e.g. species of conservation concern, the vegetation/fauna community or habitat type present on the site) it's resilience to impacts, conservation importance and the functional integrity thereof. The methodology used to determine the

<sup>7</sup> The International Union for Conservation of Nature Red List of Threatened Species, also known as the IUCN Red List or Red Data Book, founded in 1964, is the world's most comprehensive inventory of the global conservation status of biological species.

<sup>8</sup> The South African National Biodiversity Institute (SANBI) is an organisation established in terms of the National Environmental Management: Biodiversity Act, No 10 of 2004 tasked with research and dissemination of information on biodiversity, and legally mandated to contribute to the management of the country's biodiversity resources

SEI is provided in Section 5.4 of the Biodiversity Assessment. A summary of each habitat unit and its SEI is provided in Table 10-9 and illustrated in Figure 10-13.

**Table 10-9: Habitat Units and Site Ecological Importance ("SEI") (McCarthy)**

Habitat Unit	Description	SEI
<b>Kuruman Mountain Bushveld Rocky Outcrops</b>	<p>This habitat unit is considered largely representative of the Kuruman Mountain Bushveld vegetation type. Rocky outcrops provide important niche habitat for floral and faunal species.</p> <ul style="list-style-type: none"> <li>The nationally and provincially protected tree species <i>Boscia albitrunca</i> (Shepard's tree) occur in moderate abundance while the provincially protected tree species <i>Gymnosporia buxifolia</i> (spikethorn) and <i>Olea europaea</i> subsp. <i>africana</i> (African Wild Olive) were also noted.</li> <li>Several provincially protected floral species as listed in the Biodiversity Assessment were recorded.</li> <li>Two Giqualand West Centre endemics namely <i>Searsia tridactyla</i> and <i>Tarchonanthus obovatus</i> were recorded.</li> <li>No faunal SCC were noted.</li> </ul>	High
<b>Kuruman Thornveld Dense</b> <b>Kuruman Thornveld Open</b>	<p>Most prominent within the southern portion of the project area and extending northwards to the east and west of the railway line, where it also occurs on slopes.</p> <ul style="list-style-type: none"> <li>No floral SCC species were recorded or are likely to occur.</li> <li>Two nationally protected tree species in terms of the National Forests Act, namely <i>Boscia albitrunca</i> and <i>Vachellia erioloba</i> were recorded.</li> <li>Several provincially protected floral species as listed in the Biodiversity Assessment were recorded.</li> <li>No faunal SCC were recorded. Kori Bustard (<i>Ardeotis kori</i>) may utilise this habitat on occasion. Signs of one TOPS-listed species <i>Orycteropus afer</i> were noted while a single <i>Harpactira baviana</i> specimen was also recorded within this habitat unit. Both species are also provincially protected faunal species in terms of Schedule 1 of the NCNCA. Other faunal TOPS-listed species that may occur include Bat-eared Fox (<i>Otocyon megalotis</i>) and Cape Fox (<i>Vulpes chama</i>).</li> </ul>	Medium
<b>Kuruman thornveld modified</b>	<p>Conspicuous bare and grassed areas that are devoid of trees, are present within this habitat unit, which allow for a higher diversity of forb species within this unit. The Modified Kuruman Thornveld Habitat Unit is characterised by disturbances such as outbuildings, subsistence crops and livestock keeping.</p>	Low
<b>Kalahari Bushveld</b>	<ul style="list-style-type: none"> <li>No floral SCC species were recorded or are likely to occur.</li> <li>One TOPS-listed floral species, namely <i>Harpagophytum procumbens</i> was however recorded.</li> <li>Two nationally protected tree species in terms of the National Forests Act, namely <i>Boscia albitrunca</i> and <i>Vachellia erioloba</i> were recorded.</li> <li>Several provincially protected floral species as listed in the Biodiversity Assessment were recorded.</li> <li>No faunal SCC were recorded. Martial Eagle (<i>Polemaetus bellicosus</i>) may utilise this habitat on occasion however given the existing disturbances associated with Salene Manganese Mine, these occurrences are likely to be sporadic during foraging bouts. Signs of one TOPS-listed species <i>Orycteropus afer</i> were noted within this habitat unit.</li> <li>Two provincially protected faunal species, namely <i>Orycteropus. afer</i> and Brown Snake Eagle (<i>Circaetus cinereus</i>) were reported.</li> </ul>	High
<b>Watercourse</b>	<p><b>Habitat</b> This habitat unit encompasses the two riparian areas and associated drainage lines as well as episodic drainage lines and depression wetlands occurring within the project area.</p> <p><b>SCC, Protected and TOPS-listed species.</b></p> <ul style="list-style-type: none"> <li>No floral SCC or TOPS-listed species were recorded. No Nationally protected tree species were recorded.</li> <li>One provincially protected floral species, namely <i>Crinum bulbispermum</i> was recorded.</li> <li>No faunal SCC were recorded or are likely to occur.</li> </ul>	High

Habitat Unit	Description	SEI
	<ul style="list-style-type: none"> <li>One provincially protected faunal, namely Pearl-spotted Owlet (<i>Glaucidium perlatum</i>) was recorded.</li> </ul>	
Infrastructure	These areas are associated with existing infrastructure such as access and haul roads, a railway line, and outbuildings.	Low

## 10.8.4 Faunal species (MaCarthy Section)

### 10.8.4.1 Field Assessment findings

A field assessment was undertaken as part of the Biodiversity Assessment (Trogon Biodiversity) in October 2022 on the MaCarthy Section. The Table 10-10 provides the results of the field assessment in terms of faunal diversity.

**Table 10-10: Fauna Identified during Field Assessment**

MaCarthy Farm	
Type of fauna	Fauna recorded during Field Assessment
<b>Mammals</b>	12 species were recorded within the project area through direct and indirect signs (Table 18 and Figure 33 of the <i>Terrestrial Biodiversity Assessment</i> ). The Kuruman Mountain Bushveld and Rocky Outcrops provided niche habitat for rupicolous mammal species such as Rock Hyrax ( <i>Procavia capensis</i> ) and Red Rock Rabbit ( <i>Pronolagus cf rupestris</i> ). A higher density of rodent burrows was noted within the sandy Kalahari Bushveld habitat unit as opposed to the rockier western Kuruman Thornveld habitat and these are likely those of Bushveld Gerbils ( <i>Gerbilliscus leucogaster</i> ), Hairy-footed Gerbil ( <i>Gerbillurus paeba</i> ) and Muridae species. From the desktop assessment, Dent's Horeshoe Bat ( <i>Rhinolophus denti</i> ) was the only mammal SCC reported.
<b>Amphibians</b>	Two amphibians were recorded during the 2022 field assessment comprising of Boettger's Caco ( <i>Cacosternum boettgeri</i> ) and Western Olive Toad ( <i>Sclerophrys poweri</i> ). No Amphibians SCC have been reported within the 2723CC QDS and none were noted during the 2022 field survey.
<b>Reptiles</b>	During the 2022 field assessment, four species were recorded within the project area (Table 19 of the <i>Terrestrial Biodiversity Assessment</i> ), with Ground Agama ( <i>Agama aculeata aculeata</i> ) recorded most frequently. Discussion with site personnel indicated the presence of Cape Cobra ( <i>Naja nivea</i> ) within the surrounding landscape. Based on available habitat within the project area further species likely to occur include Short-snouted Grass Snake ( <i>Psammophis brevirostris</i> ), Spotted Sand Lizard ( <i>Pedioplanis lineocellata lineocellata</i> ), Variegated Skink ( <i>Trachylepis variegata</i> ), Bushveld Lizard ( <i>Heliobolus lugubris</i> ), Spotted Sandveld Lizard ( <i>Nucras intertexa</i> ), Spotted Sand Lizard ( <i>Pedioplanis lineocellata lineocellata</i> ), Southern Rock Agama ( <i>Agama atra</i> ), Bibron's Gecko ( <i>Chondrodactylus bibronii</i> ) and Rock Monitor ( <i>Varanus albigularis albigularis</i> ). No reptile SCC have been reported within the 2723CC QDS and none were noted during the 2022 field survey.
<b>Avifauna</b>	A total of 59 species were noted during the 2022 field survey (detailed in Table 20 of the <i>Terrestrial Biodiversity Assessment</i> ) Three avifaunal SCC have a moderate-high or moderate probability of occurrence. However, resident populations (breeding events) confined to the project area are unlikely. Avifaunal SCC likely to occur within the project area are specified within Table 23 of the <i>Terrestrial Biodiversity Assessment</i> .



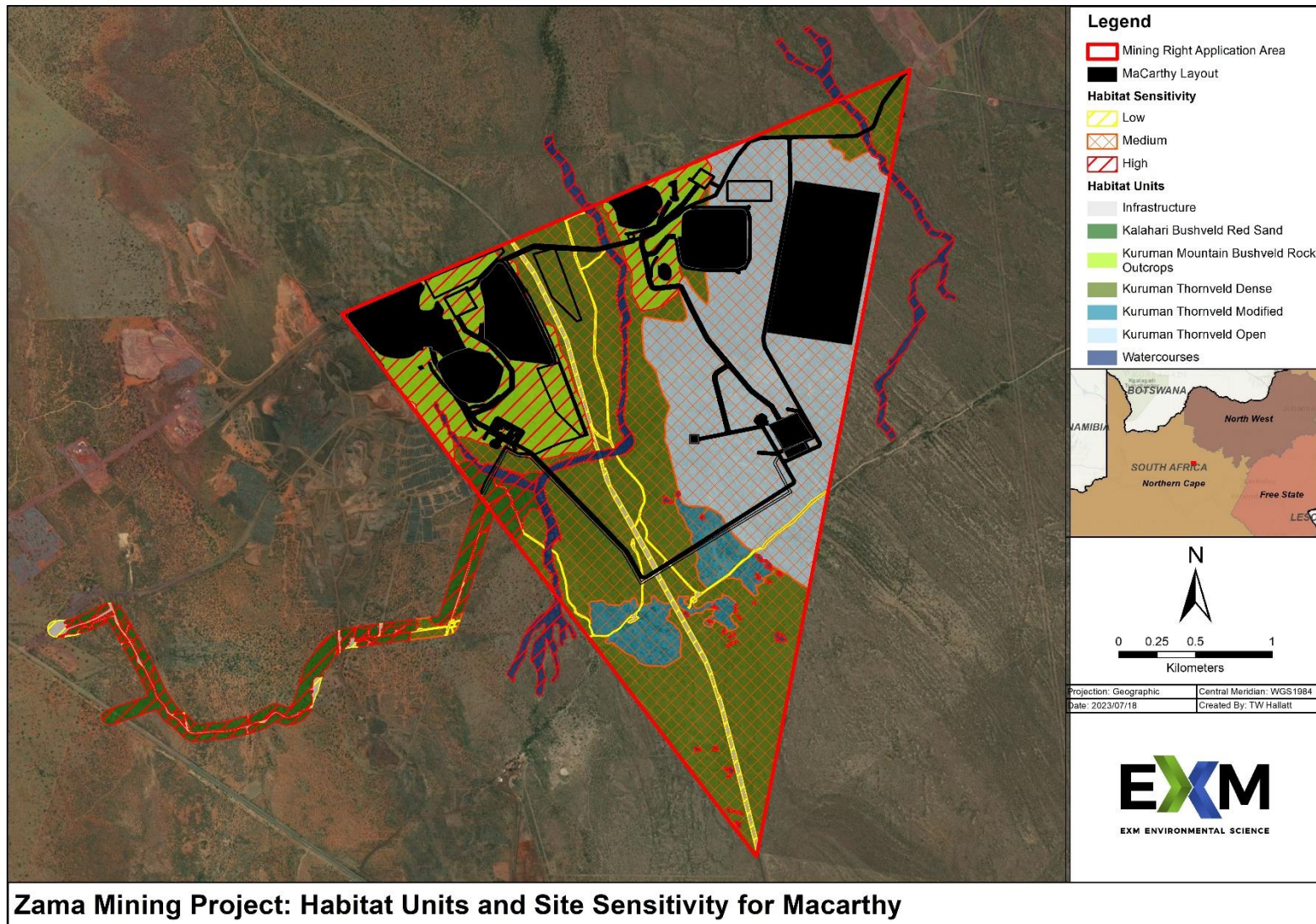


Figure 10-13: Habitat Units and Site Sensitivity Map- MaCarthy



## 10.8.5 Field Assessment (Priority Prospecting Areas)

### 10.8.5.1 Priority Floral Species

The occurrence of priority floral species within the project area as recorded during the field assessment, done by The Biodiversity Company, is summarised in Table 10-11.

**Table 10-11: Priority Floral Species**

Occurrence of priority floral species	Species recorded during field assessment
IUCN <sup>9</sup> threatened floral species and floral Species of Conservation Concern ("SCC")	No IUCN protected species of conservation concern were recorded during the site visit.
NEMBA Threatened and Protected Species (TOPS) species	Two Threatened or Protected species (TOPS) plants were found within the project area. These are <i>Harpagophytum procumbens subsp. procumbens</i> and <i>Pachypodium succulentum</i> .
National Forests Act (Act No. 84 of 1998) protected tree species	Three nationally protected trees were also found within the project area. These were <i>Boscia albitrunca</i> , <i>Vachellia erioloba</i> and <i>Vachellia haematoxylon</i> . These are protected under the national list of protected trees and require a permit for their destruction.
Northern Cape Nature Conservation Act (No. 9 of 2009) protected floral species	One specially protected species was found within the project area ( <i>Lessertia pauciflora</i> ). There were 17 provincially protected species found within the project area.
Alien Invasive Species	Six alien invasive species ( <i>Argemone Mexicana</i> , <i>Cirsium vulgare</i> , <i>Datura ferox</i> , <i>Melia azedarach</i> , <i>Opuntia ficus-indica</i> , <i>Xanthium spinosum</i> ) were recorded from the project area.

### 10.8.5.2 Habitat Units

Four (4) different habitat units were delineated within the assessment area which correlates with the vegetation types. These habitat types are primarily based on vegetation parameters including dominant species and vegetation structure and faunal habitats can then be inferred based on these delineations because of available food and other resources. All habitats within the project area of the proposed development were allocated a sensitivity category or SEI as indicated in Table 10-12 below.

**Table 10-12: Habitat Units and Site Ecological Importance ("SEI") (Western Priority Prospecting Areas)**

Habitat Unit	Description	SEI
<b>Searsia tridactyla - Aristida vestita koppie veld</b>	This vegetation unit occurs on rolling hills with shallow soils. The underlying geology appears to be both banded ironstone and of a quartzitic nature. Dominant species are <i>Senegalia mellifera subsp. detinens</i> , <i>Tarchonanthus camphoratus</i> , <i>Searsia ciliata</i> and <i>Aristida vestita</i> . Unique species occurring in this vegetation unit are <i>Pachypodium succulentum</i> , <i>Euphorbia wilmaniae</i> , <i>Lithops aucampiae var. aucampiae</i> , <i>Searsia tridactyla</i> , <i>Rhigozum obovatum</i> and <i>Euclea undulata</i> .	<b>High</b>

<sup>9</sup> The International Union for Conservation of Nature Red List of Threatened Species, also known as the IUCN Red List or Red Data Book, founded in 1964, is the world's most comprehensive inventory of the global conservation status of biological species.

Habitat Unit	Description	SEI
<b>Vachellia erioloba - Stipagrostis uniplumis woodland</b>	This vegetation unit is your typical "kalahari type vegetation" comprised of deep aeolian sands with large interspersed <i>Vachellia erioloba</i> (Camel thorn) trees. The dominant species are <i>Vachellia erioloba</i> , <i>Stipagrostis uniplumis</i> , and <i>Grewia flava</i> . Unique Species which occur in this unit are <i>Harpagophytum procumbens subsp. procumbens</i> and <i>Vachellia haematoxylon</i> .	Medium
<b>Vachellia karroo - drainage lines</b>	This unit is comprised of drainage areas where the species <i>Vachellia karroo</i> was prevalent. The soils are generally deep and in some areas erosion was a problem presumably created by flash floods, which is difficult to manage. The succulent species <i>Orbea lutea subsp. lutea</i> and <i>Kewia salsoloides</i> was found in this vegetation type as well as the bulbs <i>Nerine laticoma</i> , <i>Bulbine narcissifolia</i> and <i>Ammocharis coranica</i> .	High
<b>Jamesbrittenia atropurpurea – Stipagrostis obtusa floodplain</b>	The vegetation within this unit is comprised of mostly forbs. It is a dry floodplain dominated by species such as <i>Eragrostis truncata</i> , <i>Diospyros lycioides</i> , <i>Stipagrostis obtusa</i> and <i>Pentzia calcarea</i> . Species which are unique to this vegetation unit are <i>Jamesbrittenia atropurpurea</i> , <i>Eragrostis truncata</i> , <i>Hermannia linearifolia</i> and <i>Hertia pallens</i> .	High

### 10.8.6 Faunal species (Western Priority Prospecting Areas)

#### 10.8.6.1 Field Assessment findings

A field assessment was undertaken as part of the Biodiversity Assessment (Trogon Biodiversity) in October 2022 on the MaCarthy Section. The Table 10-10 provides the results of the field assessment in terms of faunal diversity.

**Table 10-13: Fauna Identified during Field Assessment**

Prospecting Areas	
Type of fauna	Fauna recorded during Field Assessment
<b>Mammals</b>	A total of twenty-four (24) mammal species were recorded within the project area during the survey period (detailed in Table 3-8 and Figure 3-15 of The Biodiversity Company's specialist assessment). It is considered highly likely that additional small mammal species would be recorded from the project area with extensive sampling. The Vulnerable species <i>Giraffa camelopardalis</i> was recorded from the project area. A fair number of species were present due to their value to the game ranch industry, these species would not otherwise be present in the project area due to anthropogenic pressure.
<b>Amphibians</b>	No amphibian species were recorded during the survey period. The lack of species richness was attributed to the dry nature of the project area with most water bodies and perennial drainage lines being dry at the time of the site visit. The species expected to occur within the project area provided in Appendix C. No amphibian SCC are expected for the project area.
<b>Reptiles</b>	Three reptile species, representing three families, were recorded within the project area during the survey periods (detailed in Table 3-7 and Figure 3-14 of The Biodiversity Company's specialist assessment). The lack of species richness was likely due to the combination of the inherent secretive nature of reptile species, and limited time available for fieldwork (a true representative sample requires an extensive sampling period over several surveys). The presence of suitable habitat suggests that the project area supports a diverse reptile community. No reptile SCC were recorded from the project area.
<b>Avifauna</b>	A total of Fifty (50) avifauna species were recorded within the project area during the survey period (detailed in Table 3-9 of The Biodiversity Company's specialist assessment). It is considered highly likely that additional avifauna species would be recorded from the project area with extensive sampling. No Avifauna SCC were recorded from the project area.

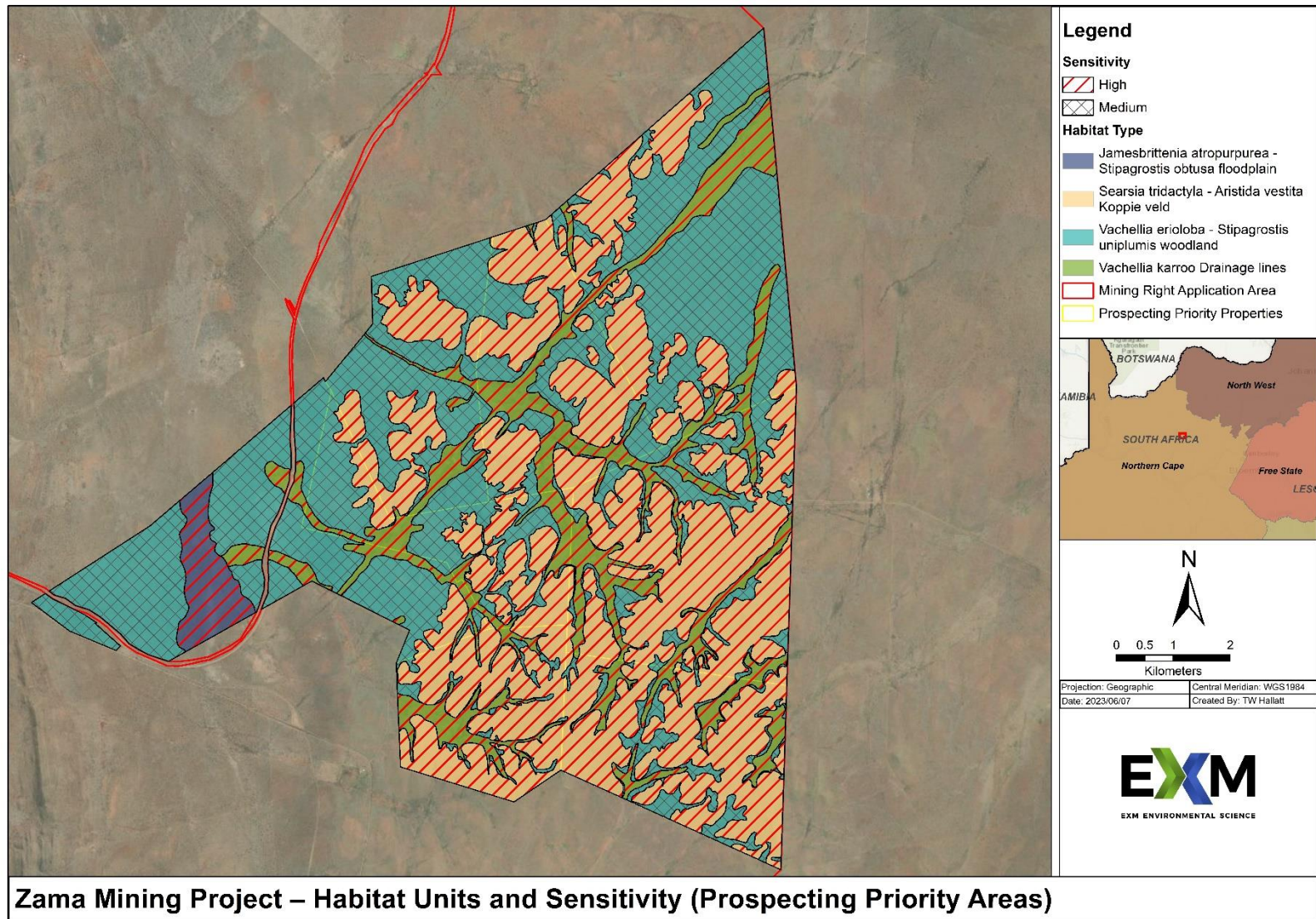


Figure 10-14: Habitat Units and Site Sensitivity Map- Western Priority Prospecting areas



## 10.9 Traffic

A Traffic Impact Assessment ("TIA") was undertaken by R&G Kalahari Consulting Engineers (May 2023) (**Part C: Appendix E**). The MN 14146 provincial road which connects to the northern section of the property as illustrated in Figure 5-2 will be used for LDV and HME vehicles to access MaCarthy. From here the ore will be transported north and connect to the DR 03333 provincial road approximately 8km from the site. The route will then cross the N14, and the ore will be off-loaded at Sishen Mine for processing. The provincial road currently has 880 to 1100 vehicles per day driving along the route which is higher than the 700 vehicles per day threshold. However, the road is well maintained by Afrimat, Helpebietjie and Demaneng Mine, and dust suppression is routinely applied. Additional vehicles from the project will increase pressure on the road and agreements with current users regarding maintenance needs to be established.

The TIA indicated that the current Level of Service ("LOS")<sup>10</sup> of the N14/DR03333 intersection is rated as an LOS A which is generally good with minor delays. The addition of traffic from MaCarthy will reduce it to a LOS B which is still good, but with slightly more delays. It was found that vehicles crossing the N14 has less impact than vehicles leaving and entering the N14. This is due to the gap requirement for acceleration to safely join the N14. The provincial gravel road has an LOS A and will not change due to the additional traffic.



**Figure 10-15: Dust Suppression on the DR03333 Provincial Road**

<sup>10</sup> Level of service (LOS) is a term used to describe the operating conditions of a roadway based on factors such as speed, travel time, manoeuvrability, delay, and safety. It basically shows the current user experience on a specific road. The LOS is rated on a scale from A (very good) to F (unacceptable).

## 10.10 Geology

According to the Geohydrological Study (Gradient, 2023), the regional geology is characterised by rocks from the Transvaal Supergroup which were deposited in the sedimentary Griqualand West basin within the Maremane Dome on the western edge of the Kaapvaal Craton. In the Griqualand West basin, the Transvaal Supergroup has a gentle dip to the west. The base of the Griqualand West succession comprises of the sedimentary Ghaap Group which is overlain by the clastic Postmasburg Group.

The Ghaap Group is sub-divided into the lower interbedded shales and dolomites of the Schmidtsdrif Subgroup followed by the limestones and dolomites of the Campbellrand Subgroup. This subgroup is locally dominated by chert and chert breccia's which overlie the dolomites and grades upwards into massive, laminated ore and BIFs of the Asbestos Hills Subgroup, which is interlayered by chert and shales (Beukes, 1983). The Dolomite paleo surface is karst, leading to collapse structures where iron and manganese formation has fallen into karst cavities to form the well-known Wolhaarkop Breccia body.

The Transvaal Supergroup sequence in the central and western sections of the Maremane Dome is unconformably overlain by the shales and red-bed clastic Gamagara Formation of the Olifantshoek Supergroup. The Olifantshoek Supergroup is largely covered by Kalahari Group sands and calcretes, especially towards the north. The lower part comprises mainly of quartzites and shales, followed by a succession of lavas overlain by thick reddish and purple quartzites and schists. Locally, the Kalahari formation is characterised by calcretes, calcareous sands, clays and pebbles.

To the west the study area is underlain by andesitic lavas of the Ongeluk Formation (Postmasburg Group) comprising of tuff, conglomerate, chert and red jasper. The lavas can extend to depths of at least 200 m (Meyer, 2010). Further to the west outcrops of the Lucknow quartzite formation also occur which is underlain by the andesitic lavas. The lava typically comprises of an upper weathered horizon and lower unweathered fractured lava. The lavas and quartzites are over large areas covered by aeolian sand which is typically underlain by largely impermeable calcrete.

The study area is also characterised by extensive geological structures that plays a role in the groundwater dynamics. A series of deformation events produced extensive N-S trending (west dipping) faults which are tightly spaced within the Asbestos Hills (dolomites). These faults show evidence of past water flow but are largely dry at surface. NE/ENE and SE/ESE strike-slip faults cross-cut the N-S trending faults and also a series of diabase dykes.

Thick diabase dykes exploited the major N-S trending structures and also tend to follow the NE-SW trending faults. These dykes also play a major role in the regional groundwater dynamics, especially in creating flow barriers and groundwater compartments, which often limit the impacts associated with mine dewatering.

## 10.11 Groundwater

Information for this section was obtained from the Geohydrological impact assessment (**Part C: Appendix C**) done by Gradient (2022).

### 10.11.1 Groundwater use

Groundwater is the main source of water supply in the general area. Groundwater from wells and boreholes is used for domestic supply, livestock watering and limited irrigation of household gardens, fruit trees and small-scale crop irrigation in some areas. In the wider region groundwater is also used for mining purposes, i.e., dust suppression, processing, and potable purposes.

### 10.11.2 Aquifer types and yield

According to Gradient (2022), the study area falls within the Griqualand West groundwater region, which is characterised by compact sedimentary strata including mudstone, iron formations, jaspilite, diabase (dolerite) intrusions, mafic and basic lavas, arenaceous strata and dolomites. Aquifer properties are primarily determined by considering these underlying lithologies. From available data and literature as well as the inferred hydrogeological map, three main aquifer systems are predominantly present as summarised in **Table 10-14**.

**Table 10-14: Summary of Aquifers in the Region**

Aquifer	Description
Fractured aquifer	Comprising mainly of shales, brecciated BIF's and jaspilite with yields ranging from 0.5 – 2.0 L/s. Regionally, this aquifer is also considered a major aquifer system within Transvaal/Griqualand West sequences where water occurrence is mainly within fissures and fractures in the brecciated BIFs where mineralization and preservation of ore bodies occurred through folding, thrusting, fracturing and sinkholes.
Karst (dolomitic) aquifer	Comprising predominantly of carbonate rocks (dolomite) and chert with yields ranging from 0.5 – 2.0L/s. Yields of higher than 40L/s have also been recorded in this aquifer in the region.

In addition to the two main aquifer systems, temporary perched, riverbed aquifers are also found which are located in the riparian zone surrounding the drainage lines and rivers. This primary alluvial sand aquifer is directly recharged during rainfall events and is limited to a

zone of variable width and depth, largely determined by the depth and extent of the calcrete and pebble beds. From the local groundwater levels and subsurface lithology, it is assumed that this aquifer only contributes to river flow directly following significant rainfall events. Loss in contribution to baseflow will be minimal as the current groundwater contribution to baseflow is insignificant.

### 10.11.3 Groundwater Levels

The average groundwater level for the study area is calculated to be 19.3 Metres Below Ground Level ("mbg"). This indicates that an extensive unsaturated zone is present, and that groundwater occurrence is mostly within the deeper, fractured aquifer.

### 10.11.4 Groundwater Quality

The overall water quality in the sampled boreholes was found to be of good quality with all parameters being within screening guidelines for drinking water, except for one (1) borehole. The groundwater signature for the MaCarthy Zama study area indicates recently recharge unpolluted, magnesium/calcium bicarbonate type groundwater with strong alkalinity. These signatures may also be indicative of dolomitic water. Only one (1) borehole, MZBH19, had a stronger chloride signature which may be indicative of a deeper, stagnant aquifer unit. Table 10-15 provides details of the water quality analysis per sampling locality.

**Table 10-15: Hydrochemistry: Groundwater quality evaluation**

Constituent	SANS 2015	241	MZ-BH02	MZ-BH05	MZ-BH09	MZ-BH19	MZ-BH20	MZ-BH21
<b>MacCarthy Zama inorganic Chemistry (mg/ℓ)</b>								
pH	5.0 to 9.7		8,09	7,43	7,53	7,38	7,52	7,49
EC (mS/m)	170		80,0	103	108	235	87,5	71,1
TDS	1200		408	517	575	1 277	460	365
Total Alkalinity	NG		341	422	531	417	378	328
Nitrate (as N)	11		1,71	5,41	3,11	62,0	6,36	2,41
Chloride (Cl)	300		46,1	32,8	21,3	301	30,1	18,3
Sulphate (SO <sub>4</sub> )	500		18,0	28,5	37,7	86,2	25,6	18,3
Ammonium (NH <sub>4</sub> as N)	1.5		0,50	<0.45	<0.45	<0.45	<0.45	<0.45
Fluoride (F)	1.5		0,23	<0.09	<0.09	0,12	0,14	0,15
Calcium (Ca)	NG		54,7	113	95,9	185	78,2	64,8
Iron (Fe)	2.0		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Magnesium (Mg)	NG		54,3	54,6	76,8	141	51,7	42,1
Potassium (K)	NG		4,45	1,97	0,78	2,41	2,36	2,27
Sodium (Na)	200		17,1	9,26	10,5	36,2	15,8	11,0
Manganese (Mn)	0.5		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aluminium (Al)	0.3		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Constituent	SANS 2015	241	MZ-BH02	MZ-BH05	MZ-BH09	MZ-BH19	MZ-BH20	MZ-BH21
Arsenic (As)	0.01		<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
Chromium (Cr)	0.05		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper (Cu)	2.0		0,01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc (Zn)	5.0		0,01	0,01	<0.01	<0.01	<0.01	<0.01
Corrosion Ratio (Aka Larson-Skold)	0.3 (indicative)		<b>0,41</b>	0,25	0,15	<b>2,15</b>	0,26	0,19
Total hardness (CaCO <sub>3</sub> )	50 (Target WQO)		360	507	556	1043	408	335

### 10.11.1 Groundwater flow direction and hydraulic gradients

According to Gradient (2022), groundwater flow direction, locally, may potentially be impacted by dewatering from mine dewatering at nearby mines. The groundwater flow directions are indicated on Figure 10-16. It is observed that groundwater flow is generally towards the west within the site footprint and regionally towards the north.

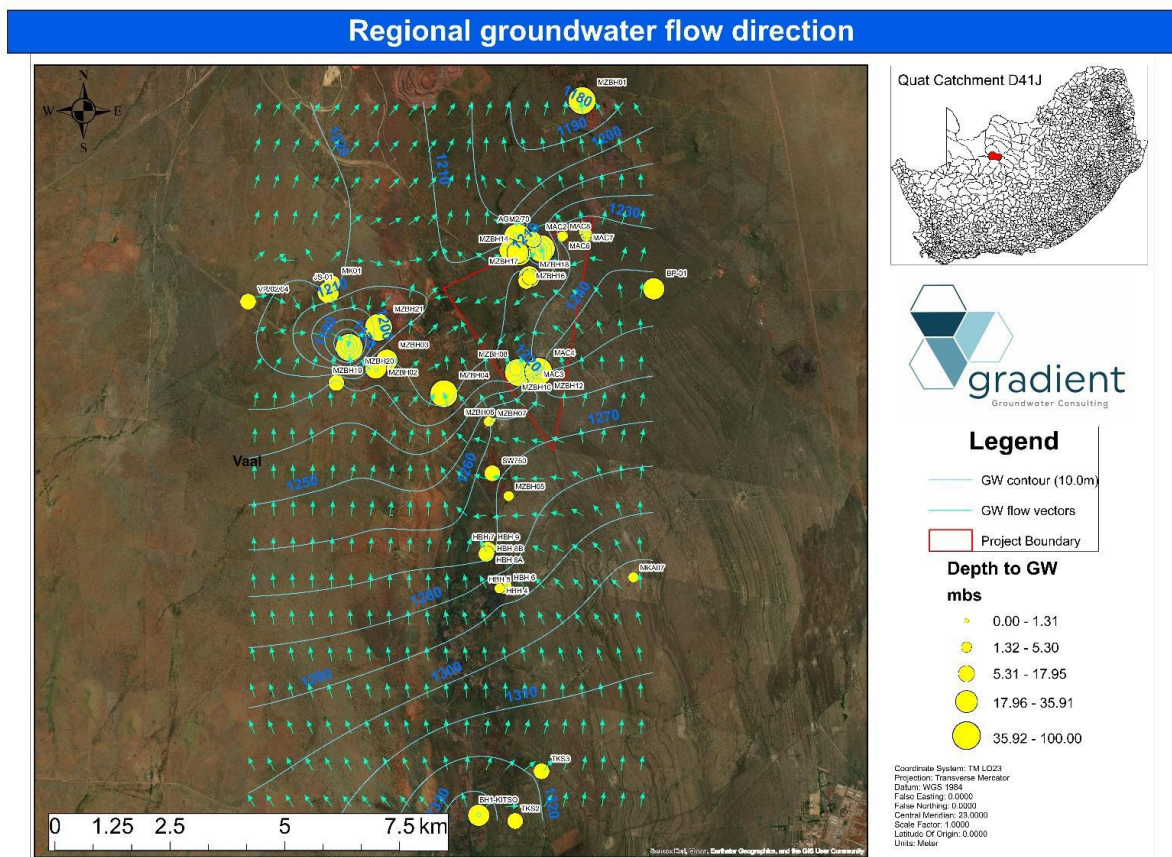


Figure 10-16: Regional Groundwater Flow Direction and Depth to Groundwater



### 10.11.2 Hydrocensus

A hydrocensus was completed by Gradient in a 3-4km radius of the farm, MaCarthy 559, in September 2022. A total of 21 boreholes were recorded during the hydrocensus. The borehole database utilized in this assessment is summarized in Table 10-16.

**Table 10-16: Hydrocensus results**

Borehole ID	Latitude	Longitude	SWL (mbg)	Farm / owner	Notes
MZBH01	-27,884156	23,053883	49,89	Help 'n Bietjie Mine	Equipped, in use, dynamic, SWL told to be at 13 mbg
MZBH02	-27,936653	23,008315	22,62	Salene Mine	Equipped (windpump), in use
MZBH03	-27,935123	23,010755	35,91	Salene Mine	Open, not in use
MZBH04	-27,941706	23,023382	50,52	Salene Mine	Equipped but not in use
MZBH05	-27,961771	23,037702	4,76	Salene Mine	Equipped but not in use
MZBH06	-27,947168	23,033326	3,56	Salene Mine	Old pit (windpump) not in use
MZBH07	-27,946833	23,034359	0	Salene Mine	Artesian, equipped in use
MZBH08	-27,937525	23,039833	47,66	MaCarthy Zama Mine	Alt name, ZMC060, open not in use
MZBH09	-27,939589	23,042504	0	MaCarthy Zama Mine	Artesian
MZBH10	-27,938556	23,043601	0	MaCarthy Zama Mine	Artesian
MZBH11	-27,937433	23,044512	0,47	MaCarthy Zama Mine	Alt name, MAC3
MZBH12	-27,937267	23,044282	45,59	MaCarthy Zama Mine	Alt name, MAC4, logger
MZBH13	-27,913996	23,039718	20,29	MaCarthy Zama Mine	Alt name, ZMC027

## 10.12 Archaeology and Cultural Heritage

### 10.12.1 MaCarthy Section

According to the Heritage Impact Assessment (**Part C: Appendix G1**), the project area is a historically sparsely populated rural area in which the human occupation consists 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.






A historic farmstead was identified on the MaCarthy Section as part of the field assessment which was also identified on Screening Report obtained from the DFFE National on-line Screening Tool. The location of the site is shown Figure 10-17. 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 site is of low significance.

**Table 10-17: Heritage Impact Field Assessment Results**

			
<p><b>Plate 1: Views of the Stone Age surface scatter site</b></p>			
			
<p><b>Plate 2: Views of the burial site</b></p>			
			
<p><b>Plate 3: Views of the Farmstead</b></p>			

### **10.12.2 Western Prospecting Priority Areas**

The DFFE Screening Tool revealed several heritage sites within the Priority Prospecting Areas. 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.

A Heritage Impact Assessment for Priority Prospecting Properties was done by J.A. van Schalkwyk in March 2023 (**Part C: Appendix G2**). During the site visit, archaeological visibility was limited as a dense grass cover was encountered in all sections as result of high rainfall experience in the period January to March 2022. Dense thickets of Swarthaak (*Acacia mellifera*) made the walking of dedicated transects virtually impossible. The strategy therefore was to investigate areas, sites, and features which, based on experience, are the most likely places to present signs of early human habitation. The field assessment results are summarised in the Table 10-18 and the location of sites of significant heritage are depicted in Figure 10-17.

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



**Table 10-18: Summary of Field Assessment Results**

NHRA Category: Stone Age		
<p><b>7.1.1 – 7.1.9</b> No formal sites dating to the Stone Age were identified. The material found is classified as find-spots. As such it is surface material and accordingly it has a low sensitivity. Most of the stone tools that have been identified in the project area date to the Middle Stone Age, with only a few that might fit into the Later Stone Age and even fewer to the Early Stone Age.</p>		
 <p>7.1.1</p>	 <p>7.1.2</p>	 <p>7.1.3</p>
 <p>7.1.4</p>	 <p>7.1.5</p>	 <p>7.1.6</p>





7.1.7



7.1.8



7.1.9

**Iron Age-** No sites, features or objects of cultural significance dating to the Iron Age were identified in the project area.

**Historic period**

**7.3.1** Small, formally fenced burial site. Two graves, one marked only with stone cairn. On the other, the headstone reads: ASM Smit (1909).

**7.3.2** Informal burial site with approximately 30 graves, all marked only with stone cairns.

**7.3.3** Small, formally fenced burial site. Two graves with headstones: MS Viljoen (1909) and JSF Venter (1910). A third grave was two overgrown with trees to get information from.

**7.3.4** Informal burial site with probably 20 graves. They are all outlined with bricks.



7.3.1



7.3.1



7.3.2



7.3.3



7.3.3



7.3.4

**NHRA Category: Burial Sites**

- **7.3.1** Small, formally fenced burial site. Two graves, one marked only with stone cairn. On the other, the headstone reads: ASM Smit (1909).
- **7.3.2** Informal burial site with approximately 30 graves, all marked only with stone cairns.
- **7.3.3** Small, formally fenced burial site. Two graves with headstones: MS Viljoen (1909) and JSF Venter (1910). A third grave was two overgrown with trees to get information from.
- **7.3.4** Informal burial site with probably 20 graves. They are all outlined with bricks.



7.3.5



7.3.6



7.3.7





7.3.8



7.3.9



7.3.10

**NHRA Category: Built Features**

- **7.3.5** Apparently, this was the original farmhouse, but it is falling apart. According to the owner it dates to the 1920s, or maybe a bit later.
- **7.3.6** This house was used by the principal of the school that existed here during the 1940s and 1950s. It has been extensively altered by the current owner. What is now garage was used as dining room and tuckshop for the school children. The school has been totally demolished.
- **7.3.7** According to this owner this is the original house, but it was totally altered. The rondavel type structure apparently was a block house built during the Second South African War (1899-1902) but has been altered.
- **7.3.8** This used to be the original farmhouse and is still in use by some of the farm labourers. According to the owner it dates to the 1940s, a fact that is supported by the style and material used.
- **7.3.9** A small, rectangular structure built with local stone. No information is available, but it seems to be very old and might go back to the first settlement on the farm.
- **7.3.10** A small rectangular structure with a hipped roof. It was used in the past as an outpost for workers to stay overnight.



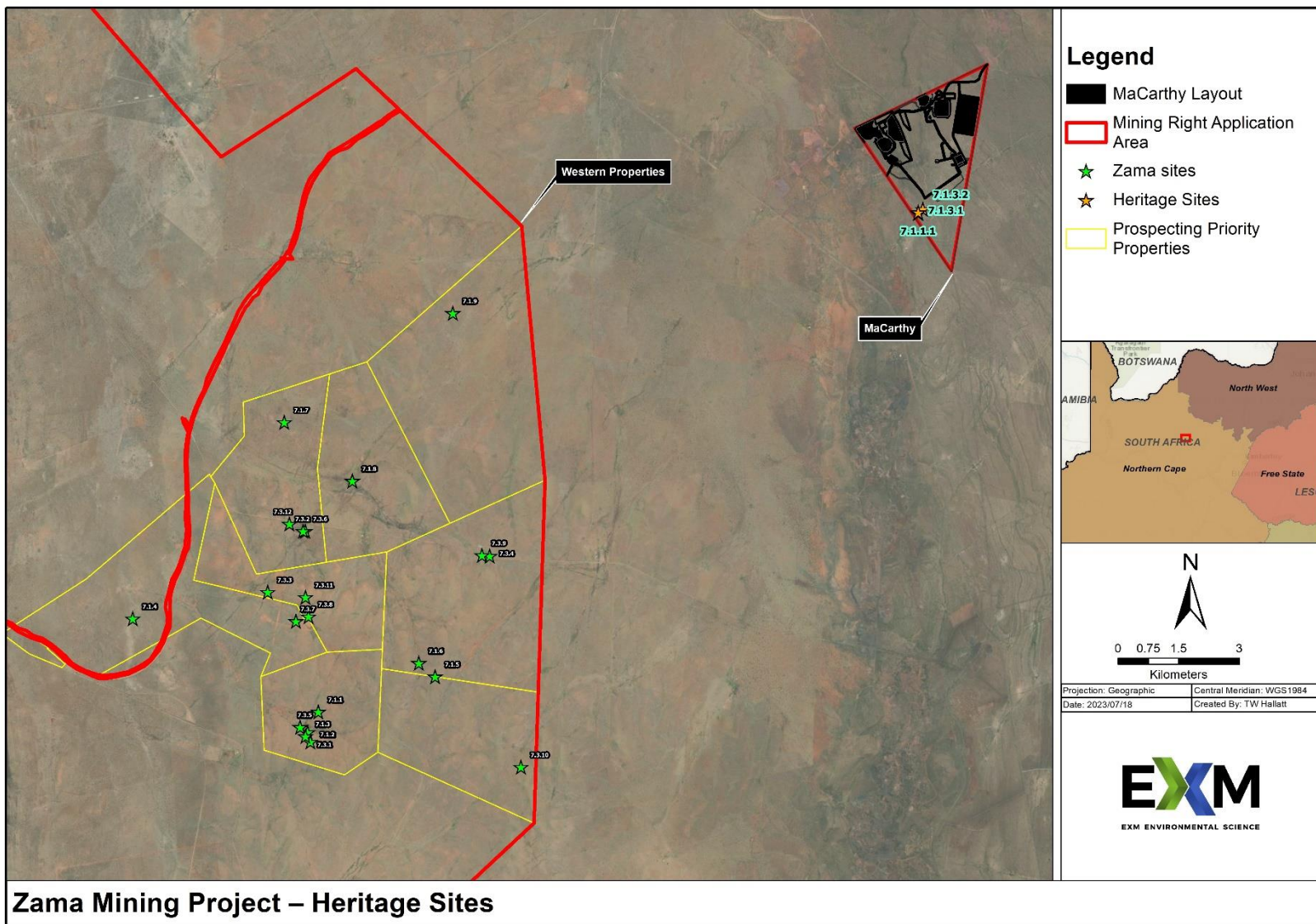
7.3.11



7.3.12



7.3.12



**Zama Mining Project – Heritage Sites**

**Figure 10-17: Location of Heritage Sites**

### 10.13 Palaeontology

The palaeontological impact desktop study assessment was undertaken by Fourie, H. Dr in May 2023 (**Part C: Appendix H**). When rock units of moderate to very high palaeontological sensitivity are present within the development footprint, a desktop and or field scoping (survey) study by a professional palaeontologist is usually warranted.

The Quaternary Formation to Holocene may contain fossils. A very wide range of possible fossil remains, though these are often sparse, such as mammalian bones and teeth, tortoise remains, ostrich eggshells, non-marine mollusc shells, ostracods, diatoms, and other micro fossil groups, trace fossils, freshwater stromatolites, plant material such as peats, foliage, wood, pollens, within calc tufa. Stromatolite structures range from a centimetre to several tens of metres in size (Groenewald and Groenewald 2014). In addition, the more recent Phanerozoic deposits (Cenozoic) are of importance in the study of life during the last 300 million years. Large areas in the western part of the Northern Cape Province are underlain by Cenozoic (Tertiary, Quaternary) deposits of the Kalahari Group. Stromatolites may be present in both the Olifantshoek and Transvaal Supergroups. Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, all strata have been allocated palaeontological sensitivities from **very low** to **very high**.

**Table 10-19: Criteria used to rate (Fossil Heritage Layer Browser/SAHRA)**

Rock Unit	Significance/vulnerability	Recommended Action
Quaternary	<b>High</b>	Desktop study is required, field assessment likely
Olifantshoek Supergroup	<b>Low</b>	Protocol for Chance Finds required
Transvaal Supergroup	<b>Moderate</b>	Desktop Study required

Using the criteria by Fossil Heritage Layer Browser/SAHRA as stated in Table 10-19 above, the Quaternary area was rated high, the Olifantshoek Supergroup was rated low, and the Transvaal Supergroup was rated moderate. There are significant fossil resources that may be impacted by the development and if destroyed are no longer available for scientific research or other public good. All the land involved in the development was assessed and none of the property is unsuitable for development.

## **10.14 Land Tenure**

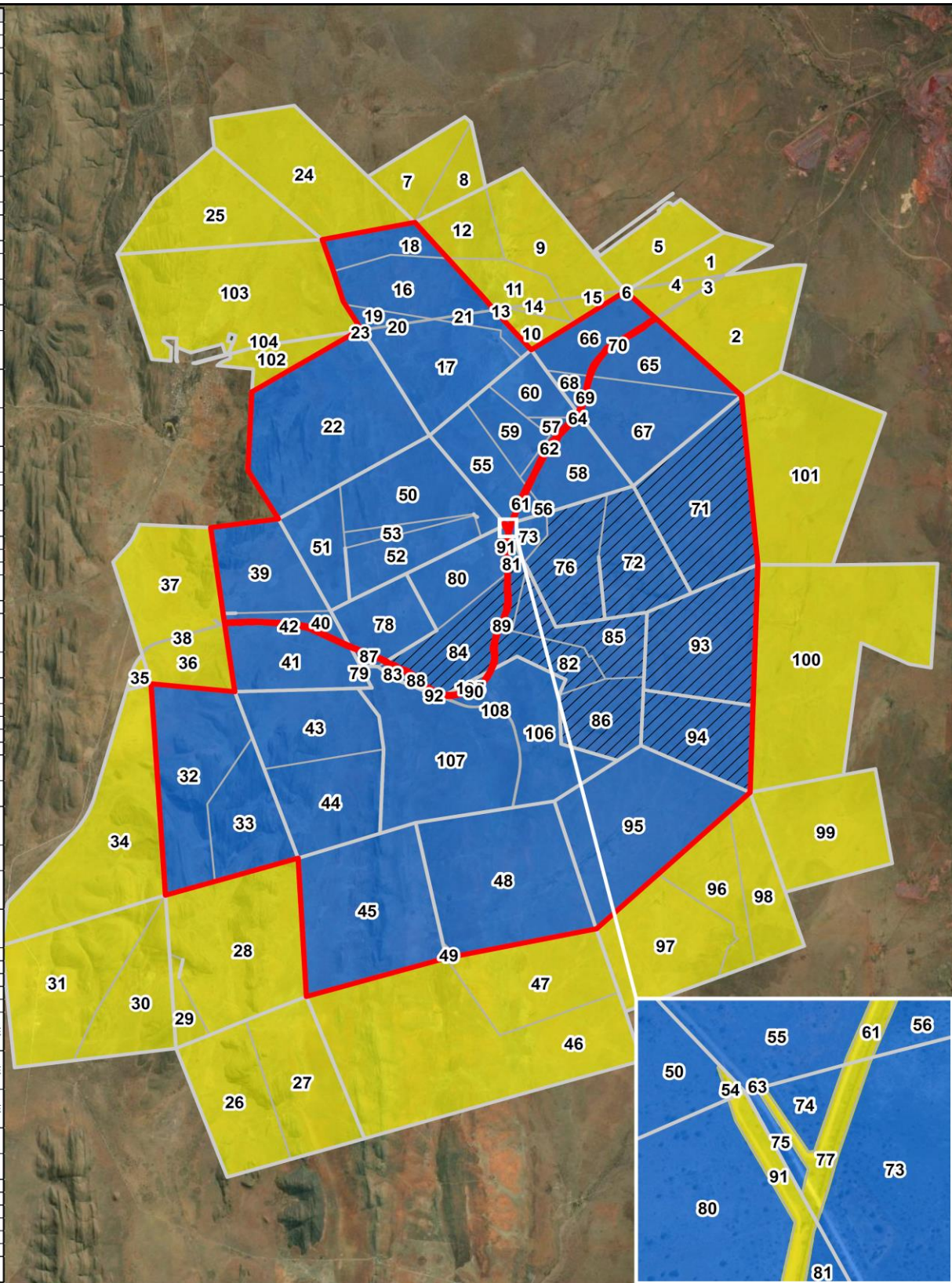
Zama Mining has held the prospecting right for iron ore and manganese over all properties included in the mining right application area since 2013. The properties included in the mining right application are all privately owned and are largely used for farming activities. Some of the properties are owned 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 (Remaining Extent) is owned by Assmang Limited and is currently used by a tenant for the purposes of livestock farming. There is also a rail servitude that crosses the MaCarthy site owned by Transnet. This will be excluded from the mining right area.

Figure 10-18 shows the properties associated with the mining right application area on the western properties as well as the surrounding farms (not within the application area). Figure 10-19 shows the properties associated with the mining right application area on for the MaCarthy section as well as the surrounding farms (not within the application area).



NR	PORTION	FARM NAME	OWNER	NR	PORTION	FARM NAME	OWNER
7	2/569	BEAUMONT 569	BERNICE FAMILIE TRUST	29	1/644	LOGOLONG 644	HENTIQ 2161 PTY LTD
8	3/569	BEAUMONT 569	ROELOFSE ANDRIES JOHANNES	100	RE/669	LOMOTENG 669	HILLIARD TRUST
36	RE/649	COMMISSIE 649	WALT ABRAHAM BAREND VAN DER	45	652	LUCKNOW 652	COLNAGO CC - BJ VAN NIEKERK
37	RE/649	COMMISSIE 649	WALT ABRAHAM BAREND VAN DER	99	3/668	MAGOLORING 668	CLAASSENS RENSKIE MARIA
38	2/649	COMMISSIE 649	TRANSNET LTD	32	RE/646	MAKALA 646	STORM BOERDERY CC - GOLEY STORM
95	665	COMPASS 665	JOHAN SNYMAN FAMILY TRUST - JANICE SNYMAN	33	1/646	MAKALA 646	VORSTER HELENA PETRONELLA
16	RE/571	COX 571	OLLIE SMITH	48	RE/654	MAMAGHODI 654	SISEN IRON ORE COMPANY PTY LTD
17	1/571	COX 571	ANDREW CHRISTIAN OLMIER	49	1/654	MAMAGHODI 654	COLNAGO CC - BJ VAN NIEKERK
18	2/571	COX 571	ANDRIES JOHANNES ROELOFSE	43	RE/651	MAMATLUN 651	PAMY TRADING PTY LTD
19	3/571	COX 571	JAFRATA CC - DAVID FRANCOIS MALAN	44	2/651	MAMATLUN 651	PETRONELLA
20	4/571	COX 571	SANRAL	46	RE/653	MAPEDI 653	LYNPUNT TRUST
21	5/571	COX 571	SANRAL	47	1/653	MAPEDI 653	IZAK GOUS FAMILIE TRUST
71	RE/660	CROSSLEY 660	GERTRUIDA WILHELMINA DE ATH - Welda Fourie	96	RE/666	METSEATSIDI 666	KOUWATER BOERDERY PTY LTD
102	765	HEUWEL 765	DIERGAART'S HEUWEL	97	1/666	METSEATSIDI 666	SLABCON TRUST
72	1/661	DIKEPING 661	COENEL EIENDOMME CC CORNIE DE JAGER TRUST	98	2/666	METSEATSIDI 666	KOUWATER BOERDERY PTY LTD ARRIE WILLEM CLAASSENS
73	2/661	DIKEPING 661	CORNIE DE JAGER TRUST	30	RE/645	MOUNT TEMPLE 645	HENTIQ 2161 PTY LTD - LOUIS JOHANNES PIETERSE
74	2/661	DIKEPING 661	CORNIE DE JAGER TRUST	31	1/645	MOUNT TEMPLE 645	HENTIQ 2161 PTY LTD - LOUIS JOHANNES PIETERSE
75	2/661	DIKEPING 661	CORNIE DE JAGER TRUST	9	RE/570	MURRAY 570	MURRAY BOERDERY CC
76	4/661	DIKEPING 661	JOHAN SNYMAN FAMILY TRUST - JANICE SNYMAN	10	1/570	MURRAY 570	SMITH OLLIE
77	5/661	DIKEPING 661	TRANSNET LTD	11	2/570	MURRAY 570	DIRK JACOBUS CROUCAMP
34	RE/647	ELLIES RUST 647	W J S STORM TRUST	12	3/570	MURRAY 570	ROELOFSE ANDRIES JOHANNES
65	RE/659	GAMALIETS 659	PIETER VAN OTTERLOO MYNHARDT	13	4/570	MURRAY 570	SANRAL
66	RE/659	GAMALIETS 659	PIETER VAN OTTERLOO MYNHARDT	14	5/570	MURRAY 570	SANRAL
67	1/659	GAMALIETS 659	LANGLAAGTE FAMILIE TRUST	15	6/570	MURRAY 570	SANRAL
68	1/659	GAMALIETS 659	LANGLAAGTE FAMILIE TRUST	103	RE/766	NEYLAN 766	COENEL EIENDOMME CC - LINA COETZEE
69	2/659	GAMALIETS 659	TRANSNET LTD	104	3/766	NEYLAN 766	SANRAL
70	3/659	GAMALIETS 659	TRANSNET LTD	25	RE/577	ODONOGHUE 577	CHAMBER LANE PROPERTIES 20 PTY LTD
101	RE/670	RESERVE 670	DANELLE FAMILIE TRUST	1	RE/563	ROSCOE 563	ERICH OLIVER TRUST (Jan Olivier)
39	RE/650	GASTON 650	RECORD EIENDOMME CC - CORNELL MAGRIETHA BEUKES	2	RE/563	ROSCOE 563	ERICH OLIVER TRUST (Jan Olivier)
40	1/650	GASTON 650	PIETER VAN OTTERLOO MYNHARDT	3	1/563	ROSCOE 563	TRANSNET LTD
41	1/650	GASTON 650	PIETER VAN OTTERLOO MYNHARDT	4	2/563	ROSCOE 563	TRANSNET LTD
42	2/650	GASTON 650	TRANSNET LTD	5	1/566	SMYTHE 566	FLADELFA TRUST
105	RE/777	GROOT VENN 777	PIETER VAN OTTERLOO MYNHARDT	6	2/566	SMYTHE 566	UNKNOWN
106	RE/777	GROOT VENN 777	PIETER VAN OTTERLOO MYNHARDT	26	RE/643	THABA LETSELE 643	KOCK JAN ALBERT DE VAN NIEKERK TRUST (BJ VAN NIEKERK)
107	RE/777	GROOT VENN 777	PIETER VAN OTTERLOO MYNHARDT	27	1/643	THABA LETSELE 643	PETRUS JACOBUS JACOBS - FRANS JL JACOBS
108	1/777	GROOT VENN 777	TRANSNET SOC LTD	50	RE/657	TOMKINS 657	JACOBS PETRUS JACOBUS
22	RE/573	HARTLEY 573	WIESE BOERDERY CC - HENK WIESE	51	1/657	TOMKINS 657	SPANGENBERG FAMILIE TRUST (THIENS SPANGENBERG)
23	3/573	HARTLEY 573	WIESE BOERDERY CC - HENK WIESE	52	2/657	TOMKINS 657	SPANGENBERG FAMILIE TRUST (THIENS SPANGENBERG)
93	RE/664	HILLIARD 664	LEON MC CABE	53	3/657	TOMKINS 657	TRANSNET LTD
94	1/664	HILLIARD 664	HILLIARD TRUST - WILLIE UYS	54	4/657	TOMKINS 657	TRANSNET LTD
35	RE/648	JOHNSON 648	W J S STORM TRUST	78	1/663	UYS 663	STEYN LOUIS PETRUS
55	RE/658	KNAPP 658	CORNIE DE JAGER TRUST	79	1/663	UYS 663	STEYN LOUIS PETRUS
56	RE/658	KNAPP 658	CORNIE DE JAGER TRUST	80	2/663	UYS 663	STEYN LOUIS PETRUS
57	1/658	KNAPP 658	CORNIE DE JAGER TRUST	81	2/663	UYS 663	STEYN LOUIS PETRUS
58	1/658	KNAPP 658	CORNIE DE JAGER TRUST	82	3/663	UYS 663	PIERRE BECKER FAMILIE TRUST (Louis Neetling)
59	2/658	KNAPP 658	ANNEGHRETTE SPANGENBERG	83	3/663	UYS 663	PIERRE BECKER FAMILIE TRUST (Louis Neetling)
60	3/658	KNAPP 658	ANDREW CHRISTIAN OLMIER	84	3/663	UYS 663	PIERRE BECKER FAMILIE TRUST (Louis Neetling)
61	4/658	KNAPP 658	TRANSNET LTD	85	4/663	UYS 663	ELZABETH PRETORIUS (LOOTS)
62	5/658	KNAPP 658	TRANSNET LTD	88	6/663	UYS 663	JACOBUS
63	6/658	KNAPP 658	TRANSNET LTD	87	7/663	UYS 663	TRANSNET LTD
64	7/658	KNAPP 658	TRANSNET LTD	88	8/663	UYS 663	TRANSNET LTD
				89	9/663	UYS 663	TRANSNET LTD
				90	10/663	UYS 663	TRANSNET LTD
				91	11/663	UYS 663	TRANSNET LTD
				92	12/663	UYS 663	TRANSNET LTD
				24	RE/575	YOUNG 575	ROELOFSE ANDRIES JOHANNES



**Legend**

- Zama Properties
- Farm Boundaries
- Farm Portion
- Prospecting Priority Properties

**Land Tenure - Affected Farms**

- Directly Affected
- Surrounding Properties

Projection: Transverse Mercator | Central Meridian: 23  
Date: 2023/06/07 | Created By: TW Hallatt

## Macarthy / Zama MRA: Land Tenure - Zama

Figure 10-18: Land Tenure



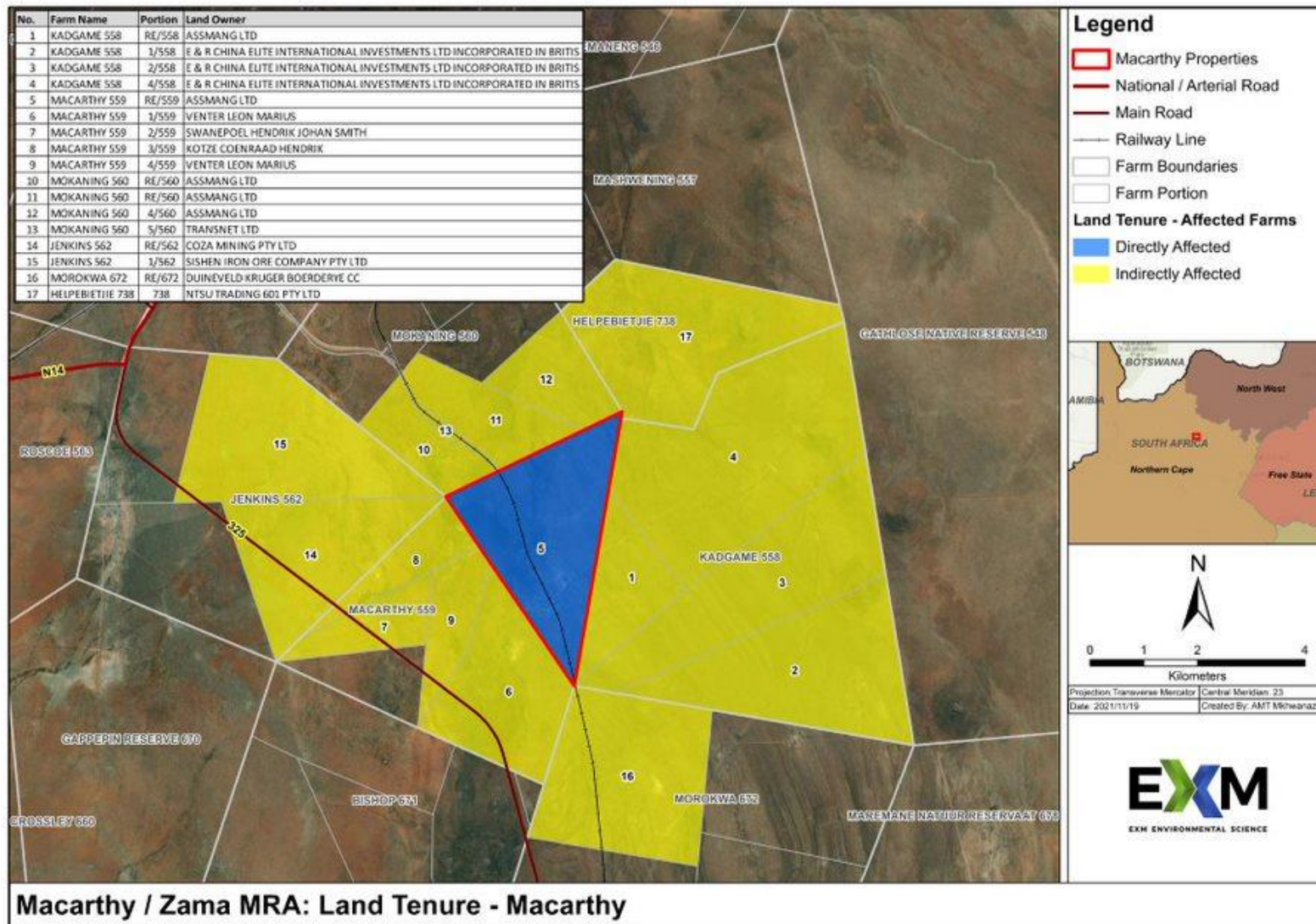


Figure 10-19: Land Tenure (MaCarthy)



## **10.15 Socio-Economic Environment**

This section provides a description of the Socio-Economic Environment associated with the study area. A Social Impact Assessment was conducted by Atlegang Social Intelligence (**Part C: Appendix I**) and the results of the assessment have also been included in this section.

### **10.15.1 Area of Influence**

Zama Mining is applying for a mining right on properties located within the Tsantsabane Local Municipality ("LM") (ZF Mgcawu District Municipality) and the Gamagara LM (John Taolo Gaetsewe District Municipality). The area of influence from a social perspective therefore includes communities in both municipal areas.

Key towns in the Gamagara LM include Kathu, Sesheng, Mapoteng, Siyathemba, Dibeng, Olifantshoek. The main residential areas within the Tsantsabane LM are Postmasburg, Jenn-Haven, Groenwater and Skeyfontein, Boichoko, Newtown, White City and Postdene, Mountainview and Greenfields, Maranteng and Maremane informal settlements and Beeshoek.

### **10.15.2 Economic Profile**

The John Taolo Gaetsewe District Municipality ("DM") 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 LM 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 LM contributes 20% to the district economy.

The economy is driven by mining as seen in Figure 10-20. 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. Other key, but not as prominent, economic drivers are the renewable sector as well as agricultural activities.

### **10.15.3 Social Profile**

The key social indicators for local and district municipalities are shown in Table 10-20. 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. 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).

The influx of people into areas can create fertile ground for the growth of socially undesirable behaviours and the resultant need for additional social infrastructure and increased social pathologies. It is important for Zama Mining to maximise local employment, especially where the skills are available in nearby communities. An employment strategy focused on local employment needs to be developed and communicated clearly. 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 mining right be issued, social interventions, as per the Social and Labour Plan commitments should particularly look at addressing issues related to skills development and improving youth unemployment.

There are also however positive impacts expected to occur such as Higher employment and increased disposable incomes, enhanced local skills, enhanced socio-economic development through SLP and CSI and enhanced procurement from local businesses.

### Gamagara Local Economy – Sectoral Profile

### Tsantsabane Local Economy – Sectoral Profile

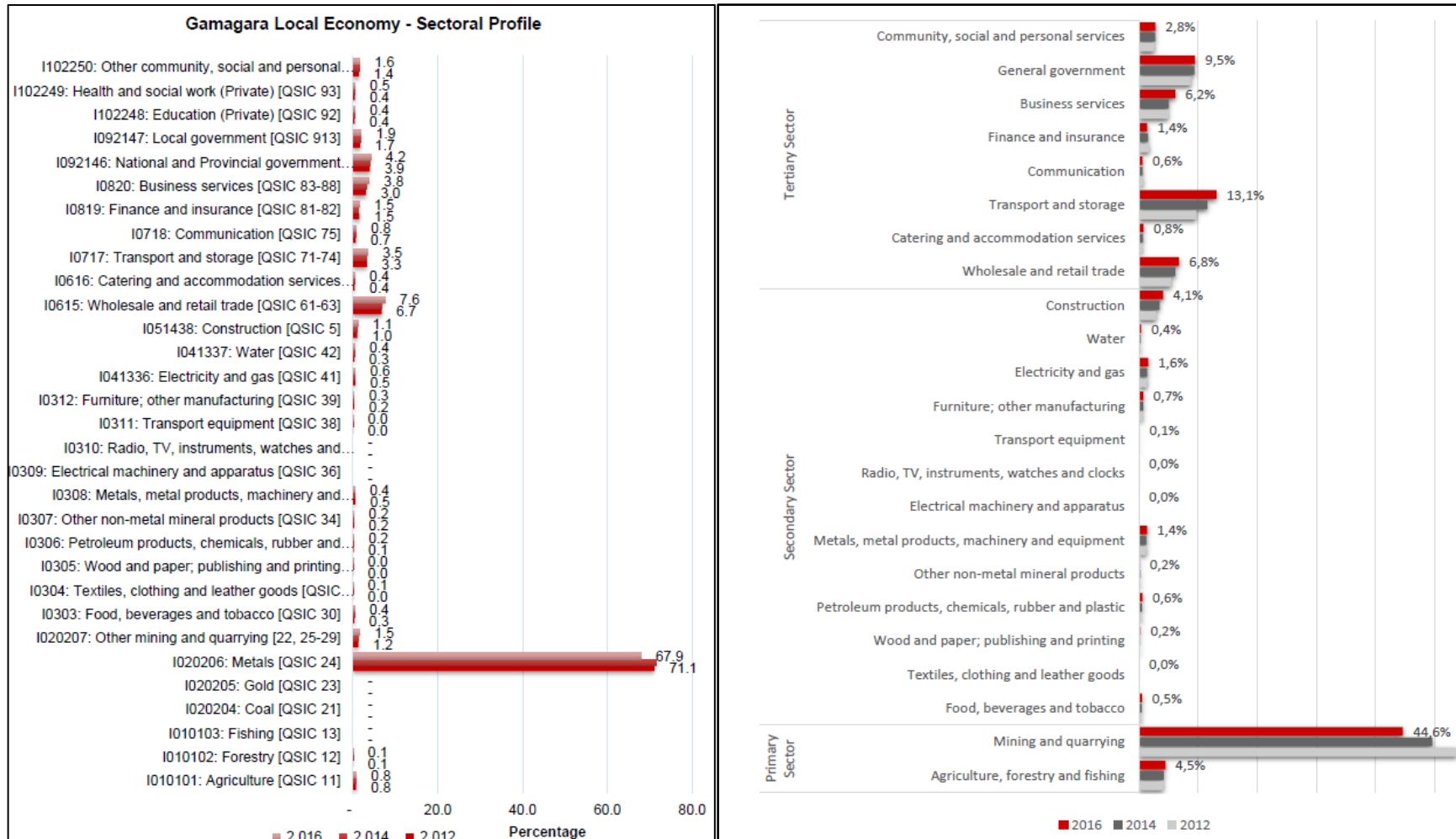


Figure 10-20: Local Economic Profile Gamagara and Tsantsabane (Demacon 2017 & 2019)

**Table 10-20: Summary of Social Performance Indicators**

Aspect	John Taolo Gaetsewe DM	Gamagara LM	ZF Mgcawu 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

### 10.15.4 Population composition

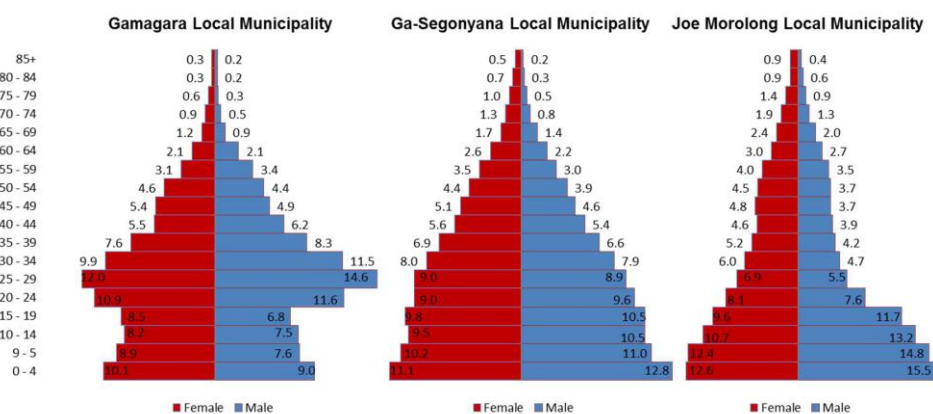
In 2016, John Taolo Gaetsewe DM had 242 264 residents. Between 2008 and 2016, the population of the district grew by 2.8%, which was double the growth rate of the country. The highest growth rate was experienced in Gamagara LM (5.29%). The population growth of Gamagara LM appears to be driven primarily by in-migration that is driven by the growth of the economy, particularly the mining industry.

**Table 10-21: District municipality population**

District and local municipality	Black/African	Coloured	White	Indian/Asian	Total
NC453: Gamagara	26 062	17 510	9 644	439	53 656
DC45: John Taolo Gaetsewe	202 347	24 311	14 717	890	242 264

Conforming to the racial profiles, as elaborated in Table 10-21, Afrikaans is the home language of 51.6% of residents of Gamagara LM, and Setswana is the home language of 32.3% of the population.

In terms of age and sex, Figure 10-21 shows that in 2017, Gamagara has a peculiar age and sex pyramid as it has a high proportion of 20 to 34 (35%) year olds, with males being dominant in that age category. This trend indicates that there has been in-migration of young males into the area and supports findings that mining activities within the region have attracted young male job seekers.



**Figure 10-21: Age and Sex Distribution in the Local Municipalities**

### 10.15.5 Access to basic services

Despite attempts made to decrease service delivery backlogs, service delivery in the district remains a significant challenge, particularly in the most impoverished areas.

## 10.16 Current Land Use

The Geo Terra Imagery of the land use in the area is shown in Figure 10-22. The predominant land use in the mining right area, including the MaCarthy and the



Prospecting Priority Areas is livestock farming predominantly with cattle, sheep, goats, and game. Other land uses in the area include mining activities particularly near MaCarthy. Salene mine, Jenkins mine, Boskop, Khumani and Helpebietjie mines all lie in close proximity to MaCarthy (Figure 10-22). 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.

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.

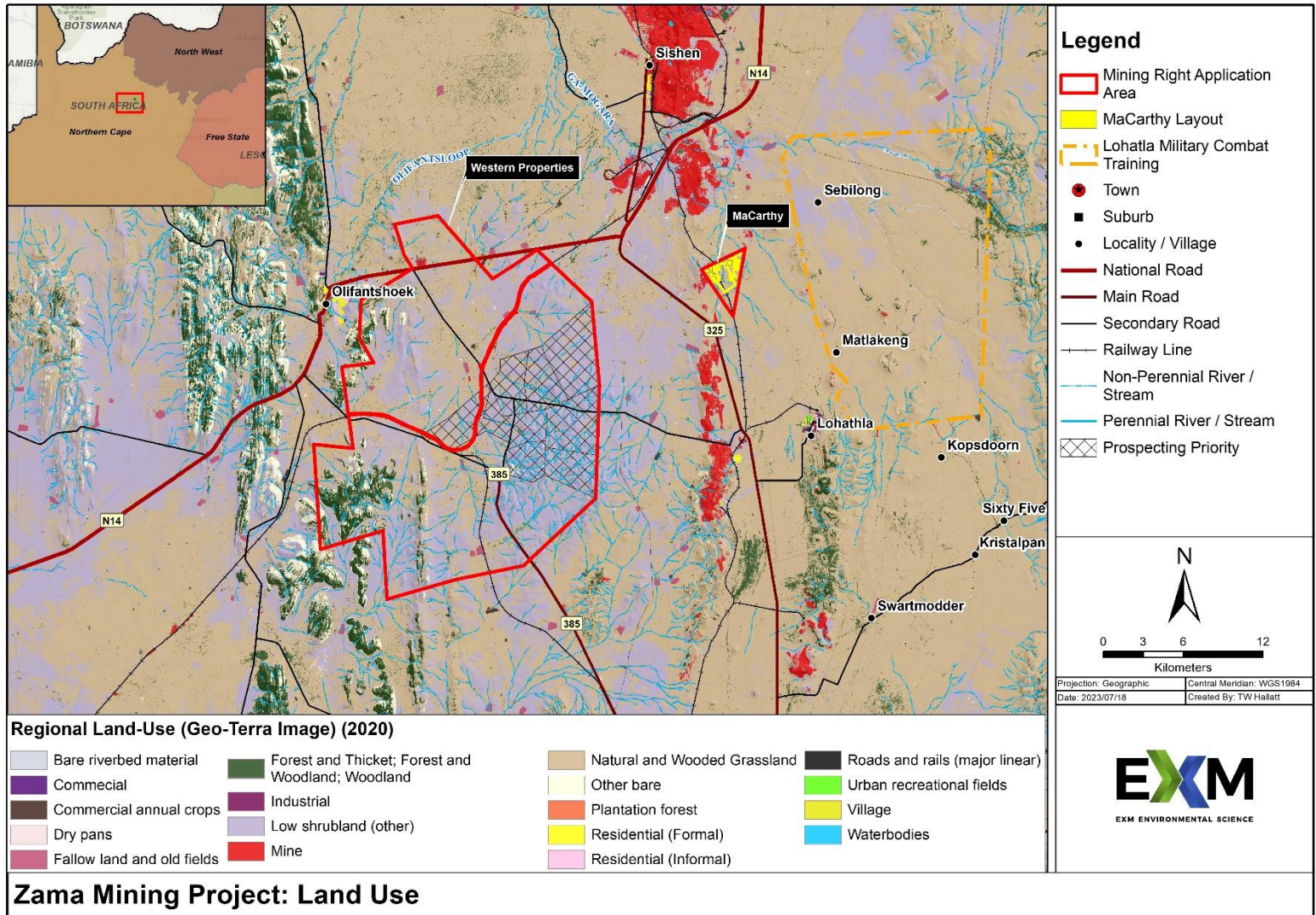


Figure 10-22: Geo Terra Land Use Map

## **10.17 Visual Environment**

According to the Visual Impact Assessment (EXM, April 2023) (Part C: Appendix J), defining the visual character of the receiving environment is integral as it establishes the visual baseline or existing visual environment in which the development would be constructed. The visual impact of a development is measured by establishing the degree to which the development would conform to the visual character of the surrounding area. The inherent visual sensitivity is thereafter determined, based on the visual character, the economic importance of the scenic quality of the area, inherent cultural value of the area and the presence of visual receptors. Physical and land use related characteristics, as outlined below, are important factors contributing to the visual character of an area.

### **10.17.1 Physical and Land Use Characteristics**

#### **10.17.1.1 General Land Cover and Land Use**

The dominant land use in the immediate study area is livestock farming predominantly with cattle, game, goats, and sheep. Other land uses include mining activities near MaCarthy: Salene Mine, Jenkins Mine, Boskop Mine, Khumani Mine and Helpebietjie Mine. Of importance is also the proximity of the South African National Defense Force Lohatla Military Combat Training Centre, located approximately 5 km east of MaCarthy.

#### **10.17.1.2 Sense of Place**

Sense of place is the distinctive value that is allocated to a specific area or place through the perspective and experience of the user or viewer. The sense of place is the extent to which a person can recognise or recall a place as being distinct from other places – as “having a vivid, unique, or at least particular, character of its own”. The sense of place of the area surrounding the project comprises desert shrubland and few mining activities in the area (Figure 10-24).

### **10.17.2 Sensitive Receptors**

Viewer groups are a collection of viewers that are involved with similar activities and experience similar views of the existing and proposed expansion development. Within the receiving environment, specific visual receptors experience different views of the existing and proposed expansion development. They will be affected due to the alteration of their view and are therefore identified as part of the receiving and affected environment. The visual receptors are grouped according to the similarities in views. The visual receptors included residents (town/suburb), adjacent Mines/Quarries, Educational Facilities, and Motorists. The potential sensitive receptors are shown in Figure 10-23.

### **10.17.3 Area of visibility**

In the case of static views, such as views from buildings, the visual relationship between an activity and the landscape will not change. The cone of vision is relatively wide, and the viewer tends to scan back and forth across the landscape. Residents, schools and tourists within 10 km of the affected environment are therefore classified as visual receptors of high sensitivity owing to their sustained visual exposure to the existing and proposed development as well as their attentive interest towards their living environment.

### **10.17.4 Visual Resource Value**

Visual resource value refers to the visual quality of elements of an environment, as well as the way in which combinations of elements in an environment appeal to our senses. The assessment combines visual quality attributes (views, sense of place and aesthetic appeal) with landscape character and gives the landscape a high, moderate, or low visual resource value.

Based on the criteria stipulated in Table 9-1 of the Visual Impact Assessment (Part C: Appendix J), an analysis of the visual resource value of the study area is discussed below:

**Topography:** the natural landscape is generally flat to undulating, with low-lying areas and elevated sites associated with wetlands and pans, and small hills, respectively. However, the natural topographical features are mostly unobtrusive and do not form visual landmarks. By contrast, the waste rock dumps will be a prominent feature in the landscape, and generally contrast dramatically and negatively with the natural topographical aesthetic. The topographical value of the study area therefore has a **low value**.

**Hydrology:** Despite the presence of Gamagara River tributary and pans in the study area and these being of at least some visual appeal, none are particularly visually prominent, and thus not highly significant features within overall visual context. The visual resource value of the study area's hydrology is therefore considered to be **moderate**.

**Vegetation:** Natural habitat adjacent to the study area has been transformed or severely modified by mining and agriculture. However, the remaining natural vegetation does contribute significantly to a scenic value. The visual resource value of the study area's vegetation cover is therefore expected to be **moderate**.

**Land Use:** Mining and agriculture are the prevailing or most visually prominent land uses across majority of the study area. Facilities associated with mining are optically intrusive and detract from the visual aesthetic of the landscape. The South African National

Defense Force Lohatla Military Combat Training Centre located approximately 5 km east of the study area. The visual resource value of the study area's land use is therefore considered to be **low**.



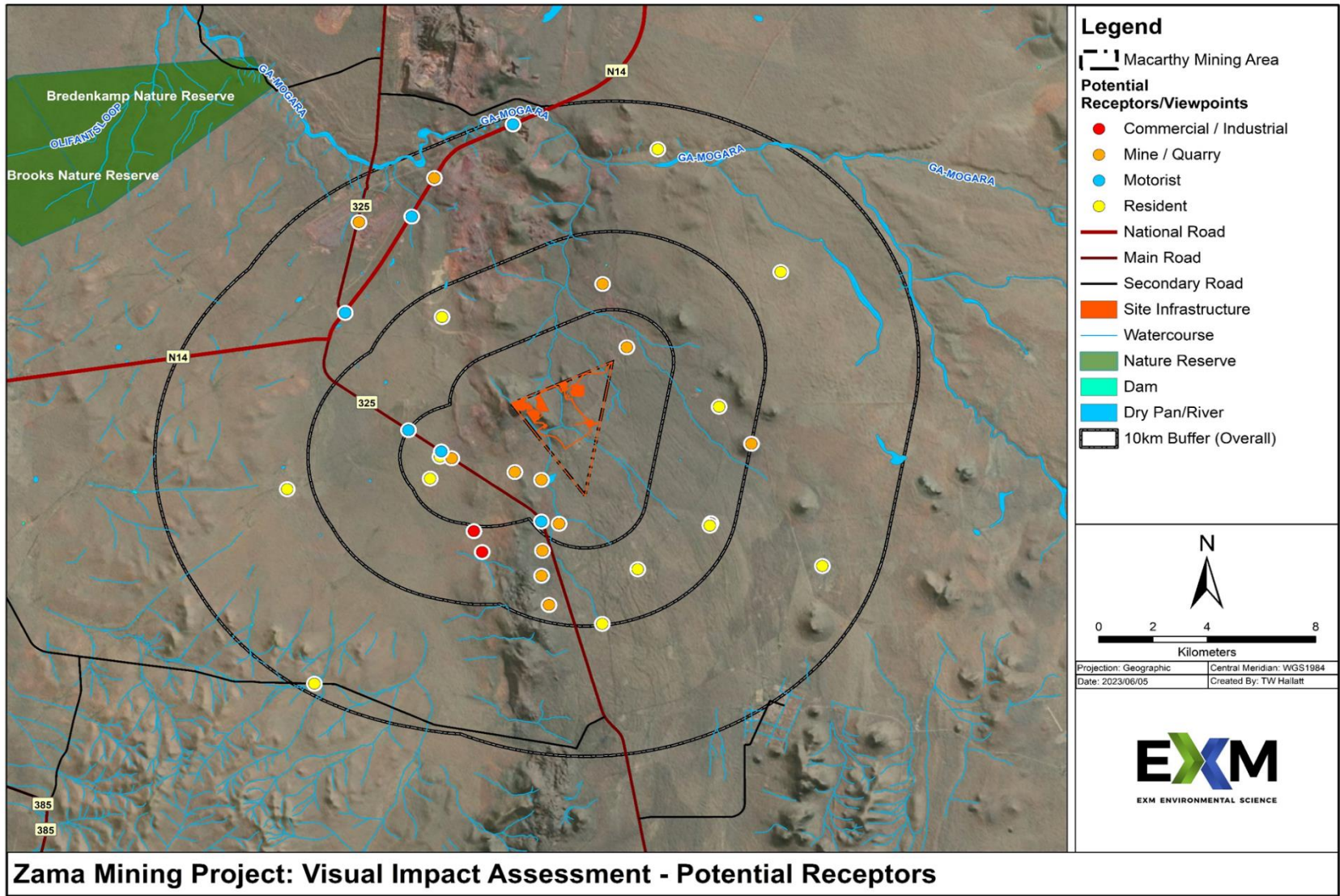


Figure 10-23: Potential Receptors



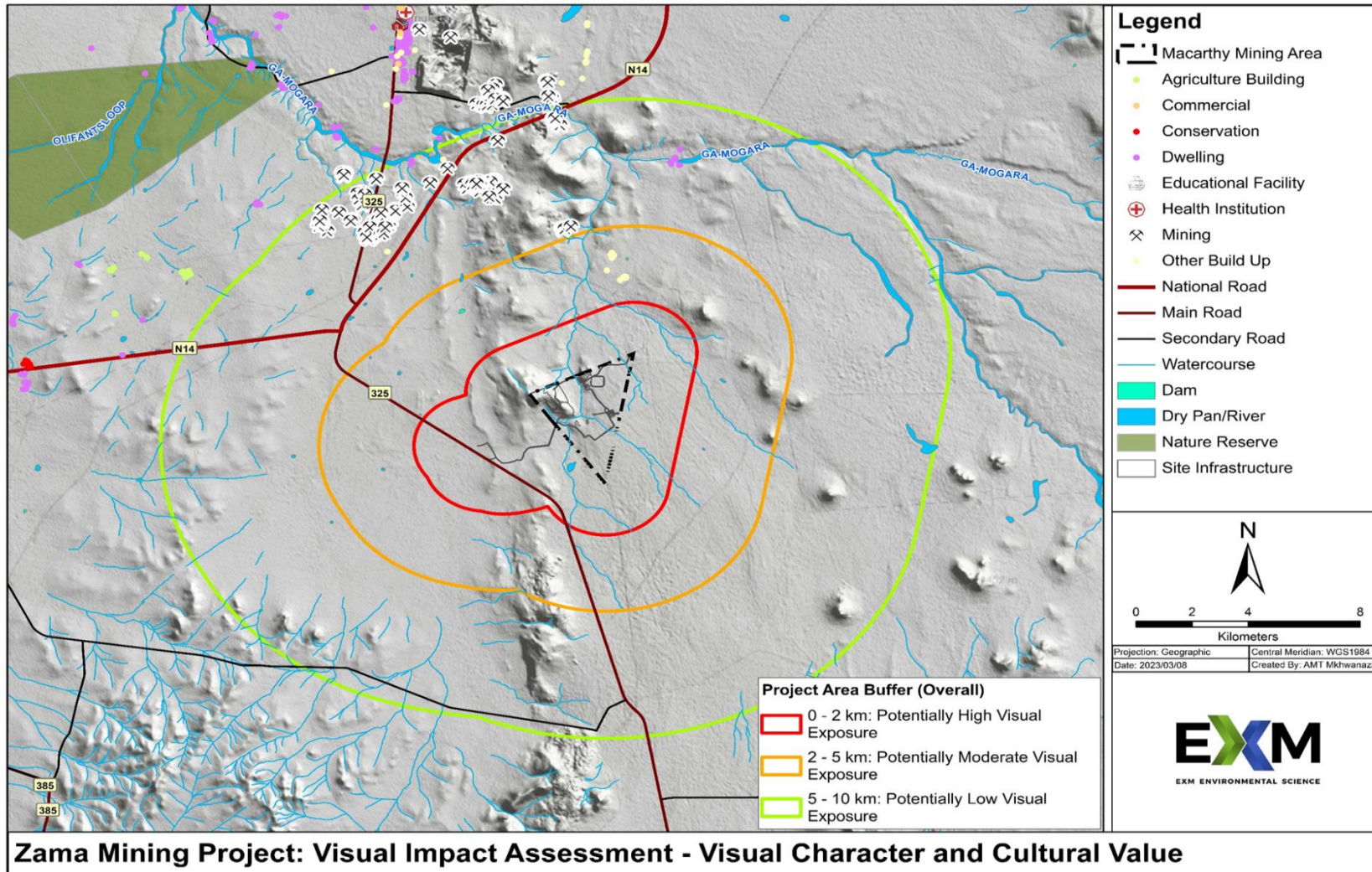


Figure 10-24: Sense of Place



### 10.18 Overall Environmental Sensitivity

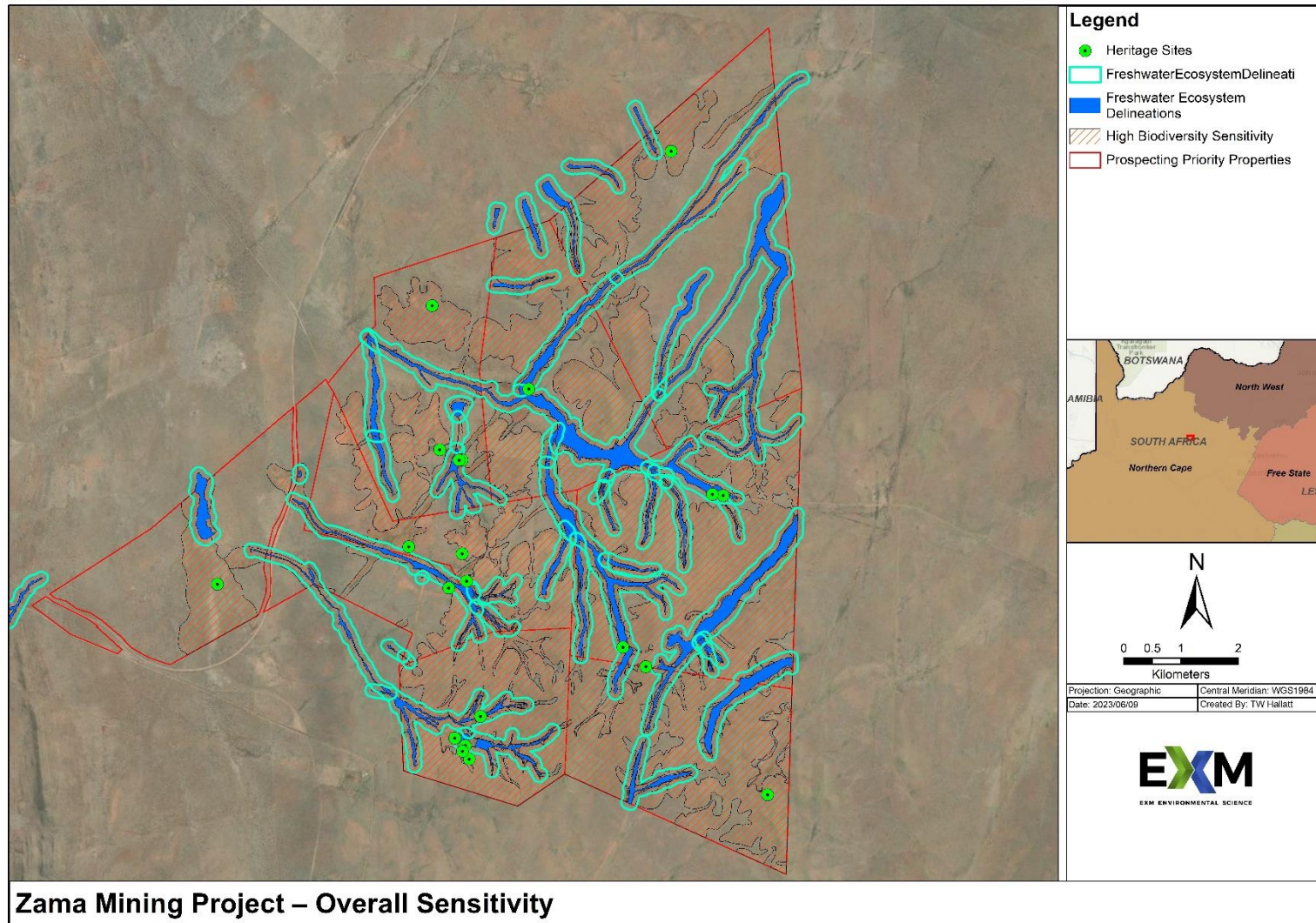


Figure 10-25: Prospecting Priority Areas Overall Sensitivity

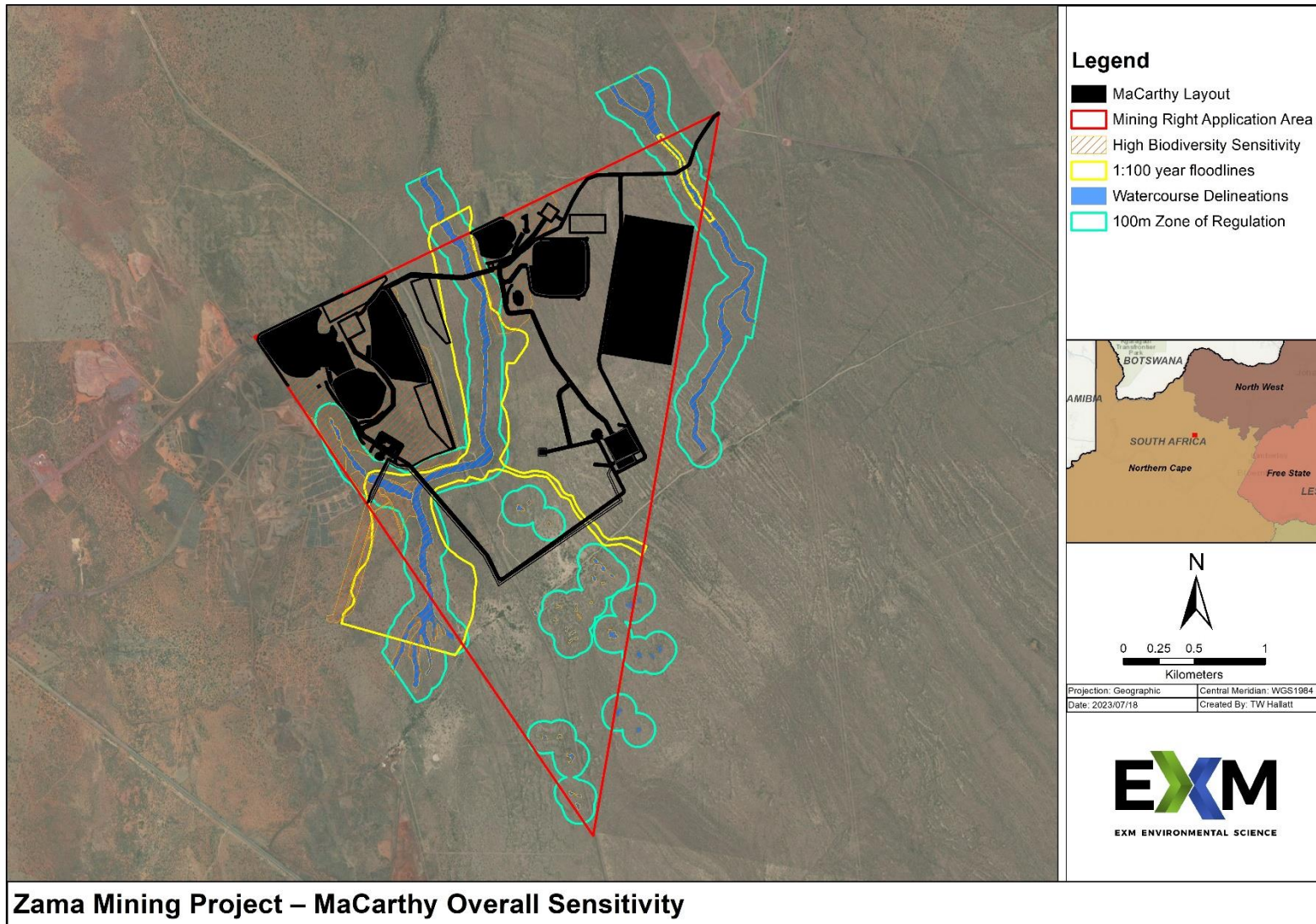


Figure 10-26: MaCarthy Overall Sensitivity



## **11. ENVIRONMENTAL IMPACT IDENTIFICATION AND ASSESSMENT**

### **11.1 Methodology used in determining the significance of environmental impacts.**

This section includes the methodology used in the assessment of each potential impact. A summary of the potential impacts associated with the activities that will be undertaken are also provided. This list of impacts has been informed by specialist studies undertaken in support of the EIA.

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

Where:

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

and

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

Each criterion is given a score from 1 to 5 based on the definitions given below. Although the criteria used for the assessment of impacts attempts to quantify the significance, it is important to note that the assessment is generally a qualitative process and therefore the application of this criteria is open to interpretation. The process adopted will therefore include the application of scientific measurements and professional judgement to determine the significance of environmental impacts associated with the project. The assessment thus largely relies on experience of the environmental assessment practitioner (EAP) and the information provided by the specialists appointed to undertake studies for the EIA.

Where the consequence of an event is not known or cannot be determined, the "precautionary principle" has been applied and the worst-case scenario assumed. Where possible, mitigation measures to reduce the significance of negative impacts and enhance positive impacts will be recommended. The significance of the impact in light of the mitigation measures has also been rated based on a confidence rating of the mitigation measures.

Consideration will be given to the phase of the project during which the impact occurs. The phase of the development during which the impact will occur will be noted to assist with the scheduling and implementation of management measures.



**Table 11-1: Severity criteria for assessing the impact significance.**

<b>INTENSITY = MAGNITUDE OF IMPACT</b>	<b>RATING</b>
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
<b>DURATION = HOW LONG THE IMPACT LASTS</b>	<b>RATING</b>
Very short-term: impact lasts for a very short time	1
Short-term: impact lasts for a short time e.g., construction period	2
Medium-term: impact lasts for the for less than the life of operation.	3
Long-term: impact occurs over the operational life of the project	4
Residual: impact is permanent (remains after mine closure)	5
<b>EXTENT = SPATIAL SCOPE OF IMPACT/FOOTPRINT AREA/NUMBER OF RECEPTORS</b>	<b>RATING</b>
Limited: Impact only affects the mine site or part there of	1
Neighbours: Limited to the immediate surroundings;	2
Local: Affecting a larger area (beyond immediate surroundings or neighbours)	3
District: Affects entire district	4
Regional: Affects an entire region e.g., Province	5
<b>PROBABILITY = LIKELIHOOD THAT THE IMPACT WILL OCCUR</b>	<b>RATING</b>
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.

### 11.2 Summary of the positive and negative impacts related to the project.

A comprehensive assessment of all impacts is given in section 10.5. A short description of key impacts is provided below.

#### 11.2.1 Air Quality

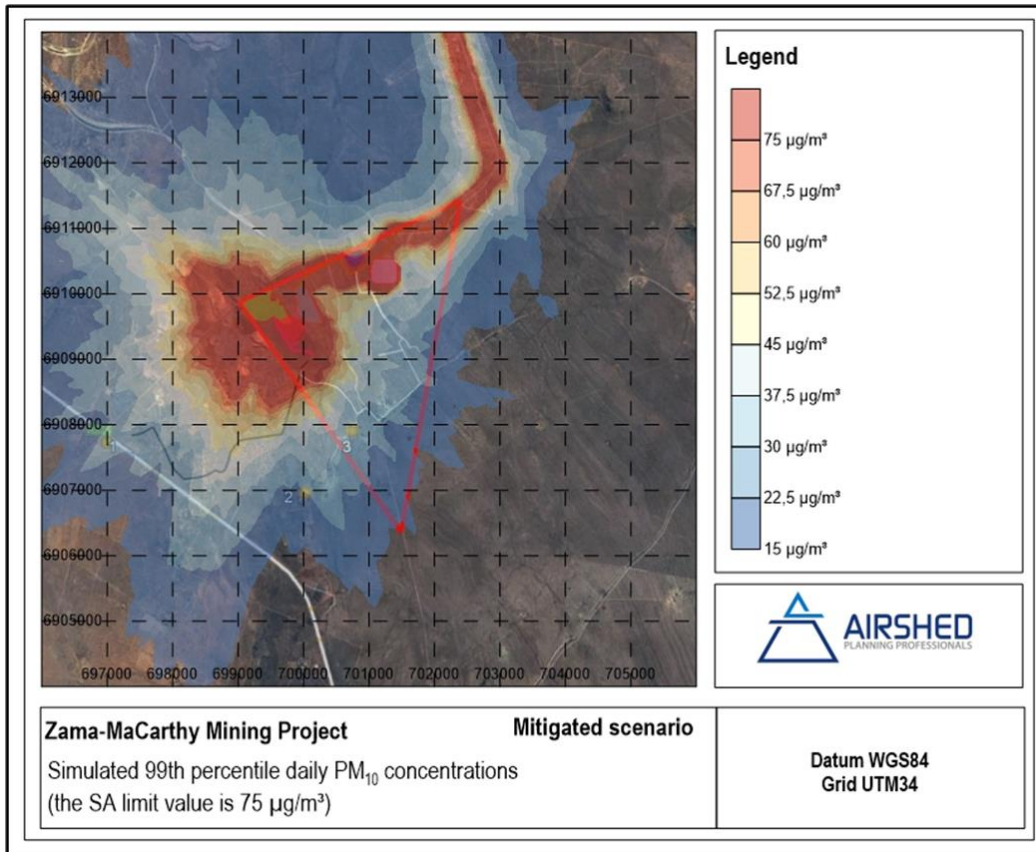
The Air Quality Impact Assessment (Airshed, 2023) used an air dispersion model<sup>11</sup> to evaluate the potential distribution of atmospheric pollutants as a result of the proposed mining operations. The study indicated that the ambient PM<sub>10</sub><sup>12</sup> & PM<sub>2.5</sub><sup>13</sup> concentrations as a result of the operational phase of the MaCarthy mine are predicted to be within annual and daily National Ambient Air Quality Standards ("NAAQS") at all the identified receptors. The model results of the daily concentrations are provided in Figure 11-1 and Figure 11-2. The NAAQS will potentially be exceeded at the boundary due to mining sources being located on the mining boundary. Surrounding mining also contributes to this and the exceedance outside the boundary is predicated over an area also currently being used for mining. Exceedances of the criteria are expected in close proximity to areas of operation.

The study also found that the predicted dust fall rates as a result of the project are low and within the limits of the National Dust Control Regulations ("NDCR") for residential areas at all receptors. Exceedances of the NDCR are expected in close proximity to areas of operation (Figure 11-3). The NDCR is exceeded slightly beyond the property boundary. Air quality impacts associated with the proposed MaCarthy mining project has a significance rating of medium prior to the implementation of mitigation measures and will be reduced to a low impact significance after mitigation has been considered. Air quality impacts associated with the prospecting activities will relate to vehicles driving on gravel roads as well as the percussion drilling operations. The impact significance is expected to be low due to the low number of vehicles that will be utilised during prospecting.

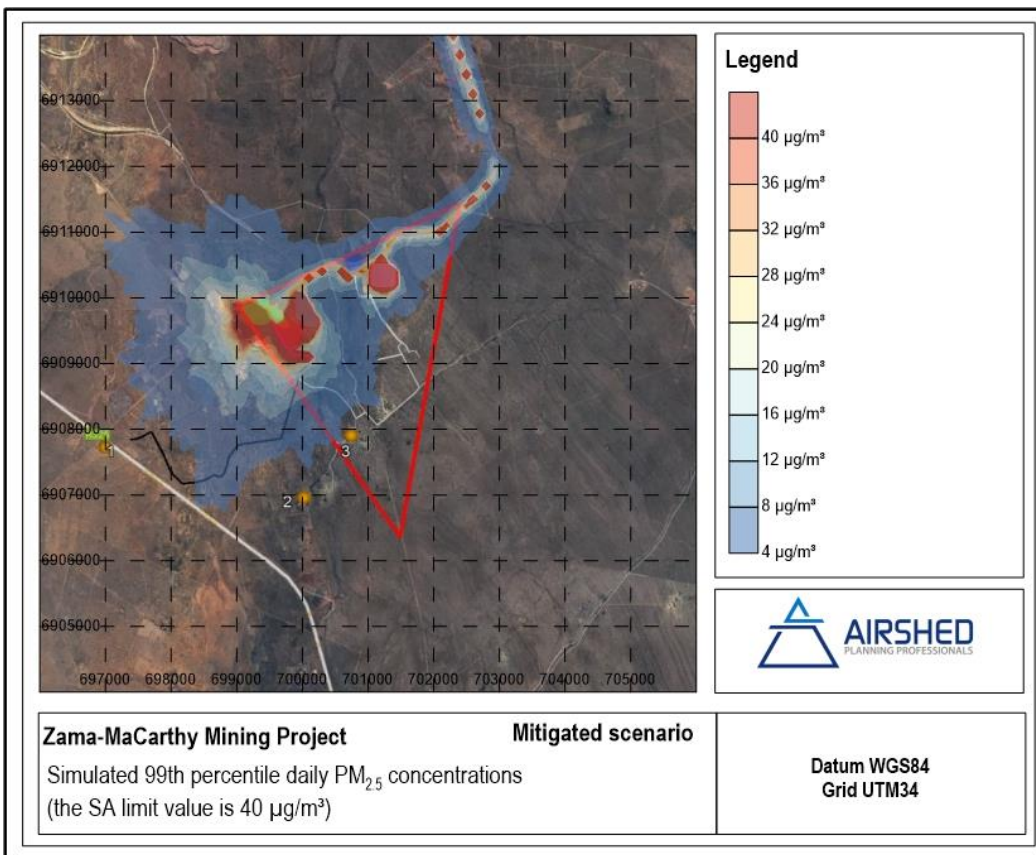
<sup>11</sup> Dispersion modeling uses mathematical calculations to characterize the atmospheric processes that disperse a pollutant emitted by a source. Based on emissions and meteorological inputs, a dispersion model can be used to predict concentrations at selected downwind receptor locations

<sup>12</sup> Particulate matter with an aerodynamic diameter of less than 10 µm.

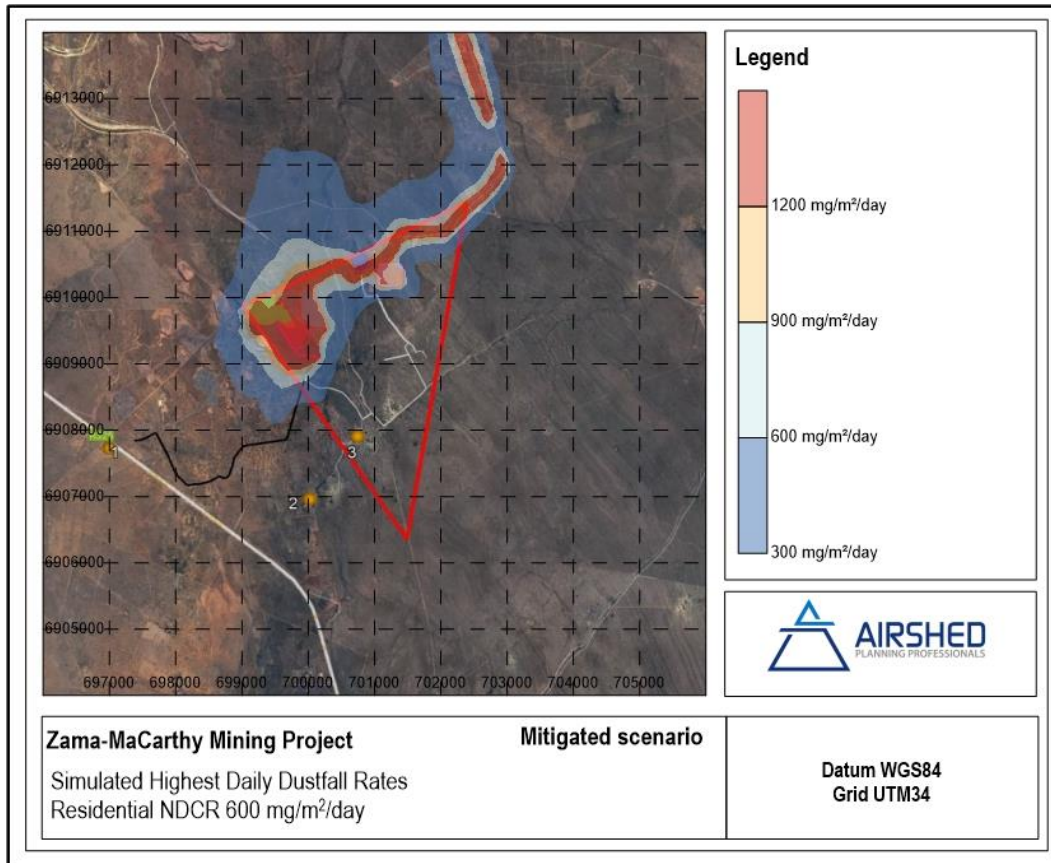
<sup>13</sup> Inhalable particulate matter with an aerodynamic diameter of less than 2.5 µm



**Figure 11-1: Daily PM10 concentrations**



**Figure 11-2: Daily PM2.5 concentrations**



**Figure 11-3: Simulated highest daily dustfall rates**

### 11.2.2 Noise

According to the Noise Impact Assessment undertaken by Airshed (2022), the study area is characterised by a rural environment with no major sources of noise, except traffic, trains, mining, prospecting, and farming activities. The study utilised a model to determine the potential increase in noise levels from the baseline measurements and to assess the potential impacts on noise receptors. The study focussed on daytime and night-time noise levels.

Table 11-2 provides a summary of simulated noise levels for the project operations at closest potential receptors within the study area. Noise levels due to project operations are predicted to be within the day- and night-time International Finance Corporation (“IFC”) noise guideline for residential and industrial areas at all residential receptors within the study area. (Figure 11-4 and Figure 11-5).

Noise impacts associated with the proposed MaCarthy mining project has a significance rating of medium prior to the implementation of mitigation measures and will be reduced to a low impact significance after mitigation has been considered.

Noise related impacts associated with the prospecting activities will relate to vehicles driving on gravel roads, general presence of drilling operators and the drilling of boreholes. No drilling will be undertaken at night time. The impact significance is expected to be low and drilling near houses must be prohibited.

**Table 11-2: Summary of simulated noise levels (provided as dBA) for proposed project operations at potential NSRs within the study area.**

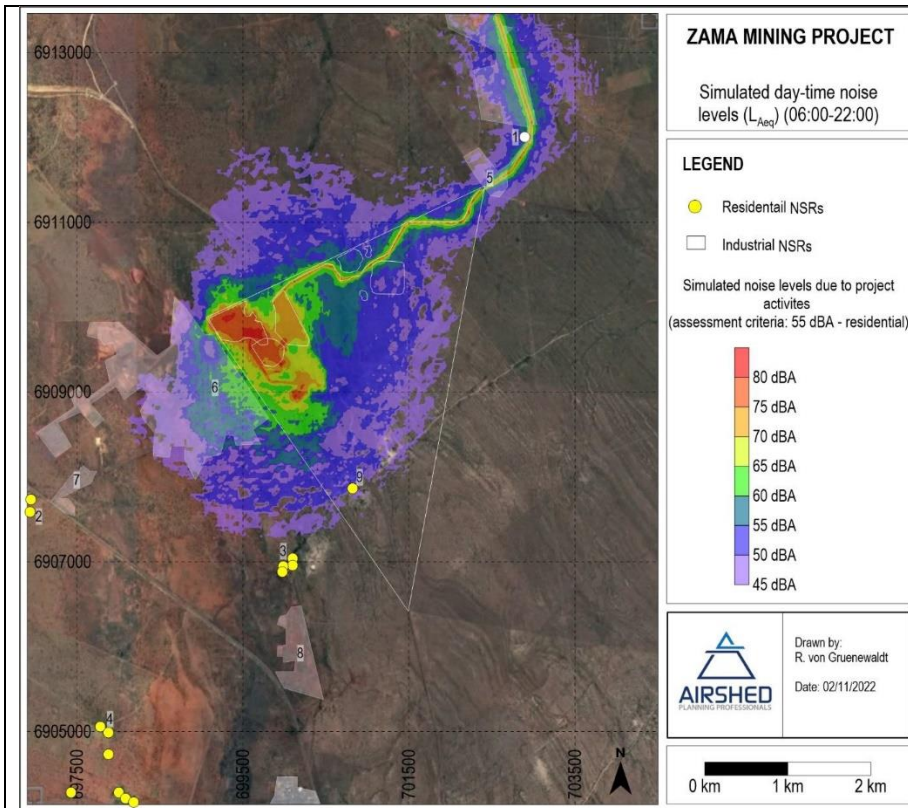
Noise Sensitive Receptor	Project operations		Baseline		Increase Above Baseline	
	Day	Night	Day	Night	Day	Night
<b>NSR1 (offices - industrial)</b>	51.7	51.9	47 (b)	43 (b)	6.0	9.4
<b>NSR2 (residential)</b>	0.0	0.0	67 (b)	61 (b)	0.0	0.0
<b>NSR3 (residential)</b>	42.1	40.9	46 (b)	45 (b)	1.5	1.4
<b>NSR4 (residential)</b>	0.0	0.0	46 (b)	45 (b)	0.0	0.0
<b>NSR5 (industrial)</b>	50.8	51.2	70 (c)	70 (c)	0.1	0.1
<b>NSR6 (industrial)</b>	61.0	61.0	70 (c)	70 (c)	0.5	0.5
<b>NSR7 (industrial)</b>	0.0	0.0	70 (c)	70 (c)	0.0	0.0
<b>NSR8 (industrial)</b>	0.0	0.0	70 (c)	70 (c)	0.0	0.0
<b>NSR9 (residential)</b>	43.2	41.9	46.3	45.2	1.7	1.7

**Notes:**

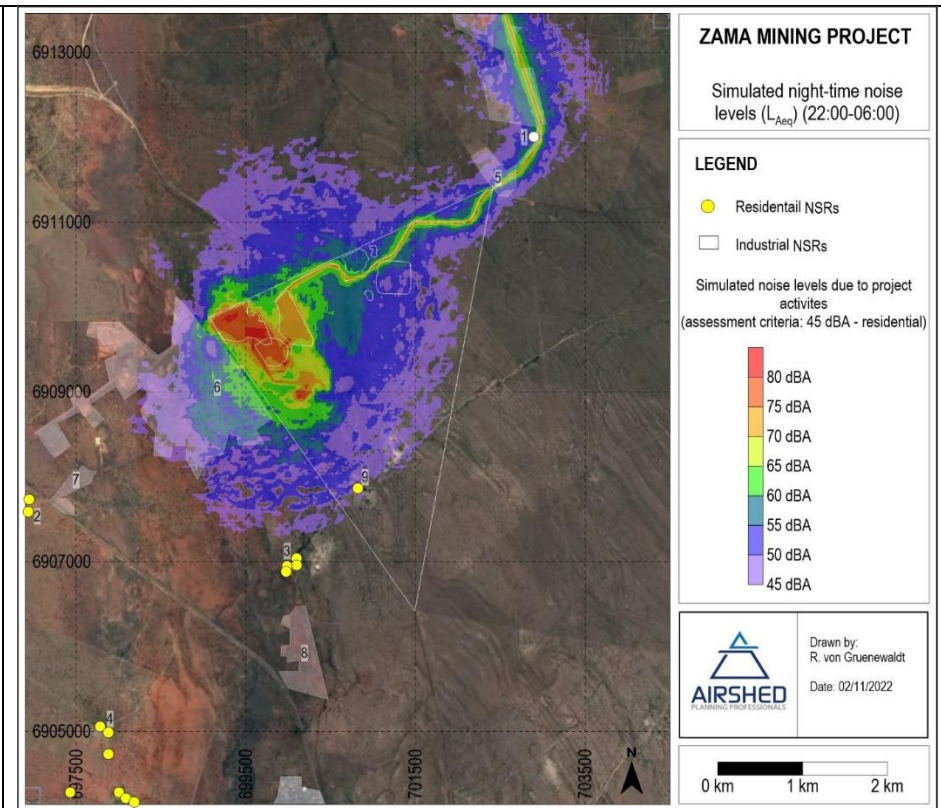
- (a) Exceedance of day- and night-time IFC guideline for residential and industrial areas is provided in bold.
- (b) Baseline measurements based on closest sampling sites and reflective of current noise levels with existing Tharisa Mine activities.
- (c) Baseline noise levels for industrial areas were assumed to be 70 dBA.
- (d) Likely community response in accordance with the SANS 10103

< 3 dBA	< 5 dBA	< 10 dBA	< 15 dBA	< 20 dBA
Change imperceptible	No reaction	'Little' reaction with sporadic complaints	'Medium' reaction with widespread complaints	'Strong' to 'very strong' reaction with threats of community action or vigorous community action.





**Figure 11-4: Simulated day-time noise levels due to proposed project operations only**



**Figure 11-5: Simulated night-time noise levels due to proposed project operations only**

### **11.2.3 Hydrology**

The general topography of the area is characterised by a flat, gently undulating plains interspersed with hills and mountains. The Priority Prospecting Area is characterised by several drainage lines that incise numerous koppies in this area. It is not expected that the prospecting activities will impact on the hydrology of the area as the footprint of the respective prospecting sites is small and no earth works will be required. The identified water courses as well as the regulated 100m buffer zones will also be deemed no-go areas without the required WUL.

The MaCarthy Section is divided into two areas on the eastern and western side of the property by an episodic drainage line which runs along a valley with associated Floodlines as indicated in Figure 10-9. The general infrastructure, pits and WRDs will not affect the hydrology of the water courses. Stormwater management is essential, and construction of clean and dirty water infrastructure will prevent any impacts on the hydrology. However, the two road crossings will alter the flow regime to a certain extent. Impact on the area's hydrology was assessed to have a medium significance prior to the implementation of mitigation measures and be reduced to a low significance. The design of the crossings must take into account potential impacts on the general hydrology of the area.

### **11.2.4 Traffic**

It is not expected that the prospecting activities at the Western Properties will result in significant traffic related impacts or deterioration of any roads due to the low number of vehicles that will be utilised.

The MaCarthy mining operations will result in an increase in HME and LDV traffic volumes on the provincial gravel roads (DR03333 & MN14146). According to the Traffic Impact Assessment (2023), the provincial road currently has 880 to 1100 vehicles per day driving along the route which is higher than the 700 vehicles per day threshold. However, the road is well maintained by Afrimat, Helpebietjie and Demaneng Mine, and dust suppression is routinely applied. Additional vehicles from the project will increase pressure on the road but will not cause significant impacts if current maintenance/dust suppression continues. Agreements with current users regarding maintenance needs to be established. Impacts related to safety of other road users and deterioration of the regional road is deemed low.

The TIA indicated that the current Level of Service ("LOS") of the N14/DR03333 intersection that will be used for the transportation of ore is rated as an LOS Category A which is generally good with minor delays. The addition of traffic from MaCarthy will reduce it to a LOS Category B which is still good, but with slightly more delays. It was found that vehicles crossing the N14 has less impact than vehicles leaving and entering the N14. This is due to the gap requirement for

acceleration to safely join the N14. Impacts on the safety of road users at the N14/DR03333 intersection was assessed to have a low significance.

#### **11.2.5 Soil**

The prospecting activities will entail the removal of topsoil at the prospecting sites which will be replaced during concurrent rehabilitation. Potential spillage of drilling fluid and drill sludge has the potential to cause soil pollution. However, only small volumes are stored at each site. Potential impacts on soil due to the prospecting operation was assessed to have a low impact significance.

The storage and handling of hazardous substances (i.e., bulk fuel) during the construction and operational phase of the MaCarthy mining operations may result in spillages and soil pollution. Runoff from disturbed areas during construction may result in soil erosion and loss of topsoil. Soil compaction may also result in impacts on soil characteristics and land capability, especially adjacent areas. The establishment of the bridge crossings across the episodic drainage lines may also result in erosion and downstream sedimentation. Specific mitigation stipulated in the site Stormwater Management Plan must be adhered to. Impacts associated with soil erosion and pollution was assessed as having a medium significance prior to the implementation of mitigation measures and low, considering the implementation of control measures.

#### **11.2.6 Land Capability and Land Use.**

The area is classified as Grazing (Class VI) and are not suitable for arable agricultural land use. The soils are, at best, suitable for natural pastures for light grazing and is currently used by wilderness as well as livestock grazing. At the time of assessment, no cultivation of crops was observed within the boundaries of the study areas as well as in the immediate vicinity, the surrounding areas are characterised by mining and related activities. Impact on land capability was rated to have a moderate significance prior to the implementation of mitigation measures and a low impact considering the implementation of the proposed control measures.

A small-scale farmer that is leasing from the property owner is currently using the property for grazing purposes and will be impacted by the mining operations and potentially be relocated. Impact on current land use was rated to have a moderate significance prior to the implementation of mitigation measures and a low impact considering the implementation of the proposed control measures. Unaffected areas could potentially be used for this purpose if proper fencing is provided.

## **11.2.7 Biodiversity**

### **11.2.7.1 Fauna and Flora Habitat (MaCarthy)**

According to the Terrestrial Biodiversity Assessment (Trogon Biodiversity, 2023), the study area has a Medium to High Site Ecological Importance ("SEI") based on the Functional Integrity ("FI") and Conservation Importance ("CI") of the habitat units identified during the assessment. The majority of the infrastructure at the MaCarthy Section will be developed on the Kuruman Mountain Bushveld Rocky Outcrops which provide important niche habitat for floral and faunal species. The project will entail the removal of natural vegetation which will directly affect habitats as well as associated fauna and flora. However, the project will not affect any CBAs or Conservation Areas.

The majority of the MaCarthy Section is however regarded as an ESA. ESAs are areas which must retain their ecological processes that have not been met in CBAs or protected areas to meet biodiversity targets.

The proliferation of alien vegetation due to disturbance caused by the project also has the potential to negatively impact indigenous vegetation and associated habitats.

Direct and indirect (edge effects) disturbance of fauna and flora habitats will have a high impact on biodiversity prior to the implementation of mitigation measures and a medium to low impact considering the implementation of the proposed control measures.

### **11.2.7.2 Species of Conservation Concern (MaCarthy)**

According to the Trogon Biodiversity, there is a moderate likelihood of selected Species of Conservation Concern ("SCC") occurring within the project area. Several plant (more than 20) and animal species that are nationally and provincially protected were recorded from the MaCarthy project area. The proposed project will result in the removal of protected plants, and it is essential to implement effective mitigation such as layout optimisation, potential relocation of selected species and obtaining permits for the removal of such species.

### **11.2.7.3 Fauna and Flora Habitat (Priority Prospecting Areas)**

According to the Terrestrial Biodiversity Assessment (The Biodiversity Company, 2023), the majority of the study area has a High Site Ecological Importance ("SEI") based on a very high Functional Integrity ("FI") of the habitat units identified during the assessment. The prospecting sites will however only cover small areas (25mX25m) and will be selected based on site sensitivity, including the avoidance of disturbance to water courses (including regulated areas) and protected plants.

Biodiversity impacts related to the establishment of prospecting sites and associated disturbance of fauna and flora habitats will have a moderate impact on biodiversity prior to the

implementation of mitigation measures and a low impact considering the implementation of the proposed control measures.

#### **11.2.7.4 Species of Conservation Concern (Priority Prospecting Areas)**

Several plant (more than 20) that are nationally and provincially protected were recorded on the Priority Prospecting Areas. The establishment of drill site will potentially result in the removal of protected plants, and it is essential that drill sites must be selected to avoid the removal of such plants.

#### **11.2.7.5 Residual Risks**

Latent or residual impacts associated with the ecology of the receiving environment are likely to occur. Once vegetation is lost to site clearance within the mining footprint area, it is highly unlikely that vegetation communities and associated faunal micro-habitats will be reinstated to the current diversity and functionality, even if revegetation and rehabilitation measures are implemented. The impact assessment concluded that the risk post mitigation is moderate however according to the biodiversity specialist study *“Provided that all mitigation and monitoring measures presented within this report are fully implemented, the specialists are of the opinion that the significance of residual impacts can be reduced”*.

### **11.2.8 Surface Water Resources**

#### **11.2.8.1 MaCarthy Section**

Two cryptic wetlands, several freshwater microhabitats as well as three episodic drainage lines have been identified by Freshwater Aquatic Assessment (SAS, 2022) to occur within the MaCarthy study area. The layout planning already undertaken will avoid most of the identified water courses, including the 100m regulated buffer zones. However, two road crossings will be established to connect the eastern with the western infrastructure and will result in direct impacts on the drainage lines as well as potential erosion that could lead to downstream sedimentation. Runoff from the exposed areas could also result in sedimentation. Potential spillages of hydrocarbons and runoff from dirty areas may also result in downstream pollution.

Direct and indirect impacts on water courses associated with the MaCarthy Section were assessed to have a medium impact significance prior to the implementation of mitigation measures and a low impact considering the implementation of the proposed control measures, including layout optimisation and implementation of a stormwater management plan.

#### **11.2.8.2 Priority Prospecting Areas**

Several episodic drainage lines have been identified by Freshwater Aquatic Assessment (SAS, 2022) to occur within the Prospecting Priority Areas as well as two cryptic wetlands. The establishment of drill sites have the potential to cause disturbance of water courses and spillages



of hazardous substances has the potential to cause pollution. The drill sites will be selected to avoid the identified water courses and associated 100m regulated buffers. A WUL will have to be obtained if drill sites intrude the regulated areas.

Impacts on water courses associated with the prospecting activities were assessed to have a low impact significance prior to the implementation of mitigation measures and a low impact considering the implementation of the proposed control measures, including layout optimisation and implementation of a stormwater management plan.

### **11.2.9 Groundwater**

The Geohydrological Assessment (Gradient, 2023) was undertaken by Gradient (2021) to determine the impact of the dewatering activities associated with MaCarthy on the aquifer yield. The study also focussed on potential impacts related to seepage from WRDs and groundwater quality. The impact assessment (impact ratings) indicates that the dewatering activities has the potential to have a high impact significance during the operational phase. The potential impacts associated with seepage from the WRDs and backfilled areas will have a moderate significance. The below model provides details of the predicted groundwater impacts.

It should be noted that no private abstraction boreholes are located in the zone of impact for the dewatering activities and the pollution plume.

The numerical groundwater model developed describes the predicted <sup>14</sup>Zone of Influence (ZOI) and aquifer dewatering at Life of Mine (LOM). Refer to Section 7.1-7.4 of the Geohydrology assessment for a detailed description of the methodology used to develop the groundwater model.

#### **Objective of the model:**

The groundwater flow and transport models were developed to:

- Understand the operational and likely post-operational groundwater flow system.
- Simulate the temporal and spatial extent of mass transport from the site (TDS was used).
- Simulate the aquifer drawdown during and after LOM.

#### **11.2.9.1 Opencast dewatering during operational phase(s).**

The average groundwater ingress and opencast dewatering volume is approximately 3 970 m<sup>3</sup>/day with a minimum groundwater ingress of 462 m<sup>3</sup>/day and a maximum of approximately 4 810 m<sup>3</sup>/d for the duration of the operational period. Dewatering will only be undertaken at

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<sup>14</sup> The Zone of Influence (Zol) is defined as the maximum distance at which the aquifer drawdowns, due to the dewatering activities, will could potentially affect the groundwater regime and water users

Pits 3, 4 and 5 after year 3. Refer to Figure 11-6 for a summary of the spatial extent of the Zone of Influence footprints representing various scenarios throughout the operational phases. Figure 11-7 provides a focussed illustration of the LoM scenario.

The simulated groundwater drawdown during the life of operation will range from 1.0m to >44.0mbsl, with an estimated average of approximately 24.0mbsl within impacted boreholes. The latter is a function of the distance towards the mine dewatering activities hence opencast footprints. It is also noted that the non-perennial drainage line traversing the study area will also be intercepted. It should however be noted that the groundwater contribution to baseflow is very limited to insignificant. Compartmentalisation caused by regional lineaments and structures traversing the study area is evident.

The groundwater capture zone i.e., drawdown zone of influence extent will cover an estimated footprint of approximately 10.0km<sup>2</sup> reaching a maximum distance of 1.95km in a north to north-western direction. The simulated impact zone extends beyond the mining right area towards the north and northwestern perimeters as well as slightly to the west and east. Monitoring boreholes, as identified during the hydrocensus user survey, potentially impacted on include AGM2/70, AKM1/77, MAC2, MAC8, MZBH13, MZBH14, Mokaning1 as well as Mokaning2. There are no private user boreholes that were identified during the hydrocensus that will be impacted on by dewatering.

#### **11.2.9.2 Pollution plume migration within the aquifer hosts for the LOM operational phase(s).**

Figure 11-8 simulates a pollution plume for the proposed opencast footprints and associated waste infrastructure for the life of mine operational phase(s). Due to the negative gradient towards the opencast facilities, the plume propagation is very limited for the duration of the operations. The simulated pollution plume extent covers a total area of approximately 1.02km<sup>2</sup> and is mainly limited to the project area due to the negative hydraulic gradient created towards the opencasts by the dewatering activities which act as a sink capturing the plume migration.

#### **11.2.9.3 Pollution plume migration within the aquifer host for the post-closure phase(s).**

A post-closure scenario was simulated to evaluate the pollution plume migration within the shallow, fractured aquifer host after discontinuing of mining activities. Figure 11-9 summarises a time-series graph of the mass load contribution to conceptually placed down-gradient receptors i.e., WRD as well as opencast facilities (backfilled areas). Due to the opencast water levels recovering, the negative hydraulic gradient towards the pit is decreasing and thus the pollution plume migration is evident.

The 50-year simulation period shows that the pollution plume extent covers a total area of approximately 2.67km<sup>2</sup>, reaching a maximum distance of ~2.20km in a general north to north-western direction towards the lower laying drainage systems. The 100-year simulation period

indicate that the pollution plume extent covers a total footprint of approximately 2.74km<sup>2</sup>, reaching a maximum distance of ~2.70km in a general north to north-western direction towards the lower laying drainage systems. The simulation shows that the pollution plume generated extends beyond the project area to the north and north-western perimeters and potentially intercept neighbouring monitoring boreholes MZBH13, MZBH17 and Mokaning1. There are no private user boreholes that were identified during the hydrocensus that will be impacted by the plume migration.

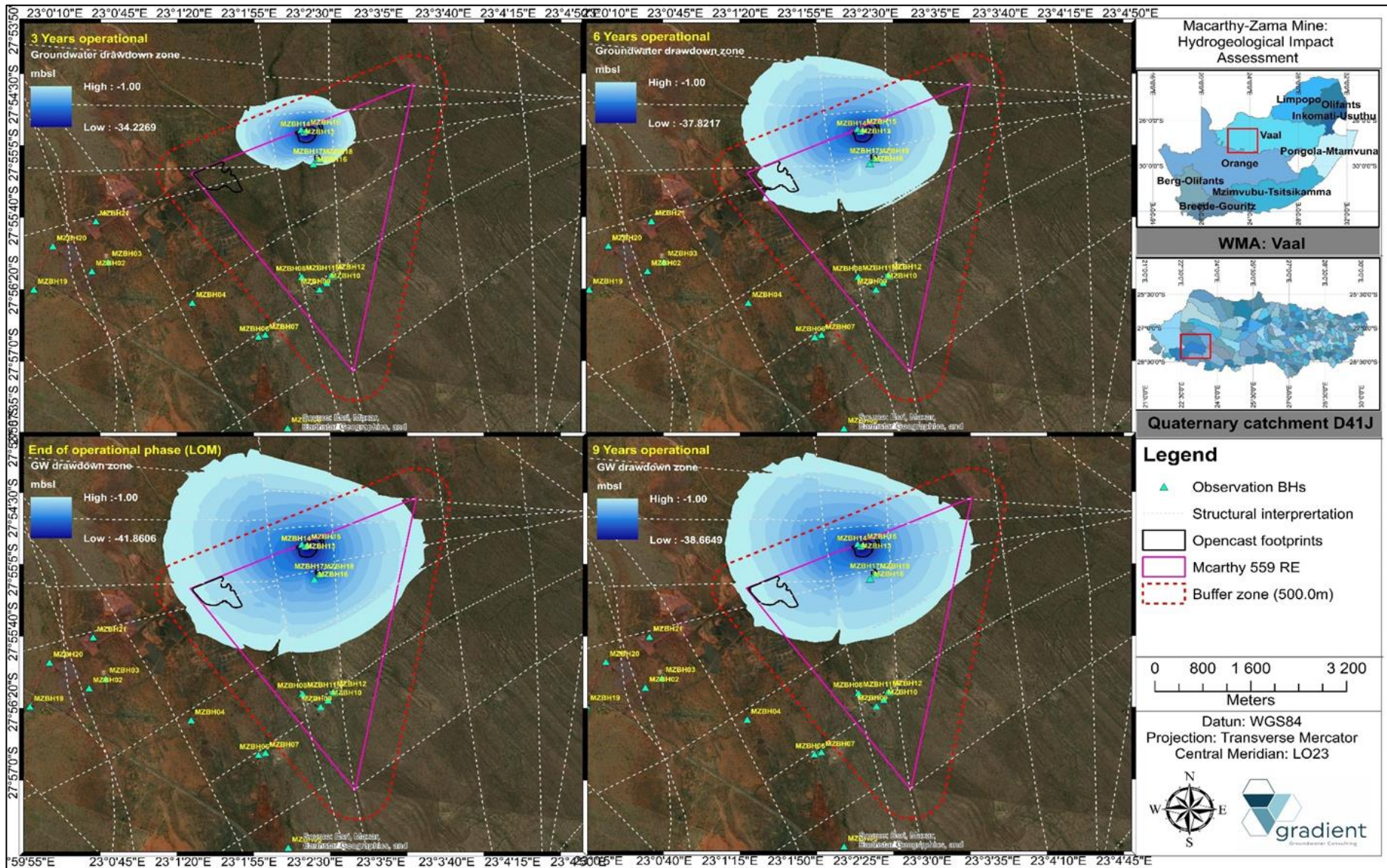


Figure 11-6: Time-series water level drawdown and groundwater capture zones of the host aquifer formed by opencast dewatering activities.





**Figure 11-7: Water level drawdown and groundwater capture zone of the host aquifer formed by opencast dewatering activities for the LOM operational phase.**



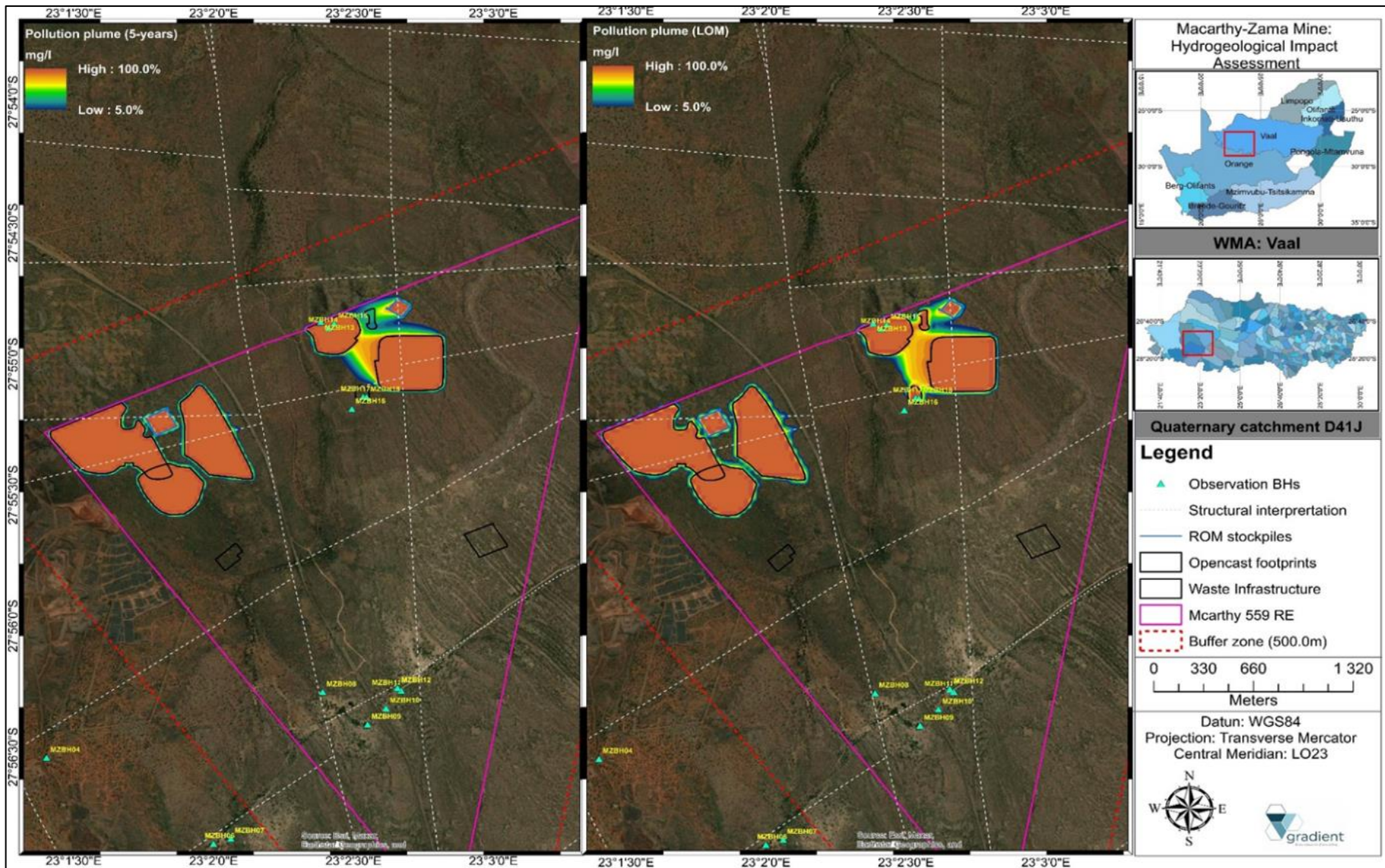


Figure 11-8: Pollution plume migration within the host aquifer for the LOM operational phase(s)



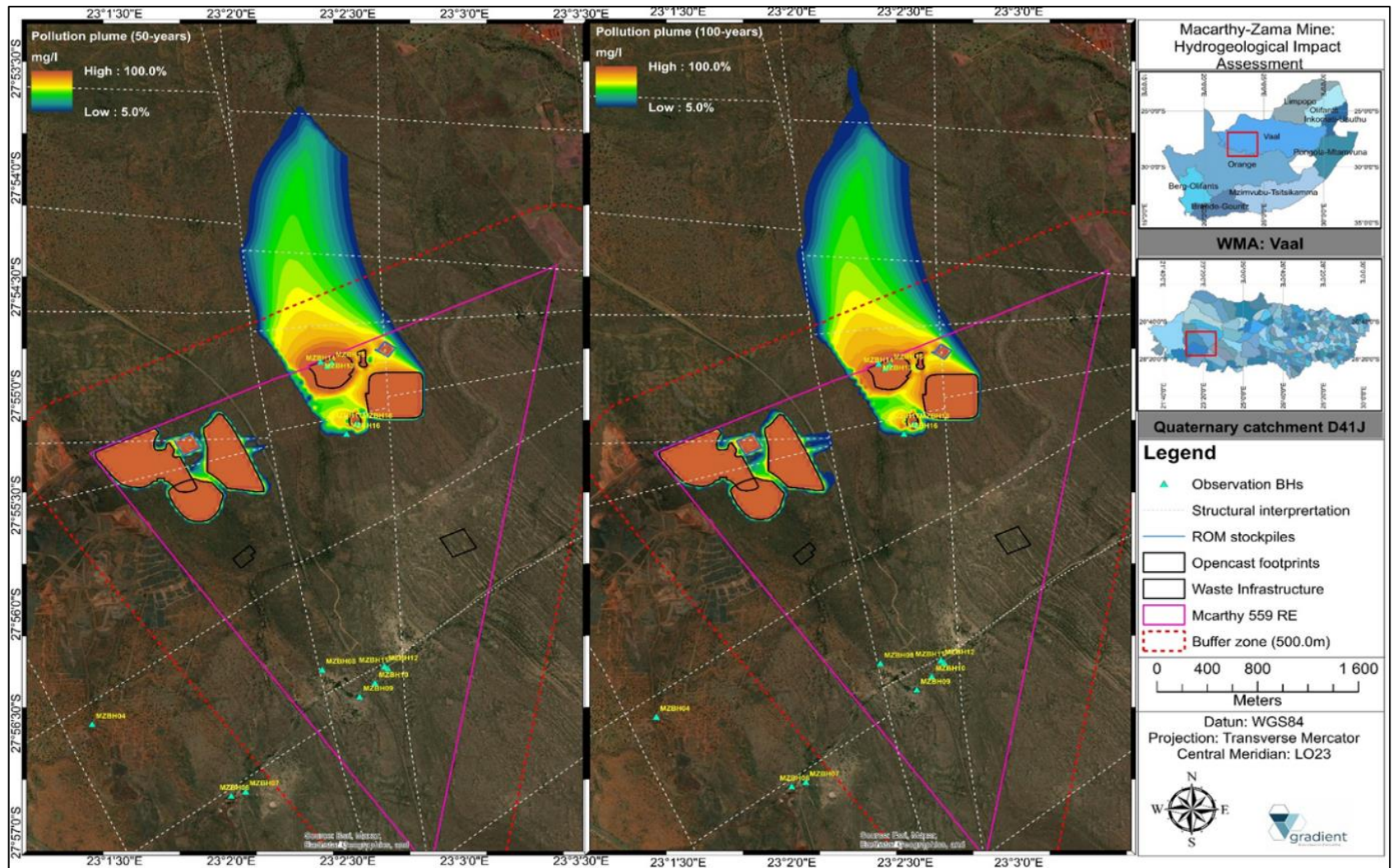


Figure 11-9: Pollution plume migration within the host aquifer for the post-closure phase

### **11.2.10 Heritage, Archaeological and Palaeontological**

Two (2) heritage sites were identified during the Heritage Impact Assessment within the MaCarthy Section, including a cemetery and a farmstead. 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. None of these sites will be affected by the project layout and the impact significance is has been assessed as low.

Twenty-three (23) heritage sites were identified during the Heritage Impact Assessment within the Prospecting Priority study area. The impact on these heritage resources including burial ground and graves is considered high to moderate prior to the implementation of mitigation measures and a low impact considering the implementation of the proposed control measures, including avoidance of these sites.

The Prospecting Priority Area is located in an area with medium palaeontological sensitivity and potential impacts are unlikely. It is however recommended that a chance find procedure be implemented in the case heritage resources are uncovered during project development.

### **11.2.11 Fire Management**

Activities related to the prospecting and mining operations has the potential to increase the risk of veld fire which may affect the landowners and land use activities. It is essential that adequate mitigation such as fire breaks at MaCarthy, open communication with landowners, other mines and emergency services, availability of firefighting equipment and strict rules regarding smoking are implemented. The significance of impacts related to potential fires was assessed as being moderate pre-mitigation and low post mitigation.

### **11.2.12 Safety and Security**

The presence of additional people on farms to undertake prospecting and mining activities may result in increased safety and security risks to landowners. It is essential that appropriate land access agreements be established that stipulate specific measures regarding access to the farms. Control measures will include no drilling to be undertaken at nighttime, all workers must have appropriate identification, no workers to stay overnight, all gates will be strictly closed, etc. The significance of impacts related to safety and security was assessed as being moderate pre-mitigation and low post mitigation.

### **11.2.13 Socio-Economic Environment**

#### *11.2.13.1 Increased pressure on social infrastructure and services*

Influx of job seekers as well as the presence of migrant workers will result in pressure being placed on existing municipal infrastructure and services. Olifantshoek, and Maramane, being the closest urban areas will likely be where this impact is felt the most. The significance of this impact was assessed as being high pre-mitigation and moderate post mitigation.

#### *11.2.13.2 Increased social pathologies*

Influx of job seekers and the presence of workers will likely result in higher incidences of social pathologies such as drug and alcohol abuse, increased crime, higher prevalence of HIV/AIDS and sexually transmitted infections. The significance of this impact was assessed as being high pre-mitigation and moderate post mitigation.

#### *11.2.13.3 Change in sense of place and nuisance factor*

Change in sense of place and nuisance factor due to the mine's existence as well as the activities that would cause the environment to change such as air quality, traffic and noise. The significance of this impact was assessed as being medium pre-mitigation and low post mitigation.

#### *11.2.13.4 Employment opportunities and increased disposable incomes*

It is anticipated that there will be between 100 and 150 during construction and approximately 300 jobs created during operation of the proposed mine. Indirect and induced jobs will be created, thus further increasing the employment levels in the area. Employment opportunities will result in an increase in disposable income and associated enhanced standards of living. The significance of this impact was assessed as being medium positive pre-mitigation and medium positive post mitigation.

#### *11.2.13.5 Enhanced local skills*

It is anticipated that during construction, there will be on the job training of unskilled and semi-skilled labourers. There will also be opportunities for those who are already skilled to acquire new skills or enhance existing ones. The significance of this impact was assessed as being low positive pre-mitigation and low positive post mitigation.

### **11.2.13.6 Enhanced socio-economic development through SLP and CSI**

The unapproved SLP for the Zama Mining Project has budgeted R16.9mil for infrastructure development projects that are set to alleviate some of the social infrastructure and social service challenges that the municipalities are experiencing. The significance of this impact was assessed as being low positive pre-mitigation and low positive post mitigation. The

significance rating was low due to the relatively small contribution of the project, taking into account the cumulative infrastructure deficiencies the municipalities are facing.

### **11.2.13.7 Enhanced procurement from local businesses**

The proposed project presents opportunities for local entrepreneurs to become suppliers to the mine. The significance of this impact was assessed as being low positive pre-mitigation and low positive post mitigation.

### **11.2.14 Visual**

The natural landscape is generally flat to undulating, with low-lying areas and elevated sites associated with wetlands and pans, and small hills, respectively. However, the natural topographical features are mostly unobtrusive and do not form visual landmarks. The findings of the study indicated that the proposed mining development will result in a visual intrusion in terms of the visual receptors surrounding the site. The impacts will however not be significant due to the distance of the nearby sensitive receptors and the relatively small footprint of the infrastructure. The surrounding landscape is also characterised by mining activities which correspond to the proposed MaCarthy Mining Development and Prospecting activities. Visual impacts were rated as having a moderate significance before the implementation of mitigation and low post mitigation.

## **11.3 The possible mitigation measures that could be applied and the level of residual risk.**

Mitigation of key impacts and risks are discussed in detail in **Part B: Environmental Management Programme**. The significance of the impact with mitigation has been weighted by multiplying the significance rating without significance by the following, depending on the confidence placed in the successful implementation of the mitigation measures or the effectiveness of those measures in reducing the impact.

### **11.3.1 Mitigation Confidence Negative Impacts**

1	Very High Risk (No confidence)	Measures are very difficult or expensive to implement or are not expected to be effective in reducing the impact (No Confidence)
0.8	High Risk (Low confidence)	Measures are difficult or expensive to implement or are expected to have limited effectiveness in reducing the impact (20% Confidence)
0.5	Moderate Risk (Moderate confidence)	Measures can be implemented with some effort and cost and/or the measures can be effective in mitigating the impact if implemented (50% Confidence)
0.2	Low Risk (High confidence)	There is high confidence that mitigation measures can be implemented and can be effective in mitigating the impact (80% Confidence)

### **11.3.2 Enhancement Confidence Positive Impacts**

1	Very High Risk	Measures are very difficult or expensive to implement or are not
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	(No confidence)	expected to be effective in enhancing the impact.
1.2	High Risk (Low confidence)	Measures are difficult or expensive to implement or are expected to have limited effectiveness in enhancing the impact (20% Confidence)
1.5	Moderate Risk (Moderate confidence)	Measures can be implemented with some effort and cost and/or the measures can be effective in enhancing the impact if implemented (50% Confidence)
1.8	Low Risk (High confidence)	There is high confidence that mitigation measures can be implemented and can be effective in enhancing the impact (80% Confidence)

## 11.4 Biodiversity Offset Development

### 11.5 Motivation where no alternative sites were considered.

Not applicable as alternative layouts have been considered based on the mitigation of impacts.

### 11.6 Statement motivating the alternative development location within the overall site.

Alternatives considered for the project are described in Section 7, including a description of the preferred alternatives.

### 11.7 Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site through the life of the activity.

Please refer to Section 10.1 for the methodology used in the ranking of impacts. Please refer to Section 11.3 for the methodology used for the application of a mitigation confidence ranking to the impact ranking.

### 11.8 Assessment of each identified potentially significant impact risk.

#### 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.
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>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. ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT RISK

### 12.1 Summary of Impact Assessment Results

A summary of the impact assessment results for the is provided in Section 12.1.1 for the Prospecting Priority Areas and in Section 12.1.2 for the MaCarthy mining activities. The Tables contain impacts related to the planning phase, construction phase, operational phase and decommissioning/closure phase, as well as the socio-economic impacts. Refer to **Appendix C** for the full impact assessment tables.

The assessment of the impacts and recommended mitigation measures have been identified though the utilisation of the baseline environmental conditions (Section 10.17), summary of the impacts which stipulate the nature thereof (Section 11.3), including the impact assessment methodology provided in Section 11.1 and the methodology used for the application of a mitigation confidence ranking provided in Section 11.1.

**Note:** The mitigation measures provided below is a summary of the proposed actions and only contains the primary control that will be applied. Refer to **Part B** for the full Environmental Management Programme (“EMP”)

### 12.1.1 Priority Prospecting Areas

**Table 12-1: Planning (Prospecting)**

Prospecting (Planning)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Soil	Incorrect planning of stormwater infrastructure	Soil erosion	<ul style="list-style-type: none"> <li>Loss of soil</li> <li>Sedimentation of downstream water courses</li> </ul>	Low	<ul style="list-style-type: none"> <li>Implement a soil management procedure that stipulates measures for the removal, stockpiling and use of soil for rehabilitation purposes.</li> </ul>	Low
Biodiversity - Fauna	Planning of facility	Encroachment of fauna	<ul style="list-style-type: none"> <li>Direct or indirect impacts on habitat</li> </ul>	Low	<ul style="list-style-type: none"> <li>Implement strict speed limits to prevent vehicles colliding with or running over animals.</li> <li>Conduct a walk through to ensure that all faunal species (where practicable) have left the demarcated area prior to the commencement of construction activities.</li> <li>Hunting/trapping or collecting of any faunal species is strictly prohibited.</li> <li>Awareness training during regarding the presence of faunal species on site.</li> </ul>	Low
Biodiversity - Flora	Planning of facility	Encroachment of sensitive areas. Alien Invasive Plants in natural areas – outcompeting natural species. Transformation of habitats	<ul style="list-style-type: none"> <li>Direct or indirect impacts on habitat</li> <li>Loss of protected species</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Implement control measures to eradicate Alien Invasive Plants.</li> <li>Use existing roads, no additional roads to be constructed without prior consent of the landowner.</li> <li>Prospecting sites must be clearly demarcated, and vegetation clearance only allowed within those areas.</li> <li>No protected trees and plants to be removed without a permit.</li> </ul>	Low

Prospecting (Planning)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Surface Water Resources	Planning of facility	Layout to directly impact water courses	<ul style="list-style-type: none"> <li>Loss of wetlands and episodic drainage lines</li> </ul>	Low	<ul style="list-style-type: none"> <li>The 100m development buffer from water courses and 500m wetland buffers must be dedicated/marked no go areas.</li> <li>Undertake concurrent rehabilitation of all prospecting areas.</li> <li>Implement adequate measures for waste and hazardous substances management at all drill sites.</li> <li>Obtain a WUL if prospecting activities will intrude regulated buffer zones.</li> <li>Restrict movement outside demarcated areas, especially close to water courses.</li> </ul>	Very Low
Heritage	Planning of facility	Encroachment of identified heritage sites	<ul style="list-style-type: none"> <li>Impact on burial ground and graves</li> </ul>	Low	<ul style="list-style-type: none"> <li>Identified heritage resources must be avoided and regarded as no-go areas.</li> <li>Obtain relevant permits if heritage resources will be impacted.</li> </ul>	Very Low

**Table 12-2: Prospecting (Construction and Operations)**

Prospecting (Construction and Operations)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Soil	Earth works	Removal of topsoil	<ul style="list-style-type: none"> <li>Loss of soil and land capability</li> </ul>	Low	<ul style="list-style-type: none"> <li>Implement a soil management procedure that stipulates measures for the removal,</li> </ul>	Low

Prospecting (Construction and Operations)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
		Soil erosion	<ul style="list-style-type: none"> <li>Loss of topsoil</li> </ul>	Low	<ul style="list-style-type: none"> <li>stockpiling and use of soil for rehabilitation purposes.</li> <li>Clearly demarcate prospecting area and limit topsoil removal in the specified footprint.</li> <li>Existing farm roads to be used as far as possible. Additional roads only to be established in agreement with landowners.</li> </ul>	Low
	Storage and use of hazardous substances	Contamination of soil	<ul style="list-style-type: none"> <li>Soil pollution</li> </ul>	Low		Low
Land use and land capability	Establishment of prospecting footprints	Footprint development	<ul style="list-style-type: none"> <li>Loss of grazing land and change in land use.</li> <li>Impact on current farming activities</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Concurrent rehabilitation of drill sites and the success thereof must be signed off by the environmental officer.</li> <li>Refer to section related to impacts on vegetation and soil.</li> <li>Proactive consultation with land owners to establish adequate access agreements.</li> </ul>	Low
Air quality	Establishment and operations of prospecting sites	Exposed surfaces. Vehicle movement on exposed areas	<ul style="list-style-type: none"> <li>Increased dust fall</li> <li>Nuisance conditions for landowners</li> </ul>	Low	<ul style="list-style-type: none"> <li>Implement strict speed limits on all roads/exposed areas.</li> <li>Dust suppression on roads and exposed areas according to a schedule if increased dust fall is detected or if complaints are received.</li> <li>Implement a community grievances and complaints management procedure. All complaints must be investigated and responded to.</li> </ul>	Very Low



Prospecting (Construction and Operations)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Noise	Establishment and operations of prospecting sites	Increased noise levels	<ul style="list-style-type: none"> <li>Nuisance conditions for receptors/ landowners in the area.</li> </ul>	Low	<ul style="list-style-type: none"> <li>Implement a community grievances and complaints management procedure. All complaints must be investigated and responded to.</li> <li>All diesel-powered equipment and plant vehicles should be kept at a high level of maintenance.</li> <li>Avoid unnecessary equipment idling.</li> <li>No drilling to be undertaken at night.</li> <li>Avoid driving past homesteads as far as possible.</li> </ul>	Very Low
Biodiversity - Flora	Construction of facility	Vegetation clearance Edge effects	<ul style="list-style-type: none"> <li>Impact on floral Habitat and Diversity</li> <li>Impact on habitat units with High Site Ecological Importance</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Clearly demarcate prospecting site footprint prior to commencement.</li> <li>Vegetation clearance only allowed in demarcated area.</li> <li>Avoid sensitive areas such as ridges/koppies.</li> <li>Existing farm roads to be used as far as possible. Additional roads only to be established in agreement with landowners.</li> <li>Obtain permits for the removal/relocation of protected species. Consideration should be given to rescue and relocation of</li> </ul>	Low

Prospecting (Construction and Operations)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					protected succulent and bulbous species. <ul style="list-style-type: none"> <li>Concurrent rehabilitation of drill sites and must be signed off by the environmental officer. Monitoring of rehabilitated sites to ensure that rehabilitation was successfully implemented.</li> </ul>	
Biodiversity - Flora	Site clearance and construction Soil disturbance	Encroachment of invader plant species	<ul style="list-style-type: none"> <li>Impact on floral Habitat and Diversity</li> <li>Outcompete natural species</li> </ul>	Low	<ul style="list-style-type: none"> <li>Develop and implement a plan which contains measures to eradicate Alien Invasive Plants.</li> <li>Use only registered Pest Control Operators (PCOs) for the use of any herbicides.</li> </ul>	Low
Biodiversity - Fauna	Site clearance and construction	Vegetation removal for construction purposes Earth works Collisions with vehicles	<ul style="list-style-type: none"> <li>Impact on habitat units with High Site Ecological Importance.</li> <li>Faunal mortalities</li> </ul>	Low	<ul style="list-style-type: none"> <li>Implement strict speed limits during construction to prevent vehicles colliding with or running over animals.</li> <li>Prospecting area to be fenced to prevent animals from entering.</li> <li>Conduct a walk through to ensure that all faunal species (where practicable) have left the demarcated area prior to the commencement of construction activities.</li> <li>Hunting/trapping or collecting of any faunal species is strictly prohibited.</li> </ul>	Very Low

Prospecting (Construction and Operations)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					<ul style="list-style-type: none"> <li>Awareness training during construction regarding the presence of faunal species on site.</li> <li>Limit disturbance to demarcated/authorised areas and restrict access to other areas.</li> </ul>	
Surface Water Resources	Footprint establishment	Encroachment of cryptic wetland pans and freshwater micro-habitats	<ul style="list-style-type: none"> <li>Destruction/disturbance of wetland habitat</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>The 100m development buffer from water courses and 500m wetland buffers must be dedicated/marked no go areas.</li> <li>Undertake concurrent rehabilitation of all prospecting areas.</li> <li>Implement adequate measures for waste and hazardous substances management at all drill sites.</li> <li>Obtain a WUL if prospecting activities will intrude regulated buffer zones. Restrict movement outside demarcated areas, especially close to water courses.</li> </ul>	<b>Very Low</b>
	Storage and use of hazardous substances	Potential spillages of hazardous substances.	<ul style="list-style-type: none"> <li>Pollution of surface water resources</li> </ul>	<b>Low</b>	<ul style="list-style-type: none"> <li>Refer to section related to hazardous substances management.</li> </ul>	<b>Very Low</b>

Prospecting (Construction and Operations)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
	Temporary toilets	Spillages	<ul style="list-style-type: none"> <li>Pollution of surface water resources</li> </ul>	Low	<ul style="list-style-type: none"> <li>Servicing and washing of vehicles to be conducted off site.</li> <li>Temporary toilets must be located outside of the 100m buffer from water courses.</li> </ul>	Very Low
	Soil disturbance	Runoff from exposed surfaces	<ul style="list-style-type: none"> <li>Erosion and sedimentation of water courses</li> </ul>	Low	<ul style="list-style-type: none"> <li>Refer to section related to soil management.</li> </ul>	Very Low
Fire management	Construction of the proposed surface infrastructure	Lightning Intentional fire starting	<ul style="list-style-type: none"> <li>The impact of potential fires on farming activities.</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>No smoking allowed at the prospecting sites, or only in dedicated areas according to internal procedures.</li> <li>Risk of fires must be clearly communicated to all employees at prospecting sites. Implement an emergency preparedness plan with specific measures related to fire management.</li> <li>Firefighting equipment must be placed at strategic locations and serviced according to manufacturer's specifications.</li> <li>Ensure adequate communication with landowners regarding fires and collaborate with adjacent farmers with regards to fire management.</li> </ul>	Low

Prospecting (Construction and Operations)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Groundwater	Use of hazardous substances	Spillages - seepage	<ul style="list-style-type: none"> <li>Potential pollution/Contamination of groundwater</li> </ul>	Low	Refer to section related to hazardous substances management.	Very Low
Heritage	Footprint construction	Encroachment of identified heritage sites	<ul style="list-style-type: none"> <li>Impact on burial ground and graves</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Identified heritage resources must be dedicated no go areas.</li> <li>Obtain relevant permits if heritage resources will be impacted.</li> </ul> Implement a chance find procedure in case where possible heritage/fossil finds are uncovered.	Very Low
Palaeontology	Construction	Earth moving equipment/machinery (front end loaders, excavators, graders, dozers) during construction	<ul style="list-style-type: none"> <li>Sealing-in, disturbance, damage, or destruction of the fossils by:</li> <li>Development,</li> <li>Vehicle traffic,</li> <li>Prospecting,</li> <li>Mining,</li> <li>And human disturbance.</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>The overburden and interburden must always be surveyed for fossils.</li> <li>Special care must be taken during the clearing, digging, drilling, and excavating of foundations, trenches, channels and footings and removal of overburden not to intrude fossiliferous layers.</li> </ul>	Very Low
Waste Management	Construction activities	Discarding of waste	<ul style="list-style-type: none"> <li>Waste/Land Pollution Impacts on Groundwater and Surface Water</li> </ul>	Low	<ul style="list-style-type: none"> <li>Provide designated labelled bins and skips at strategic positions for the placement of general and hazardous waste, separately. These containers must not be overfilled.</li> <li>Good housekeeping practices must be implemented at the waste storage area.</li> </ul>	Very Low



Prospecting (Construction and Operations)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					<ul style="list-style-type: none"> <li>No littering must be allowed on site.</li> <li>All hydrocarbon contaminated material (rags, PPE, containers etc.) must be placed in a labelled, skip and disposed at a licenced facility.</li> </ul>	
Sewage management	Temporary toilets	Sewage spills/leaks	<ul style="list-style-type: none"> <li>Impacts on Surface Water</li> </ul>	Low	<ul style="list-style-type: none"> <li>Any sewage spillages must be reported and cleaned appropriately.</li> <li>Temporary toilets must be emptied as required by a registered contractor and sludge disposed at the municipal sewer system.</li> <li>Good housekeeping practices must be implemented at the temporary toilets to prevent nuisance conditions.</li> </ul>	Very Low
Hazardous substances management	Prospecting activities	Generation and management of hazardous waste Spillages	<ul style="list-style-type: none"> <li>Water and soil pollution</li> </ul>	Low	<ul style="list-style-type: none"> <li>Incident management procedure.</li> <li>Safety Data Sheets must be available.</li> <li>Spill kits must be available in areas where hazardous substances are used/stored.</li> <li>Spills must be cleaned timeously and appropriately.</li> <li>Refuelling to be conducted off site.</li> </ul>	Low

Prospecting (Construction and Operations)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					<ul style="list-style-type: none"> <li>Hazardous substances must be stored in an area with containment measures in place.</li> </ul>	
Safety and security	Prospecting activities	Movement of drilling contractors and influx of workers	<ul style="list-style-type: none"> <li>Increase in crime.</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Establish access agreements with landowners with specific measures as agreed with regards to security.</li> <li>Drilling contractors should not be allowed to move outside of designated areas.</li> <li>Access of personnel related to the prospecting operations will only be allowed on approval by the project manager.</li> <li>All personnel that have access to the property needs to be made visible.</li> <li>Drilling contractors to be housed off the drilling property.</li> </ul>	<b>Low</b>

### 12.1.2 MaCarthy Section

Table 12-3: Planning (MaCarthy)

MaCarthy (Planning)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Soil	Incorrect planning of stormwater infrastructure	Soil erosion	<ul style="list-style-type: none"> <li>Loss of soil</li> <li>Sedimentation of downstream water courses</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Plan soil stockpile positions according to other future footprints to prevent disturbance.</li> <li>Stripping of topsoil only allowed in demarcated and approved footprints.</li> <li>Monitor stockpiles for erosion problems.</li> <li>Topsoil stockpiles may not exceed 2.5 meters.</li> <li>No equipment will be allowed on top of stockpiles for any reason including deposition of soil.</li> </ul>	Low
Biodiversity - Fauna	Planning of facility	Encroachment of fauna	<ul style="list-style-type: none"> <li>Direct or indirect impacts on habitat</li> </ul>	High	<ul style="list-style-type: none"> <li>Implement strict speed limits during construction to prevent vehicles colliding with or running over animals.</li> <li>Conduct a walk through to ensure that all faunal species (where practicable) have left the demarcated area prior to the commencement of construction activities.</li> <li>Hunting/trapping or collecting of any faunal species is strictly prohibited.</li> <li>Awareness training during construction regarding the presence of faunal species on site.</li> </ul>	Low

MaCarthy (Planning)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Biodiversity - Flora	Planning of facility	Encroachment of Alien Invasive Plants in natural areas – outcompeting natural species. Transformation of habitats	<ul style="list-style-type: none"> <li>Direct or indirect impacts on habitat</li> <li>Loss of protected species</li> </ul>	<b>High</b>	<ul style="list-style-type: none"> <li>Clearly demarcate authorised footprint and encroachment of adjacent areas must be prohibited.</li> <li>Contractors must be informed of the extent of the authorised footprint.</li> <li>Implement control measures to eradicate Alien Invasive Plants.</li> <li>Obtain permits for the removal/relocation of protected species.</li> <li>Consideration should be given to rescue and relocation of protected succulent and bulbous species.</li> </ul>	<b>Low</b>
Surface Water Resources	Planning of facility	Layout to directly impact cryptic wetlands	<ul style="list-style-type: none"> <li>Loss of wetlands and episodic drainage lines</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Implement mitigated layout plan to avoid water courses.</li> <li>Water crossings must be designed with measures in place to prevent erosion in episodic drainage lines.</li> <li>Implement stormwater control measures as stipulated in the stormwater management plan to prevent sedimentation of water courses.</li> <li>The 100m development buffer from water courses (not authorised in the WUL) must be dedicated/marked no go areas.</li> <li>Water courses must be monitored for the infestation of alien and invader plants and measures must be implemented to eradicate such plants.</li> </ul>	<b>Low</b>

MaCarthy (Planning)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Heritage	Planning of facility	Encroachment of identified heritage sites	<ul style="list-style-type: none"> <li>Impact on burial ground and graves</li> </ul>	Low	All heritage sites must be dedicated no-go areas.	Very Low

**Table 12-4: Site Preparation and Construction (MaCarthy)**

MaCarthy (Site Preparation and Construction)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Soil	Earth works Site clearance	Removal of topsoil	<ul style="list-style-type: none"> <li>Loss of soil and land capability</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Plan soil stockpile positions according to other future footprints to prevent disturbance.</li> <li>Stripping of topsoil only allowed in demarcated and approved footprints.</li> <li>Topsoil stockpiles may not exceed 2 meters.</li> <li>No equipment will be allowed on top of stockpiles for any reason including deposition of soil.</li> <li>Any contaminated soil must be handled as hazardous waste.</li> <li>Refer to section related to hazardous substances management.</li> </ul>	Low
		Soil erosion	<ul style="list-style-type: none"> <li>Loss of topsoil</li> </ul>	Moderate		Low
	Storage and use of hazardous substances	Contamination of soil	<ul style="list-style-type: none"> <li>Soil pollution</li> </ul>	Low		Low



MaCarthy (Site Preparation and Construction)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Topography	Construction of infrastructure and footprints	Change in topography	<ul style="list-style-type: none"> <li>Alteration of landscape</li> </ul>	Low	<ul style="list-style-type: none"> <li>Rehabilitation to be undertaken in terms of the Closure and Rehabilitation Plan.</li> <li>Optimise backfilling of pits.</li> </ul>	Very Low
Land use and land capability	Establishment of footprint	Footprint development	<ul style="list-style-type: none"> <li>Loss of grazing land and change in land use</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Rehabilitation to be undertaken in terms of the Closure and Rehabilitation Plan.</li> <li>Refer to section related to impacts on vegetation and soil.</li> </ul>	Low
Air quality	Construction activities (earth works, moving equipment, vehicles travelling)	Vehicle movement on exposed areas	<ul style="list-style-type: none"> <li>Increased dust fall</li> <li>Nuisance conditions</li> </ul>	Low	<ul style="list-style-type: none"> <li>Implement strict speed limits on all roads/exposed areas.</li> <li>Dust suppression on roads and exposed areas according to a schedule.</li> <li>Dust fall monitoring in the area surrounding the property during construction according to the National Dust Control Regulations.</li> <li>Implement a community grievances and complaints management procedure. All complaints must be investigated and responded to.</li> </ul>	Low
		Exhaust emissions, construction vehicles	<ul style="list-style-type: none"> <li>Contribution to greenhouse gas emissions.</li> </ul>	Low		Very Low
Noise	Construction activities (earth works, moving	Increased noise levels	<ul style="list-style-type: none"> <li>Nuisance conditions for receptors in the area.</li> </ul>	Low	<ul style="list-style-type: none"> <li>Implement a community grievances and complaints management procedure. All</li> </ul>	Low

MaCarthy (Site Preparation and Construction)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
	equipment, vehicles travelling)				complaints must be investigated and responded to. <ul style="list-style-type: none"> <li>Biannual noise monitoring</li> </ul>	
Biodiversity - Flora	Site clearance for the establishment of infrastructure, roads, WRD, Pits, etc.	Vegetation clearance Edge effects	<ul style="list-style-type: none"> <li>Impact on floral Habitat and Diversity</li> <li>Fragmentation of habitat</li> <li>Impact on habitat units with High Site Ecological Importance</li> </ul>	High	<ul style="list-style-type: none"> <li>Vegetation clearance only allowed in demarcated and approved footprints.</li> <li>Limit road construction to the authorised access roads.</li> <li>Placement of construction camps, contractor's laydown areas and other temporary infrastructure are to be placed within areas that have already been modified or fall within the overall development footprint,</li> </ul>	Moderate
Biodiversity - Flora	Site clearance for the establishment of infrastructure, roads, WRD, Pits, etc.	Vegetation clearance	<ul style="list-style-type: none"> <li>Destruction of protected plant species.</li> <li>Impact on habitat units with High Site Ecological Importance</li> </ul>	High	<ul style="list-style-type: none"> <li>Obtain permits for the removal/ relocation of protected species.</li> <li>Consideration should be given to rescue and relocation of succulent or bulbous species and other protected species.</li> <li>Rehabilitation of mining footprints as per the rehabilitation plan.</li> </ul>	Moderate
Biodiversity - Flora	Site clearance and construction Soil disturbance	Encroachment of invader plant species	<ul style="list-style-type: none"> <li>Impact on floral Habitat and Diversity</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Develop and implement a plan which contains measures</li> </ul>	Low

MaCarthy (Site Preparation and Construction)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
			Outcompete natural species		to eradicate Alien Invasive Plants. • Topsoil stockpiles to be kept clear of Alien Invasive Plants.	
Biodiversity - Fauna	Site clearance and construction	Vegetation removal for construction purposes Earth works Coalitions with vehicles	<ul style="list-style-type: none"> <li>Impact on habitat units with High Site Ecological Importance.</li> <li>Faunal mortalities</li> </ul>	High	<ul style="list-style-type: none"> <li>Implement strict speed limits during construction to prevent vehicles colliding with or running over animals.</li> <li>Construction area to be fenced to prevent animals from entering.</li> <li>Conduct a walk through to ensure that all faunal species (where practicable) have left the demarcated area prior to the commencement of construction activities.</li> <li>Hunting/trapping or collecting of any faunal species is strictly prohibited.</li> <li>Limit disturbance to demarcated/authorised areas and restrict access to other areas.</li> </ul>	Moderate

MaCarthy (Site Preparation and Construction)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Surface Water Resources	Footprint establishment	Encroachment of cryptic wetland pans and freshwater micro-habitats	<ul style="list-style-type: none"> <li>Destruction/disturbance of wetland habitat</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Implement mitigated layout plan to avoid wetland pans and other freshwater microhabitats.</li> <li>Water crossings must be designed with measures in place to prevent erosion in episodic drainage lines.</li> <li>Implement stormwater control measures as stipulated in stormwater management plan.</li> <li>The 100m development buffer from water courses (not authorised in the WUL) must be dedicated/marked no go areas.</li> <li>Restrict movement outside demarcated areas, especially close to water courses.</li> </ul>	Low
	Storage and use of hazardous substances	Potential spillages of hazardous substances.	<ul style="list-style-type: none"> <li>Pollution of surface water resources</li> </ul>	Low	<ul style="list-style-type: none"> <li>Refer to section related to hazardous substances management.</li> <li>Servicing and washing of vehicles to be conducted in dedicated areas with measures in place for the containment of runoff.</li> </ul>	Very Low
	Temporary toilets	Spillages	<ul style="list-style-type: none"> <li>Pollution of surface water resources</li> </ul>	Moderate		Low

MaCarthy (Site Preparation and Construction)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					<ul style="list-style-type: none"> <li>Temporary toilets must be located outside of the 100m buffer from water courses.</li> </ul>	
	Soil disturbance	Runoff from exposed surfaces	<ul style="list-style-type: none"> <li>Erosion and sedimentation of water courses</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Install dissipating structures (such as gabions) at stormwater discharge points, where necessary, as per the stormwater management plan.</li> <li>Implement measures contained in the site stormwater management plan.</li> <li>Rehabilitation/stabilisation of areas disturbed during construction that will not be used during operations.</li> <li>Monitor downstream for erosion problems.</li> </ul>	<b>Low</b>
Fire management	Construction of the proposed surface infrastructure	Lightning Intentional fire starting Storage of waste tyres	<ul style="list-style-type: none"> <li>The impact of potential fires on neighbouring farming and other activities</li> </ul>	<b>Low</b>	<ul style="list-style-type: none"> <li>Fire breaks must be established and maintained.</li> <li>Implement an emergency preparedness plan with specific measures related to fire management.</li> <li>Maintenance of grass/vegetation within the fenced area.</li> <li>Firefighting equipment must be placed at strategic locations and serviced</li> </ul>	<b>Very Low</b>



MaCarthy (Site Preparation and Construction)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					<p>according to manufacturer's specifications.</p> <ul style="list-style-type: none"> <li>Sufficient emergency water must be available on site for firefighting purposes.</li> <li>Ensure adequate communication with neighbours regarding fires and collaborate with adjacent farmers with regards to fire management.</li> </ul>	
Groundwater	Use of hazardous substances, including hydrocarbons	Spillages - seepage	<ul style="list-style-type: none"> <li>Potential pollution</li> <li>Contamination of groundwater</li> </ul>	Low	Refer to section related to hazardous substances management and sewage management.	Very Low
	Overburden stripping and start of the opencast pits.	Groundwater dewatering	<ul style="list-style-type: none"> <li>Change in groundwater levels due to dewatering</li> </ul>	Very Low	Groundwater and surface water levels should be monitored.	
	Leakages and spillages from machinery	Groundwater quality deterioration and contamination of the environment.	<ul style="list-style-type: none"> <li>Impact of change in groundwater quality</li> </ul>	Very Low	<ul style="list-style-type: none"> <li>Monitoring is recommended according to the monitoring plan.</li> <li>Dirty surface run-off should be pumped or transferred passively to dirty water dams. These dams should be lined to ensure no future pollution of groundwater resources.</li> </ul>	
Heritage	Footprint construction	Encroachment of identified heritage sites	<ul style="list-style-type: none"> <li>Impact on burial ground and graves</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Implement a chance find procedure during construction in case where</li> </ul>	Low

MaCarthy (Site Preparation and Construction)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					possible heritage/fossil finds are uncovered. <ul style="list-style-type: none"> <li>In the event that any of the identified archaeological sites will be impacted, a Phase 2 archaeological mitigation process must be implemented. A permit issued under s35 of the NHRA will be required to conduct such work.</li> </ul>	
Visual	Footprint of activities Security lighting	Visual appearance	<ul style="list-style-type: none"> <li>Visual intrusion</li> <li>Sense of place</li> </ul>	Low	<ul style="list-style-type: none"> <li>Keep footprint of facility as small as possible according to demarcated area.</li> <li>Dust suppression. Only develop infrastructure in demarcated areas.</li> </ul>	Very Low
Traffic	Movement of construction vehicles on regional roads	Additional dust from construction vehicles driving on provincial road.	<ul style="list-style-type: none"> <li>Poor visibility - increased safety risk for road users</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Implement dust suppression on provincial road.</li> <li>Avoid crossing N14 during peak traffic periods.</li> <li>All drivers must have valid driver's licences.</li> <li>Risk of crossing the N14 must be clearly communicated to divers and included in Safety Risk Assessments.</li> </ul>	Low
		Additional heavy vehicles crossing N14	<ul style="list-style-type: none"> <li>Safety of existing road users travelling on N14</li> </ul>	Moderate		Low

MaCarthy (Site Preparation and Construction)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Waste Management	Construction activities	Discarding of waste	<ul style="list-style-type: none"> <li>Waste/Land Pollution Impacts on Groundwater and Surface Water</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Provide designated labelled bins and skips at strategic positions for the placement of general and hazardous waste, separately. These containers must not be overfilled.</li> <li>Good housekeeping practices must be implemented at the waste storage area.</li> <li>No littering must be allowed on site. Investigate measures to separate and recycle different waste types.</li> <li>All hydrocarbon contaminated material (rags, PPE, containers etc.) must be placed in a labelled, skip and disposed at a licenced facility.</li> <li>Contaminated soil must be managed as hazardous waste.</li> <li>Construction waste must be stored in a designated area and disposed at a licenced facility.</li> </ul>	<b>Very Low</b>

MaCarthy (Site Preparation and Construction)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Sewage management	Temporary toilets	Sewage spills/leaks	<ul style="list-style-type: none"> <li>Impacts on Surface Water</li> </ul>	<b>Low</b>	<ul style="list-style-type: none"> <li>Any sewage spillages must be reported and cleaned appropriately.</li> <li>Temporary toilets during construction must be emptied as required by a registered contractor and sludge disposed at the municipal sewer system.</li> <li>Good housekeeping practices must be implemented at the temporary toilets to prevent nuisance conditions.</li> </ul>	<b>Very Low</b>
Visual	Construction	Site / Vegetation Clearance Sense of place Dust creation Local scenic quality	<ul style="list-style-type: none"> <li>Site / Vegetation Clearance.</li> <li>Vehicular movement of trucks delivering supplies and construction material.</li> <li>Soil stockpiling and vegetation debris.</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>The construction contractor should clearly demarcate construction areas so as to minimise site disturbance.</li> <li>The minimum amount of existing vegetation and topsoil should be removed. Ensure, wherever possible, all existing natural vegetation is retained and incorporated into the site rehabilitation.</li> <li>During construction of the development, access roads will require an effective dust suppression management programme, such as regular wetting and/or the use of</li> </ul>	<b>Low</b>

MaCarthy (Site Preparation and Construction)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					<p>non-polluting chemicals that will retain moisture in the road surface.</p> <ul style="list-style-type: none"> <li>Construction site screens should be put up.</li> </ul>	
Sewage management	Temporary toilets	Sewage spills/leaks	<ul style="list-style-type: none"> <li>Impacts on Surface Water</li> </ul>	Low	<ul style="list-style-type: none"> <li>Any sewage spillages must be reported and cleaned appropriately.</li> <li>Temporary toilets during construction must be emptied as required by a registered contractor and sludge disposed at the municipal sewer system.</li> <li>Good housekeeping practices must be implemented at the temporary toilets to prevent nuisance conditions.</li> </ul>	Very Low
Hazardous substances management	Construction activities	<p>Generation and management of hazardous waste</p> <p>Spillages</p>	<ul style="list-style-type: none"> <li>Water and soil pollution</li> </ul>	Low	<ul style="list-style-type: none"> <li>Implement an incident management procedure.</li> <li>Bulk fuel storage containers (during operations) must be placed in a bunded area with capacity to contain 110% of the tank volume or 25% of the volume where multiple tanks are stored.</li> <li>Safety Data Sheets must be available on file.</li> </ul>	Very Low



MaCarthy (Site Preparation and Construction)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					<ul style="list-style-type: none"> <li>Spill kits must be available in areas where hazardous substances are used/stored.</li> <li>Spills must be cleaned timeously and appropriately.</li> <li>Large spills that cannot be managed by the site must be reported and additional external resources must be used for rectification.</li> <li>Refuelling to be conducted in a dedicated area with stormwater capturing measures in place to capture spillages.</li> <li>Hazardous substances must be stored in an area with containment measures in place.</li> </ul>	

**Table 12-5: Operational (MaCarthy)**

MaCarthy (Operational)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Soil	Runoff from exposed areas, WRDs	Soil erosion	<ul style="list-style-type: none"> <li>Loss of topsoil</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Install dissipating structures (such as gabions) at stormwater discharge</li> </ul>	<b>Low</b>

MaCarthy (Operational)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
	Management of soil stockpiles	Erosion on or compaction of soil stockpiles Proliferation of AIPs on soil stockpiles	<ul style="list-style-type: none"> <li>Loss of topsoil stockpiles</li> <li>Negative impact on rehabilitation success</li> </ul>	Moderate	<p>points, where necessary, as per the stormwater management plan.</p> <ul style="list-style-type: none"> <li>Implement measures contained in the site stormwater management plan, including a silt trap downstream of the WRDs.</li> <li>Rehabilitation/stabilisation of areas disturbed during construction that will not be used for operational purposes.</li> <li>Monitor soil stockpiles for erosion problems.</li> <li>No equipment will be allowed on top of stockpiles for any reason including deposition of soil.</li> <li>Soil stockpiles must be marked and be managed as no-go areas during operations.</li> </ul>	Very Low
	Storage and use of hazardous substances	Contamination of soil	<ul style="list-style-type: none"> <li>Soil pollution</li> </ul>	Low		Low
Topography	Establishment of WRD and Pits	Change in topography	<ul style="list-style-type: none"> <li>Alteration of landscape</li> </ul>	Low	<ul style="list-style-type: none"> <li>Rehabilitation to be undertaken in terms of the Closure and Rehabilitation Plan.</li> <li>Optimise backfilling of pits.</li> </ul>	Very Low
Air quality	Mining operations	Drilling, blasting, hauling	<ul style="list-style-type: none"> <li>Increased dust fall</li> <li>Nuisance conditions</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Implement blasting procedures. Implement strict speed limits on all roads/exposed areas.</li> <li>Dust suppression on roads and exposed areas according to a schedule.</li> <li>Dust fall monitoring in the area surrounding the property according to the National Dust Control Regulations.</li> </ul>	Low
		Exhaust emissions, construction vehicles	<ul style="list-style-type: none"> <li>Contribution to greenhouse gas emissions.</li> </ul>	Low		Very Low

MaCarthy (Operational)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					<ul style="list-style-type: none"> <li>Implement a community grievances and complaints management procedure.</li> <li>All complaints must be investigated and responded to. Maintain mining machinery and vehicles to ensure emissions are kept to a minimum.</li> </ul>	
Noise	Mining operations	Drilling, blasting, hauling	<ul style="list-style-type: none"> <li>Nuisance conditions for receptors in the area.</li> </ul>	Low	<ul style="list-style-type: none"> <li>Implement a community grievances and complaints management procedure.</li> <li>All complaints must be investigated and responded to.</li> <li>All diesel-powered equipment and plant vehicles should be kept at a high level of maintenance.</li> <li>Avoid unnecessary equipment idling. Biannual noise monitoring</li> </ul>	Low
Biodiversity - Flora	WRD and Pit development (post site clearance)	Edge effects Encroachment of adjacent areas.	<ul style="list-style-type: none"> <li>Impact on floral Habitat and Diversity</li> <li>Destruction of protected plant species.</li> <li>Impact on habitat units with High Site Ecological Importance</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Clearly demarcate construction footprint prior to commencement.</li> <li>Vegetation clearance only allowed in demarcated and approved footprints.</li> <li>Limit Road construction to the authorised access roads.</li> <li>Placement of construction camps, contractor's laydown areas and other temporary infrastructure are to be placed within areas that have already been modified or fall within the overall development footprint,</li> </ul>	Moderate

MaCarthy (Operational)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					<ul style="list-style-type: none"> <li>Obtain permits for the removal/relocation of protected species.</li> <li>Rehabilitation of areas temporarily disturbed by construction activities.</li> <li>Restrict movement outside authorised areas.</li> <li>Consideration should be given to rescue and relocation of succulent or bulbous species.</li> </ul>	
Biodiversity - Flora	Operations	Encroachment of invader plant species	<ul style="list-style-type: none"> <li>Impact on floral Habitat and Diversity</li> <li>Outcompete natural species</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Develop and implement a plan which contains measures to eradicate Alien Invasive Plants.</li> <li>Topsoil stockpiles to be kept clear of Alien Invasive Plants.</li> <li>Use only registered Pest Control Operators (PCOs) for the use of any herbicides.</li> </ul>	Low
Biodiversity - Fauna	WRD and Pit development (post site clearance)	Edge effects Encroachment of adjacent areas.	<ul style="list-style-type: none"> <li>Impact on habitat units with High Site Ecological Importance.</li> <li>Impact on sensitive faunal species</li> <li>Faunal mortalities</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Implement strict speed limits during construction to prevent vehicles colliding with or running over animals.</li> <li>Hunting/trapping or collecting of any faunal species is strictly prohibited.</li> <li>Awareness training regarding the presence of faunal species on site.</li> <li>Limit disturbance to demarcated/authorised areas and restrict access to other areas.</li> </ul>	Low
Surface Water Resources	Footprint establishment	Encroachment of cryptic	<ul style="list-style-type: none"> <li>Destruction/disturbance of wetland habitat</li> </ul>	Moderate		Low

MaCarthy (Operational)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
		wetland pans and freshwater micro-habitats			<ul style="list-style-type: none"> <li>• Implement mitigated road alignment to avoid wetland pans and freshwater micro-habitats.</li> <li>• Implement mitigated layout plan to avoid wetland pans and other freshwater microhabitats.</li> <li>• Water crossings must be designed with measures in place to prevent erosion in episodic drainage lines.</li> <li>• Water crossings must be designed to allow for connectivity between the up and downstream aquatic environment.</li> <li>• Implement stormwater control measures as stipulated in stormwater management plan to prevent sedimentation of water courses.</li> <li>• The 100m development buffer from water courses (not authorised in the WUL) must be dedicated/marked no go areas.</li> <li>• Restrict movement outside demarcated areas, especially close to water courses.</li> <li>• Water courses must be monitored for the infestation of alien and invader plants and measures must be implemented to eradicate such plants.</li> </ul>	



MaCarthy (Operational)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
	Runoff from wash bay and workshops	Potential spillages of hazardous substances.	<ul style="list-style-type: none"> <li>Pollution of surface water resources</li> </ul>	Low	<ul style="list-style-type: none"> <li>Refer to section related to hazardous substances management.</li> <li>Maintenance to be conducted in a roofed area with containment measures in place.</li> <li>Servicing and washing of vehicles to be conducted in dedicated areas with measures in place for the containment of runoff.</li> <li>Temporary toilets must be located outside of the 100m buffer from water courses.</li> </ul>	Very Low
	Storage and use of hazardous substances	Potential spillages of hazardous substances.	<ul style="list-style-type: none"> <li>Pollution of surface water resources</li> </ul>	Low		Very Low
	Temporary toilets	Spillages	<ul style="list-style-type: none"> <li>Pollution of surface water resources</li> </ul>	Moderate		Low
	Soil disturbance	Runoff from exposed surfaces	<ul style="list-style-type: none"> <li>Erosion and sedimentation of water courses</li> </ul>	Moderate		<ul style="list-style-type: none"> <li>Install dissipating structures (such as gabions) at stormwater discharge points, where necessary, as per the stormwater management plan.</li> <li>Implement measures contained in the site stormwater management plan.</li> <li>Rehabilitation/stabilisation of areas disturbed during construction that will not be used during operations.</li> <li>Monitor downstream for erosion problems.</li> </ul>
Fire management	Operations	Lightning Intentional fire starting Storage of waste tyres	<ul style="list-style-type: none"> <li>The impact of potential fires on neighbouring farming and other activities</li> </ul>	Low	<ul style="list-style-type: none"> <li>Fire breaks must be established and maintained.</li> <li>Implement an emergency preparedness plan with specific measures related to fire management.</li> <li>Firefighting equipment must be placed at strategic locations and serviced</li> </ul>	Very Low

MaCarthy (Operational)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					<p>according to manufacturer's specifications.</p> <ul style="list-style-type: none"> <li>Sufficient emergency water must be available on site for firefighting purposes.</li> <li>Ensure adequate communication with neighbours regarding fires and collaborate with adjacent farmers with regards to fire management.</li> </ul>	
Heritage	Footprint construction	Encroachment of identified heritage sites	<ul style="list-style-type: none"> <li>Impact on burial ground and graves</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Implement a chance find procedure during construction in case where possible heritage/fossil finds are uncovered.</li> <li>In the event that any of the identified archaeological sites will be impacted, a Phase 2 archaeological mitigation process must be implemented. A permit issued under s35 of the NHRA will be required to conduct such work.</li> </ul>	<b>Low</b>
Visual	Footprint of activities Security lighting	Visual appearance	<ul style="list-style-type: none"> <li>Visual intrusion</li> <li>Sense of place</li> </ul>	<b>Low</b>	Keep footprint of facility as small as possible according to demarcated area.	<b>Very Low</b>
Traffic	Movement of construction vehicles on regional roads	Additional dust from construction vehicles driving on provincial road.	<ul style="list-style-type: none"> <li>Poor visibility - increased safety risk for road users</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Implement dust suppression on provincial road.</li> <li>Avoid crossing N14 during peak traffic periods.</li> <li>All drivers must have valid driver's licences.</li> </ul>	<b>Low</b>

MaCarthy (Operational)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
		Additional heavy vehicles crossing N14	<ul style="list-style-type: none"> <li>Safety of existing road users travelling on N14</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Risk of crossing the N14 must be clearly communicated to divers and included in Safety Risk Assessments.</li> </ul>	Low
Waste Management	Construction activities	Discarding of waste	<ul style="list-style-type: none"> <li>Waste/Land Pollution Impacts on Groundwater and Surface Water</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Provide designated labelled bins and skips at strategic positions for the placement of general and hazardous waste, separately. These containers must not be overfilled.</li> <li>Good housekeeping practices must be implemented at the waste storage area.</li> <li>No littering must be allowed on site. Investigate measures to separate and recycle different waste types.</li> <li>All hydrocarbon contaminated material (rags, PPE, containers etc.) must be placed in a labelled, skip and disposed at a licenced facility.</li> <li>Contaminated soil must be managed as hazardous waste.</li> <li>Construction waste must be stored in a designated area and disposed at a licenced facility.</li> </ul>	Very Low
Sewage management	Sewage packaging plant	Sewage spills/leaks	<ul style="list-style-type: none"> <li>Impacts on Surface Water</li> </ul>	Low	<ul style="list-style-type: none"> <li>Only competent employees to manage sewage packaging plant.</li> <li>Any sewage spillages must be reported and cleaned appropriately.</li> <li>Temporary toilets during construction must be emptied as required by a registered contractor and sludge</li> </ul>	Very Low

MaCarthy (Operational)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					<p>disposed at the municipal sewer system.</p> <ul style="list-style-type: none"> <li>• Good housekeeping practices must be implemented at the sewage packaging plant to prevent nuisance conditions.</li> </ul>	
Hazardous substances management	Construction activities	<p>Generation and management of hazardous waste</p> <p>Spillages</p>	<ul style="list-style-type: none"> <li>• Water and soil pollution</li> </ul>	Low	<ul style="list-style-type: none"> <li>• Implement an incident management procedure.</li> <li>• Bulk fuel storage containers (during operations) must be placed in a bunded area with capacity to contain 110% of the tank volume or 25% of the volume where multiple tanks are stored.</li> <li>• Spill kits must be available in areas where hazardous substances are used/stored. Spills must be cleaned timeously and appropriately.</li> <li>• Large spills that cannot be managed by the site must be reported and additional external resources must be used for rectification.</li> <li>• Refuelling to be conducted in a dedicated area with stormwater capturing measures in place to capture spillages.</li> <li>• Hazardous substances must be stored in an area with containment measures in place.</li> </ul>	Very Low
Groundwater	Dewatering activities	Use of natural resources	<ul style="list-style-type: none"> <li>• Potential impact on aquifer yield.</li> </ul>	High	<ul style="list-style-type: none"> <li>• Monitor and record dewatering volumes.</li> </ul>	Moderate

MaCarthy (Operational)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					<ul style="list-style-type: none"> <li>Dewatering volumes must not exceed authorised volumes.</li> <li>Groundwater levels should be monitored on-site as well as on surrounding farms.</li> <li>Monitor and record dewatering volumes.</li> <li>Dewatering volumes must not exceed authorised volumes.</li> <li>Groundwater levels should be monitored on-site as well as on surrounding farms.</li> <li>The groundwater flow model should be updated on a regular basis and prior to closure phase with the latest water level data.</li> <li>All leaks must be reported and repaired timeously.</li> </ul>	
		Decreased base flow to drainage lines	<ul style="list-style-type: none"> <li>Potential impact on water availability in drainage lines</li> </ul>	Low	None	Low

MaCarthy (Operational)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
	Use of hazardous substances. Pollution control dam Sewage packaging plant.	Spillages/ seepage	<ul style="list-style-type: none"> <li>Potential pollution/Contamination of groundwater</li> </ul>	Low	<ul style="list-style-type: none"> <li>Refer to section related to hazardous substances management and sewage management.</li> <li>Refer to section related to sewerage management.</li> <li>Only competent employees to manage sewage packaging plant.</li> <li>Any sewage spills must be cleaned timeously and appropriately.</li> <li>Installation of PCD liner as per design report.</li> </ul>	Very Low
	Establishment of Waste Rock Dumps	Seepage from WRDs	<ul style="list-style-type: none"> <li>Contamination of groundwater resources which may affect groundwater users.</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Establish a Class D liner (base preparation layer) for WRDs.</li> <li>Concurrent rehabilitation of WRDs as per rehabilitation and closure plan.</li> <li>Undertake groundwater quality monitoring according to the monitoring programme in the EMPr.</li> <li>Dirty surface run-off should be pumped to dirty water dams.</li> <li>Monitoring is recommended according to the monitoring plan</li> </ul>	Low
	Impact on groundwater quality	Seepage from backfilled pits	<ul style="list-style-type: none"> <li>Contamination of aquifer.</li> </ul>	Moderate		Low
Resource efficiency	Sewage packaging plant	Sewage spills/leaks	<ul style="list-style-type: none"> <li>Impacts on Surface Water</li> </ul>	Positive High	None	Positive High

**Table 12-6: Decommissioning and Closure (MaCarthy)**



MaCarthy (Decommissioning and Closure)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Biodiversity	Decommissioning of infrastructure	Earth works - edge effects	<ul style="list-style-type: none"> <li>Potential risk to biodiversity and habitat health. Possibility of failing to control alien invasive species on rehabilitated land.</li> <li>Permanent loss of biodiversity.</li> <li>Ineffective indigenous biodiversity</li> <li>Reestablishment</li> <li>Impedance onto wetlands due to decommissioning activities</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Any disturbance of sensitive habitats and species of conservation concern must be actively avoided. In this regard, maintaining migratory corridors and connectivity in wetland and riparian habitat units is deemed essential. All buffer areas must be avoided and maintained.</li> <li>Rehabilitation to be undertaken according to the Closure and Rehabilitation Plan</li> <li>Restrict activities to only designated areas to prevent further destruction of vegetation.</li> <li>Use existing roads during closure to avoid additional scarring.</li> <li>Implement alien invasive control/eradication programme and monitor alien invasive species during the post closure phase.</li> <li>Edge effect control needs to be implemented within affected areas.</li> <li>Continuous monitoring and maintenance of rehabilitated areas.</li> <li>Erosion protection measures must be implemented where deemed necessary.</li> </ul>	<b>Low</b>

MaCarthy (Decommissioning and Closure)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Visual	Final footprint	Final rehabilitated footprints (incl. WRDs, Pits and other disturbed areas) and remaining infrastructure	<ul style="list-style-type: none"> <li>Visual appearance of final footprint</li> </ul>	Low	<ul style="list-style-type: none"> <li>The WRDs need to be sloped and vegetated as soon as possible. This would significantly contribute to re-establishment of the scenic setting of the impacted landscape.</li> <li>Exposed areas need to be reshaped and revegetated as soon as possible.</li> <li>Backfilling of pits should be done during LOM where possible to reduce the volumes of waste going to the WRDs.</li> <li>Construction of access control measures around remaining pits should, as far as practically possible, blend with the surroundings. This includes revegetation of the berms with trees/ shrubs.</li> </ul>	Very Low
Land capability	Closure and rehabilitation of facility.	Topsoil deficit	<ul style="list-style-type: none"> <li>Unable to adequately undertake rehabilitation activities to achieve post closure land use.</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Ensure that maximum volume of topsoil is stripped for rehabilitation purposes.</li> <li>Topsoil stockpiles must not exceed 2 meters and must be protected against erosion.</li> <li>The aim of rehabilitation should be to change the land use from mining back to the desired ELU (grazing/wilderness)</li> <li>Rehabilitation should be done according to guidelines set out in</li> </ul>	Low

MaCarthy (Decommissioning and Closure)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					the Guidelines for Rehabilitation of Mined Land.	
Surface Water	Closure and rehabilitation of facility.	Runoff from disturbed areas/contaminated areas	<ul style="list-style-type: none"> <li>Contamination of surface water quality in streams, rivers, and wetlands downstream.</li> <li>Possible sedimentation of streams, rivers, and wetlands.</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>Create a sustainable landform that can be integrated into the surrounding landscape that will not compromise the future land uses in the long term.</li> <li>Ensure that the end state of the WRDs is aesthetically acceptable.</li> <li>Investigate suitable capping material, including slope stabilisation and re-vegetation requirements for the WRDs.</li> <li>Revegetation of side slopes of the WRDs must be undertaken concurrently within LOM activities.</li> <li>All pollution control infrastructure must be maintained during operations and possibly post-closure depending on the stability of the WRDs.</li> <li>Ensure that storm water management infrastructure is maintained to prevent dirty water from entering the surrounding environment.</li> <li>Rehabilitation initiatives should consider edge effects, specifically for surface water resources and wetland areas</li> </ul>	<b>Low</b>

MaCarthy (Decommissioning and Closure)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
	Remaining WRDs Backfilled areas.	Pollution plume migration to surface water resources (streams) due to base flow contribution.	<ul style="list-style-type: none"> <li>Contamination of surface water quality in streams</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>See section related to groundwater contamination post closure.</li> </ul>	Low
Groundwater	Remaining WRDs	Backfill material will come into contact with and potentially interact geochemically with groundwater as the levels rebound after dewatering has stopped. Potential contamination of groundwater due to leaching from MRDs	<ul style="list-style-type: none"> <li>Groundwater contamination</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Continue to monitor the potential impact so that corrective action can be taken.</li> <li>Design final landforms that spread rainfall and runoff on several smaller areas to reduce seepage.</li> <li>Rehabilitate the WRDs according to the Rehabilitation and Closure Plan/</li> <li>Fill the open pit above the surrounding NGL to allow for future consolidation and ensure a free draining surface.</li> <li>Deep rip the backfilled open pit to increase infiltration.</li> <li>Divert surface runoff away from the backfilled pit.</li> <li>Reshape the remaining steep slopes and ensure highwalls are stable.</li> </ul>	Low
Socio-economic	Decommissioning activities	Loss of income and jobs and inadequate timeously implement and design an exit strategy for employees. No alternative work	<ul style="list-style-type: none"> <li>Loss of jobs and associated income.</li> <li>Social and labour unrest because of dissatisfaction at</li> </ul>	High	<ul style="list-style-type: none"> <li>Identify reallocation of jobs to other business units.</li> <li>Undertake investigations into long-term livelihood sustenance project creation to reskill and enable mine employees to be sustainable post closure.</li> </ul>	Moderate

MaCarthy (Decommissioning and Closure)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
		opportunities to obtain work elsewhere once mine stopped	loss of employment followed by economic hardship and physical displacement		<ul style="list-style-type: none"> <li>The closure planning and SLP integration is required to investigate potential sustainable economic land uses that might offset the economic impact of closure of the mine.</li> <li>Develop skills required for end land use through the SLP</li> </ul>	
Waste Management	Decommissioning activities	Generation of demolition waste	<ul style="list-style-type: none"> <li>Littering</li> <li>Illegal disposal of waste</li> <li>Land contamination</li> </ul>	Low	<ul style="list-style-type: none"> <li>Identify structures that can be beneficially re-used and establish agreements for transfer/hand-over.</li> <li>Demolish and remove concrete and/or brick structures and dispose of at a registered site and/or apply for necessary regulatory permits to dispose of demolition waste into pits (if inert).</li> <li>Dismantle steel structures and sell salvageable scrap metal.</li> <li>All material recovered from the demolition of building structures will either be transported to a permitted disposal site, sold as scrap metal, or made available to the local community as building materials – provided that the material is still in a satisfactory condition and pose no health risks.</li> </ul>	Low
Community safety	Open voids	Community access to open pit/voids post operational phase	<ul style="list-style-type: none"> <li>Unsafe conditions for surrounding</li> </ul>	High	<ul style="list-style-type: none"> <li>Prevent access to the remaining void (not backfilled) by constructing an abandonment</li> </ul>	Low

MaCarthy (Decommissioning and Closure)						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
		Access to an open water body, i.e., increase safety risk.	landowners and community members leading to injury or death		bund and trench around the entire pit perimeter. <ul style="list-style-type: none"> <li>• Locate the access control measures outside the ZoR or potential failure zone of the backfilled material.</li> <li>• Erect a security fence around the mining area, reducing the risk of free access to the area by people.</li> <li>• Decommission ramps into the pit, i.e., drill and blast, excavate trenches or dump waste rock.</li> </ul>	

### 12.1.3 Combined (All Properties)

Table 12-7: Socio-economic

Socio-economic Impacts (All Properties)						
ACTIVITY	PHASE	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Socio-economic	Construction	Employment opportunities during construction	<ul style="list-style-type: none"> <li>• Employment opportunities during construction</li> </ul>	Positive High	<ul style="list-style-type: none"> <li>• Maximise the employment of local persons (unemployed youth) by contractors.</li> </ul>	Positive High
Socio-economic	Construction	Community expectations	<ul style="list-style-type: none"> <li>• Action from community due to failed expectations</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>• Stakeholder engagement aimed at transparency regarding employment and procurement opportunities.</li> </ul>	Low



Socio-economic Impacts (All Properties)						
ACTIVITY	PHASE	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Socio-economic	Construction and operations	Infrastructure challenges	<ul style="list-style-type: none"> <li>Increased pressure on infrastructure and services linked to influx of job seekers and workers</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Develop, communicate, and implement an employment strategy focused on local employment.</li> <li>Information regarding employment needs should be communicated well in advance of each phase of the project in which employees will be required.</li> <li>Hiring at both construction and operation phase should take place formally in accordance with relevant legislative requirements and nationally acceptable methods. No recruitment should take place 'at the gate'.</li> <li>Project information should be effectively communicated throughout all stages of the project to ensure that expectations of all stakeholders are managed.</li> </ul>	Low
Socio-economic	Construction and operations	Increased risk of diseases	<ul style="list-style-type: none"> <li>Social pathologies linked to influx of workers and job seekers.</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>To mitigate the potential increase in HIV/AIDS prevalence and the spread of sexually transmitted diseases, Zama Mining should develop a HIV/AIDS management strategy prior to construction. The strategy should be implemented for all staff and contractors where workers should be trained on HIV/AIDS and STI prevention and management. Workers should also have access to counselling and testing.</li> </ul>	Low

Socio-economic Impacts (All Properties)						
ACTIVITY	PHASE	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					<ul style="list-style-type: none"> <li>Develop and implement a Code of Conduct (CoC) to address drug and alcohol abuse.</li> <li>Establish a wellness programme that provides training on stress management and healthy living.</li> </ul>	
Socio-economic	Construction and operations	Enhanced local skills	<ul style="list-style-type: none"> <li>Enhanced local skills</li> </ul>	<b>Moderate Positive</b>	<ul style="list-style-type: none"> <li>As per the Mining Charter, the mine should implement a Human Resource Development (HRD) programme.</li> <li>In order to maximise impact and ensure that the right individuals are being targeted for training interventions, prior to implementation of the HRD programme, a skill needs assessment should be conducted.</li> <li>Mine and contractors should identify the specific skills needed at operation and build skills by recruiting community members and developing their skills by enrolling them at relevant training institutions with the view of appointing them when required. This is more viable for semi-skilled positions, as the lead time for the development of advanced skills may be too long.</li> <li>Zama Mining should make each effort to prioritise local community members in its skills development interventions. This is more viable for semi-skilled positions, as the lead time for the development of advanced skills may be too long.</li> </ul>	<b>Moderate Positive</b>

Socio-economic Impacts (All Properties)						
ACTIVITY	PHASE	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
					<ul style="list-style-type: none"> <li>On the job training should be encouraged and be a prerequisite, where possible.</li> </ul>	
Socio-economic	Operations	Change in sense of place	<ul style="list-style-type: none"> <li>Change in sense of place and nuisance factor due to mining and prospecting activities</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>To limit air quality impacts, noise impacts, and impacts of traffic the recommendations of the respective specialist impact assessments should be followed.</li> </ul>	<b>Low</b>
Socio-economic	Operations	Permanent Employment-	<ul style="list-style-type: none"> <li>Employment of local persons during operations</li> </ul>	<b>Positive High</b>	<ul style="list-style-type: none"> <li>Maximise the employment of local persons.</li> </ul>	<b>Positive High</b>

**Table 12-8: Cumulative Impacts**

Cumulative Impacts						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Biodiversity	Combined mining footprint in the area in sensitive habitats, related to MaCarthy and other mines	Impact on habitat units with high site ecological importance, fauna and flora, fragmentation of habitats	<ul style="list-style-type: none"> <li>Loss of habitat and protected species</li> <li>Habitat (fauna and flora) fragmentation</li> <li>Outcompeting of natural species.</li> <li>Direct or indirect impacts on habitat as a result of encroachment of fauna.</li> <li>Impact on habitat units with High Site Ecological Importance and faunal mortalities due to vegetation removal, earth works, encroachment of adjacent areas and edge effects and collisions with vehicles.</li> </ul>	<b>High</b>	Refer to impacts and mitigation related to Biodiversity.	<b>Moderate</b>
Surface Water Resources	Erosion and potential pollution from other sources combined with MaCarthy's contribution.	Soil erosion Spillages	<ul style="list-style-type: none"> <li>Destruction/disturbance of wetland habitat due to encroachment of cryptic wetland pans and freshwater micro-habitats</li> <li>Pollution of surface water resources due to spillages from temporary toilets</li> <li>Erosion and soil disturbance sedimentation of water courses from runoff from exposed surfaces.</li> </ul>	<b>Moderate</b>	Refer to impacts and mitigation related to Surface Water Resources	<b>Low</b>

Cumulative Impacts						
IMPACT CATEGORY	ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	SIGNIFICANCE WITH MITIGATION
Air Quality	Other mining activities in the area, combined with the MaCarthy operations.  Vehicles driving on unsurfaced roads in the area	Dust fall from cumulative contribution	<ul style="list-style-type: none"> <li>Increased dust fall and nuisance conditions due to cumulative contribution of other mines in the area</li> </ul>	<b>Moderate</b>	Refer to impacts and mitigation related to Air Quality	<b>Low</b>
Noise Impacts	Other mining activities in the area, combined with the MaCarthy operations.	Increased noise levels from cumulative contribution	<ul style="list-style-type: none"> <li>Nuisance conditions for receptors/landowners in the area.</li> </ul>	<b>Moderate</b>	Refer to impacts and mitigation related to Noise	<b>Low</b>
Visual Impacts	Cumulative	Footprint of activities  Security lighting	<ul style="list-style-type: none"> <li>Visual intrusion</li> <li>Sense of place</li> </ul>	<b>Moderate</b>	Refer to impacts and mitigation related to Visual	<b>Low</b>

### 13. SUMMARY OF SPECIALIST REPORTS

Table 13-1 below contains a summary of the mitigation measures proposed by the specialists and shows the measures that have been transferred to the **Environmental Management Programme (Part B)**. The mitigation measures incorporated in the EMPr is based on the practical implementation thereof. It will allow the applicant to ensure that adequate mitigation is implemented from a practical and realistic point of view.

**Table 13-1: Summary of main findings in specialist studies**

Specialist	Property/Site	Summary of Main Findings in Specialist Reports	Recommendations Included in the EMPr Report
Air Quality Impact Assessment <b>(Part C: Appendix A)</b> (Airshed Planning Professionals, 2022)	MaCarthy and Western Priority Prospecting Areas	Estimated emissions along with information on the receiving environment were used as input to an atmospheric emissions dispersion model which simulated ground level pollutant concentrations and dust fall rates. Simulated ground level pollutant concentrations and dust fall rates were screened against NAAQs and National Dust Control Regulations (NDCRs). The main findings of the impact study are listed below. <ul style="list-style-type: none"> <li>• Simulated ground-level concentrations are compliant with the NAAQS at all the AQSRs.</li> <li>• The significance of the operational phase of the proposed operations were found to be moderate. Assuming the adoption of good practice mitigation and management measures as recommended, the significance of impacts may be reduced to low.</li> </ul>	<ul style="list-style-type: none"> <li>• Implement strict speed limits on all roads/exposed areas.</li> <li>• Dust suppression on roads and exposed areas according to a schedule if increased dust fall is detected or if complaints are received.</li> <li>• Implement a community grievances and complaints management procedure. All complaints must be investigated and responded to.</li> <li>• Maintain construction vehicles and equipment to ensure emissions are kept to a minimum.</li> </ul>
Soil, Land use and Land Capability Assessment <b>(Part C: Appendix B)</b> (Zimpande Research Collaborative, 2022)	MaCarthy and Western Priority Prospecting Areas	Coega/Knersvlakte, Glenrosa/Mispah and Mispah are the main soil formations identified. These soil types are shallow in nature and thus of restricted potential due to the limited choice of crops to cultivate. In addition, these soils require intense management systems in order to be cultivated such as ripping of subsoil layers which may further increase input cost and thus further limit the area in terms of agricultural potential.	Refer to Section related to soil management.



Specialist	Property/Site	Summary of Main Findings in Specialist Reports	Recommendations Included in the EMPr Report
		<p>The cumulative impact on the local and regional scale is considered medium to low without mitigation and low to very low with mitigation measures in place as the dominant soils are not sensitive from an agricultural potential and land capability point of view.</p>	
<p>Biodiversity and Wetland Specialist Study <b>(Part C: Appendix C1)</b>  (Trogon Biodiversity, 2022).</p>	<p>MaCarthy</p>	<p>The proposed mining activities and the development of associated mining infrastructure will lead to the total loss of existing terrestrial floral communities and associated faunal habitat within the extent of the mining operations footprint, and as such will have long term negative impacts on floral and faunal communities. Those species reliant on rocky and mountainous habitat will be impacted, as these areas are where the main mining activities are proposed due to the location of the resource to be mined. Impacts are also likely to extend outside of the development footprint areas, mainly due to increased edge effects.</p> <p>All anticipated risks are considered to have a moderate to low residual impact significance provided that the mitigation measures are effectively implemented.</p>	<ul style="list-style-type: none"> <li>• Clearly demarcate construction footprint prior to commencement.</li> <li>• Vegetation clearance only allowed in demarcated and approved footprints.</li> <li>• Limit road construction to the authorised access roads.</li> <li>• Obtain permits for the removal/relocation of protected species.</li> <li>• Rehabilitation of areas temporarily disturbed by construction activities.</li> <li>• Restrict movement outside authorised areas.</li> <li>• Consideration should be given to rescue and relocation of succulent or bulbous species.</li> <li>• Develop and implement a plan which contains measures to eradicate Alien Invasive Plants.</li> <li>• Topsoil stockpiles to be kept clear of Alien Invasive Plants.</li> <li>• Use only registered Pest Control Operators (PCOs) for the use of any herbicides.</li> <li>• Implement strict speed limits during construction to prevent vehicles colliding with or running over animals.</li> <li>• Conduct a walk through to ensure that all faunal species (where practicable) have left the demarcated area prior to the commencement of construction activities.</li> <li>• Hunting/trapping or collecting of any faunal species is strictly prohibited.</li> </ul>

Specialist	Property/Site	Summary of Main Findings in Specialist Reports	Recommendations Included in the EMPr Report
<p>Biodiversity and Wetland Specialist Study <b>(Part C: Appendix C2)</b>  (The Biodiversity Company, 2022).</p>	<p>Western Priority Prospecting Areas</p>	<p>Based on the outcomes of the SEI determination, the project area possesses a 'Medium' – 'High' SEI. The overall avoidance and subsequent impact minimisation could achieve a low post-mitigation impact significance.</p> <p>Indirect impacts on the floral habitat and diversity for the focus area can be reduced to medium-low and very low significance levels. For the impacts associated with SCC, prior to the implementation of mitigation measures, the impact significance was deemed to range between medium-high and very low across the focus area. With the implementation of mitigation measures, the direct and indirect impacts on the SCC communities for the focus area can be reduced to medium-low and very low significance levels.</p>	<ul style="list-style-type: none"> <li>• Awareness training during construction regarding the presence of faunal species on site.</li> <li>• Implement control measures to eradicate Alien Invasive Plants.</li> <li>• Use existing roads, no additional roads to be constructed without prior consent of the landowner.</li> <li>• Prospecting sites must be clearly demarcated, and vegetation clearance only allowed within those areas.</li> <li>• No protected trees and plants to be removed without a permit.</li> <li>• Clearly demarcate prospecting site footprint prior to commencement.</li> <li>• Vegetation clearance only allowed in demarcated area.</li> <li>• Avoid sensitive areas such as ridges/koppies.</li> <li>• Existing farm roads to be used as far as possible.</li> <li>• Additional roads only to be established in agreement with landowners.</li> <li>• Obtain permits for the removal/relocation of protected species.</li> <li>• Consideration should be given to rescue and relocation of succulent or bulbous species.</li> <li>• Concurrent rehabilitation of drill sites and must be signed off by the environmental officer.</li> <li>• Monitoring of rehabilitated sites to ensure that rehabilitation was successfully implemented.</li> </ul>

Specialist	Property/Site	Summary of Main Findings in Specialist Reports	Recommendations Included in the EMPr Report
<p>Noise Impact Assessment <b>(Part C: Appendix D)</b></p> <p>(Airshed Planning Professionals, 2022)</p>	<p>MaCarthy and Western Priority Prospecting Areas</p>	<p>The study area is characterised by a rural environment with no major sources of noise, except traffic, trains, mining, prospecting, and farming activities. Airshed (2022) utilised a model to determine the potential increase in noise levels from the baseline measurements and to assess the potential impacts on NSRs. The study focussed on daytime and night-time noise levels.</p> <p>Noise levels due to project operations are predicted to be within the day- and night-time IFC noise guideline for residential and industrial areas at all NSRs within the study area.</p> <p>For a person with average hearing acuity an increase of less than 3 dBA in the general ambient noise level is not detectable. According to SANS 10103 (2008); the predicted increase in noise levels from the current baseline due to proposed project operations only is expected to result in imperceptible change.</p>	<ul style="list-style-type: none"> <li>• Limiting access road traffic to day-time hours only (06:00 – 18:00).</li> <li>• Using a different access route that does not pass by NSRs.</li> <li>• Diversion of the access route to be further from the NSRs.</li> <li>• Speed controls close to the receptor location, such as bumps.</li> <li>• Paving of the section of road if trucks make more noise on unpaved roads due to rattling.</li> <li>• An earth berm with vegetation between the road and the receptor if possible.</li> <li>• A complaints register must be kept throughout the life of the operations.</li> </ul>
<p>Traffic Impact Assessment <b>(Part C: Appendix E)</b></p> <p>(R&amp;G Kalahari, 2023)</p>	<p>MaCarthy and Western Priority Prospecting Areas</p>	<p>The provincial road currently has 880 to 1100 vehicles per day driving along the route which is higher than the 700 vehicles per day threshold. However, the road is well maintained by Afrimat, Helpebietjie and Demaneng Mine, and dust suppression is routinely applied. Additional vehicles from the project will increase pressure on the road and agreements with current users regarding maintenance needs to be established.</p> <p>The TIA indicated that the current Level of Service ("LOS") of the N14/DR03333 intersection is rated as an LOS A which is generally good with minor delays. The addition of traffic from MaCarthy will reduce it to a LOS B which is still good, but with slightly more delays. It was found that vehicles crossing the N14 has less impact than vehicles leaving and entering the N14. This is due to the gap requirement for acceleration to safely join the N14. The provincial gravel road has an LOS A and will not change due to the additional traffic.</p>	<ul style="list-style-type: none"> <li>• Implement a community grievances and complaints management procedure. All complaints must be investigated and responded to.</li> <li>• Dust suppression on regional unsurfaced roads at areas of concern.</li> </ul>
<p>Freshwater Ecological Specialist Assessment <b>(Part C: Appendix F1)</b></p> <p>(Scientific Aquatic Services, 2022).</p>	<p>MaCarthy</p>	<p>The majority of proposed activities are likely to pose a low significance risk to the watercourses. This is attributed to cognisant planning of the project footprint, to ensure that as much as possible, activities are excluded from the watercourses and associated 100 m zone of regulation in terms of GN 704. Some activities such as the upgrade of existing or construction of new road crossings through the EDLs are</p>	<ul style="list-style-type: none"> <li>• Implement mitigated layout plan to avoid wetland pans and other freshwater microhabitats.</li> <li>• Water crossings must be designed with measures in place to prevent erosion in episodic drainage lines.</li> </ul>

Specialist	Property/Site	Summary of Main Findings in Specialist Reports	Recommendations Included in the EMPr Report
		<p>anticipated to result in medium significance risks, due to the necessity of certain actions to occur directly within the watercourses. However, the significance thereof can be considerably reduced by ensuring that construction activities directly within the watercourses occur during the dry winter months.</p> <p>Assuming that responsible implementation of the mitigation hierarchy, as well as strict adherence to cogent, well-developed mitigation measures takes place throughout all phases of the proposed mining development, it is the specialist's opinion that the proposed development may be considered for authorisation.</p>	<ul style="list-style-type: none"> <li>• Water crossings must be designed to allow for connectivity between the up and downstream aquatic environment.</li> <li>• Implement stormwater control measures as stipulated in the stormwater management plan to prevent sedimentation of water courses.</li> <li>• The 100m development buffer from water courses (not authorised in the WUL) must be dedicated/marked no go areas.</li> <li>• Restrict movement outside demarcated areas, especially close to water courses.</li> <li>• Water courses must be monitored for the infestation of alien and invader plants and measures must be implemented to eradicate such plants.</li> </ul>
<p>Freshwater Ecological Specialist Assessment <b>(Part C: Appendix F2)</b>  (Scientific Aquatic Services, 2022).</p>	<p>Western Priority Prospecting Areas</p>	<p>The proposed activities are likely to pose a low significance risk to the freshwater ecosystems, provided that appropriate mitigation measures are implemented and adhered to throughout the exploration process. Assuming that responsible implementation of the mitigation hierarchy, as well as strict adherence to cogent, well-developed mitigation measures takes place throughout all phases of the proposed mining exploration, it is the specialist's opinion that the proposed exploration activities may be considered for authorisation.</p>	<ul style="list-style-type: none"> <li>• The 100m development buffer from water courses and 500m wetland buffers must be dedicated/marked no go areas.</li> <li>• Undertake concurrent rehabilitation of all prospecting areas.</li> <li>• Implement adequate measures for waste and hazardous substances management at all drill sites.</li> <li>• Obtain a WUL if prospecting activities will intrude regulated buffer zones. Restrict movement outside demarcated areas, especially close to water courses.</li> </ul>
<p>Heritage/Archaeological Impact Assessment and desktop palaeontological assessment <b>(Part C: Appendix G1)</b>  (Apelser Archaeological Consulting, 2022).</p>	<p>MaCarthy</p>	<p>The impact of the proposed development on the recorded and known cultural heritage sites in the area is therefore deemed as Negligible based on the Impact Assessment criteria used. However, there is always a possibility of sites, features and material being missed as a result of various factors such as vegetation cover hampering visibility on the ground, as well as the often-subterranean nature of cultural heritage resources (including low stone-packed or unmarked graves). These factors need to be taken into consideration and it is therefore</p>	<ul style="list-style-type: none"> <li>• Implement a chance find procedures in case where possible heritage finds are uncovered.</li> </ul>

Specialist	Property/Site	Summary of Main Findings in Specialist Reports	Recommendations Included in the EMPr Report
		recommended that a Chance Finds Protocol be drafted and implemented for the proposed mining development.	
Heritage/Archaeological Impact Assessment and desktop palaeontological assessment <b>(Part C: Appendix G2)</b>  (Apelser Archaeological Consulting, 2022).	Western Priority Prospecting Areas	From an archaeological perspective this site would be rated as moderate-low in significance, with possible impact on burial ground and graves as a result of encroachment of identified heritage sites.	<ul style="list-style-type: none"> <li>Identified heritage resources must be dedicated no go areas.</li> <li>Obtain relevant permits if heritage resources will be impacted. Implement a chance find procedure in case where possible heritage/fossil finds are uncovered.</li> <li>In the event that any of the identified archaeological sites will be impacted, a Phase 2 archaeological mitigation process must be implemented. A permit issued under s35 of the NHRA will be required to conduct such work.</li> </ul>
Social Impact Assessment <b>(Part C: Appendix H)</b>  (Atlegang Social Intelligence, 2023)	MaCarthy and Western Priority Prospecting Areas	At face value, the proposed development is a seemingly good opportunity to promote the economy and create jobs for the community. Mitigation measures to be considered include impacts caused by pressure on municipal services and infrastructure due to the additional influx of people in the district for employment opportunities and pressure on scarce necessities such as water, electricity, education, healthcare and sanitation facilities.	<ul style="list-style-type: none"> <li>Maximise the employment of local persons (unemployed youth) by contractors.</li> <li>Maximise the employment of local persons.</li> <li>Stakeholder engagement aimed at transparency regarding employment, procurement opportunities and grievance process.</li> </ul>

## 14. ENVIRONMENTAL IMPACT STATEMENT

This section provides a summary of the key findings of the impact assessment which was derived from the following information sources:

- Project description (Section 4).
- Final project layout map (Figure 5-3).
- Baseline environment description (Section 4).
- Overall site sensitivity map (Figure 10-25 and Figure 10-26).
- Results of impact assessment (Section 11).

The purpose of this Section is to provide a statement to indicate whether the impacts associated with the project can be effectively mitigated to ensure that the project does not result in unacceptable changes to sensitive environmental features.

### 14.1 Summary of Key Findings of the Environmental Impact Assessment

The following provides a summary of the key environmental risks related to the project that were rated moderate or high sensitivity prior to the implementation of mitigation measures. The key mitigation measures are also discussed that has been included in the Environmental Management Programme (**Part B**) to manage potential impacts.

#### 14.1.1 Social Impacts

##### 14.1.1.1 Positive

The proposed project will provide socio-economic benefits related to job creation, implementation of SLP projects in the local municipalities and purchasing of local goods and services.

##### **Key mitigation to be implemented:**

- Implement measures to ensure that procurement and allocation of jobs provide preference to local communities.
- Implement socio-economic development projects to enhance socio-economic development potential in consultation with the relevant stakeholders.

##### 14.1.1.2 Negative

The influx of people in the area in search of job opportunities may lead to increased pressure on existing municipal infrastructure and services, higher incidences of social pathologies such as drug and alcohol abuse, increased crime, higher prevalence of HIV/AIDS and sexually transmitted infections, as well as a change in sense of place due to nuisance factors.



**Key mitigation to be implemented:**

- Project information should be effectively and transparently communicated throughout all stages of the project to ensure that expectations of all stakeholders are managed.

#### **14.1.2 Soil Erosion**

The MaCarty section is situated in an area with relatively steep slopes which may result in increased runoff velocity from bare surfaces and cause soil erosion. The establishment of the road crossings over the drainage lines may also result in concentrated flow. Care must be taken to establish adequate stormwater management measures to prevent erosion from occurring.

**Key mitigation to be implemented:**

- Implement a Stormwater Management Plan ("SWMP") to minimise soil erosion and loss of topsoil. The focus should be to prevent concentrated flow, especially near water courses.

#### **14.1.3 Biodiversity – Flora and Fauna (MaCarthy)**

According to the Biodiversity Assessment for the MaCarthy Section the majority of the infrastructure will be developed on the Kuruman Mountain Bushveld Rocky Outcrops which has a high Site Ecological Importance ("SEI") and provides important niche habitat for floral and faunal species. The project will not affect any CBAs or Conservation Areas. The majority of the MaCarthy Section is however regarded as an ESA and the functionality thereof may be affected by the development. ESAs are areas which must retain their ecological processes that have not been met in CBAs or protected areas to meet biodiversity targets. Moreover, several plant (more than 20) and animal species that are nationally and provincially protected were recorded from the MaCarthy project area. Residual impacts on biodiversity will have a moderate significance after mitigation has been applied. Impacts on biodiversity is however not considered a fatal flaw.

**Key mitigation to be implemented:**

- Clearly demarcate the approved footprint and restrict access to the surrounding natural areas.
- Obtain permits for the removal of protected plants species.
- Protected succulent and bulbous species be rescued and relocated to suitable habitat outside of the development footprint.
- Implement measures contained in the approved rehabilitation plan, focus should be on concurrent rehabilitation.

#### **14.1.4 Biodiversity – Flora and Fauna (Priority Prospecting Areas)**

According to the Biodiversity Assessment, the majority of the study area has a High Site Ecological Importance ("SEI") based on a very high Functional Integrity ("FI") of the habitat units identified during the assessment. The prospecting sites will however only cover small areas (25mX25m) and will be selected based on site sensitivity, including the

avoidance of disturbance to water courses (including regulated areas) and protected plants. Several plant species (more than 20) that are nationally and provincially protected were recorded on the Priority Prospecting Areas.

Biodiversity impacts related to the establishment of prospecting sites and associated disturbance of fauna and flora habitats will have a moderate impact on biodiversity prior to the implementation of mitigation measures and a low impact considering the implementation of the proposed control measures.

**Key mitigation to be implemented:**

- Clearly demarcate prospecting site footprint prior to commencement. Vegetation clearance only allowed in demarcated area.
- Obtain permits for the removal/relocation of protected species.
- Consideration should be given to rescue and relocation of succulent or bulbous species.
- Concurrent rehabilitation of drill sites and must be signed off by the environmental officer.
- Development of a Biodiversity Offset Report prior to construction.

#### **14.1.5 Surface Water Resources**

##### *14.1.5.1. MaCarthy Section*

Two cryptic wetlands, several freshwater microhabitats as well as three episodic drainage lines have been identified by Freshwater Aquatic Assessment (SAS, 2022) to occur within the MaCarthy study area. The layout planning already undertaken will avoid most of the identified water courses, including the 100m regulated buffer zones. However, two road crossings will be established to connect the eastern with the western infrastructure and will result in direct impacts on the drainage lines as well as potential erosion that could lead to downstream sedimentation. Runoff from the exposed areas could also result in sedimentation. Potential spillages of hydrocarbons and runoff from dirty areas may also result in downstream pollution.

Direct and indirect impacts on water courses associated with the MaCarthy Section were assessed to have a moderate impact significance prior to the implementation of mitigation measures and a low impact considering the implementation of the proposed control measures, including layout optimisation and implementation of a stormwater management plan.

##### *14.1.5.2. Priority Prospecting Areas*

Several episodic drainage lines have been identified by Freshwater Aquatic Assessment (SAS, 2022) to occur within the Prospecting Priority Areas as well as two cryptic wetlands. The establishment of drill sites have the potential to cause disturbance of water courses and spillages of hazardous substances has the potential to cause pollution. The drill sites

will be selected to avoid the identified water courses and associated 100m regulated buffers. A WUL will have to be obtained if drill sites intrude the regulated areas.

Impacts on water courses associated with the prospecting activities were assessed to have a low impact significance prior to the implementation of mitigation measures and a low impact considering the implementation of the proposed control measures, including layout optimisation and implementation of a stormwater management plan.

**Key mitigation to be implemented:**

- Implement the mitigated project layout to prevent impact on aquatic fauna and flora.
- Buffer zones (100m) from water resources must be regarded as no-go areas, except where authorised in terms of the WUL.
- Implement measures stipulated in the stormwater management plan to prevent erosion/sedimentation and pollution of downstream water resources.
- No prospecting activities to be undertaken within the regulated zones of any water courses, unless authorisations have been obtained.

#### **14.1.6 Fire Management**

Activities related to the prospecting and mining operations has the potential to increase the risk of veld fire which may affect the landowners and land use activities. It is essential that adequate mitigation such as fire breaks at MaCarthy, open communication with landowners, other mines and emergency services, availability of firefighting equipment and strict rules regarding smoking are implemented. The significance of impacts related to potential fires was assessed as being moderate pre-mitigation and low post mitigation.

#### **14.1.7 Safety and Security**

The presence of additional people on farms to undertake prospecting activities may result in increased safety and security risks to landowners. It is essential that appropriate land access agreements be established that stipulate specific measures regarding access to the farms. Control measures will include no drilling to be undertaken at night time, all workers must have appropriate identification, no workers to stay over night, all gates will be strictly closed, etc. The significance of impacts related to potential fires was assessed as being moderate pre-mitigation and low post mitigation.

#### **14.1.8 Groundwater**

**Key mitigation to be implemented:**

- Ensure that groundwater abstraction rates remain below sustainable safe yields.
- Installation of a liner system at the oxidation pond according to the design specifications.

## **14.2 Proposed management objectives and the impact management outcomes for inclusion in the EMPr.**

The key management outcomes and associated mitigation measures to be included in the EMPr are as follows:

- Preference should be given to local employment and procurement to ensure that local communities obtain maximum benefit from the project.
- Implementation of the mitigated layout to prevent encroachment of water courses. The water courses and 100 m buffers as well as 100-year Floodlines must be regarded as no-go areas (unless authorised).
- Concurrent rehabilitation should be prioritised, including optimisation of pit backfilling.
- Effective management of stormwater to prevent erosion, loss of topsoil and sedimentation of water courses. Implement a Stormwater Management Plan ("SWMP") to minimise soil erosion that may lead to sedimentation of downstream.
- Care must be taken to minimise impacts on biodiversity and measure should include obtain of permits for the removal of protected and relocation of certain bulbous/succulent species, prohibit poaching, restrict activities to demarcated/approved footprints.
- Groundwater dewatering must be monitored and ensure that the volumes do not exceed authorised volumes.
- The establishment of access agreements with land owners to undertake prospecting activities must be done proactively.
- Adequate measures must be implemented to ensure that the safety of land owners are not compromised.
- The monitoring of compliance to the provisions of the EMPr should be prioritised, including the appointment of an Environmental Control Officer ("ECO") to oversee the implementation of mitigation measures.

## **14.3 Aspects for inclusion as conditions in the authorisation**

The authorisation is subject to the implementation of the Mitigated Layout Plan which is required to reduce negative impacts to acceptable levels. The authorisation is also subject to the recommendations contained in the EMPr (**Part B**). Key conditions to be included are the implementation of a Stormwater Management Plan to minimise erosion and sedimentation of downstream water courses. The project footprint must be clearly demarcated prior to site preparation and activities must be confined to the predetermined dimensions. The establishment of access agreements with landowners to undertake prospecting activities must be done proactively. Adequate measures must be implemented to ensure that the safety of landowners are not compromised.

Due to the fact that the residual impact on biodiversity is considered moderate, the development of a Biodiversity Offset Report is recommended prior to the commencement of construction activity.

#### **14.4 Description of any assumptions, uncertainties, and gaps in knowledge**

The outcomes of this EIA Report are based on the following assumptions, uncertainties, and knowledge gaps:

- The impacts are associated with the project description provided by Zama Mining and as described in Section 5.
- The proposed layout as provided are conceptual. Detailed design of such infrastructure is still to be undertaken. The final layout may differ slightly from the conceptual layout plan. The principles as specified in the outcomes of the EIA Report will however be adhered to during final design.
- The EIA was done at a specific time frame according to current environmental legislation which may change over time.
- The outcome of the environmental impact assessment is based on the findings of the specialist studies and the respective specialist's knowledge of the different field.
- Each specialist study contains specific assumptions and limitations that apply to the outcome of the EIA process.

#### **14.5 Reasoned opinion as to whether the proposed activity should or should not be authorised.**

It is the opinion of the EAP that the activities associated with the mining development and prospecting activities be authorised based on the following reasons:

- No fatal flaws or unacceptable risks were identified as part of the impact assessment. One of the main risks relate to impacts on biodiversity habitat units with high ecological value as several plant and animal species that are nationally and provincially protected were recorded from the MaCarthy project area. However, the area that will be disturbed is relatively small and the implementation of the proposed mitigation measures is sufficient to reduce the risk to a moderate significance. It is therefore, not deemed as a fatal flaw. However, it is recommended that a biodiversity offset report be developed prior to the construction phase.
- The dewatering activities will result in potential high impacts on the aquifer yield prior to the implementation of mitigation measures, however the groundwater model suggest that no private groundwater users will be affected.

- Potential seepage from the Waste Rock Dumps and backfilled pits has the potential to cause groundwater pollution. However, the waste assessment indicated that the waste rock material has low polluting potential and the pollution plume model showed that no private boreholes (except monitoring locations) are located in the pollution plume domain.
- The implementation of the mitigated layout and adherence to the associated no-go buffers will ensure the prevention of impacts on water courses and associated aquatic biodiversity.
- Impacts related to visual intrusion, traffic, air pollution, increased noise levels were assessed to be insignificant.
- The proposed mining and prospecting activities will provide socio-economic benefits in terms of job creation, local procurement and purchasing of local goods and services to a community where high unemployment is prevalent. Implementation of SLP related projects will also provide benefits to the local community.
- The identified impacts can effectively manage to acceptable levels with the implementation of the mitigation measures stipulated in the EMPr.

#### **14.6 Period for which the environmental authorisation is required.**

The Life of Mine ("LoM") of the MaCarthy mine is currently 10 years with one (1) year construction and one (1) year decommissioning (total 12 years). The prospecting activities will likely continue after the LoM has been reached. The LoM is however subject to change, based on ongoing prospecting activities and updated resource statements.

### **15. FINANCIAL PROVISIONING**

Please refer to Section 7 of the EMPr (**Part B**) as well as the closure plan (**Appendix K under part B**) for details regarding the financial provisioning for the project.

### **16. DEVIATIONS FROM THE APPROVED SCOPING REPORT AND PLAN OF STUDY**

Not applicable.

### **17. INFORMATION REQUIRED BY COMPETENT AUTHORITY AND OTHER MATTERS REQUIRED IN TERMS OF S. 24(4)(A) AND (B) OF NEMA**


Not applicable.



## 18. UNDERTAKING

I, Trevor Hallatt, 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 have 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.

Report Sign-Off			
Name	Designation	Signature	Date
Trevor Hallatt	EXM Advisory Services (Pty) Ltd Senior Environmental Scientist (EAP)		2023/09/06

## **19. REFERENCES**

**Airshed Planning Professionals**, 2022. Air Quality Impact Assessment Report for the Proposed Zama-MaCarthy Mining Project.

**Airshed Planning Professionals**, 2022. Noise Impact Assessment Report for the Proposed Zama-MaCarthy Mining Project.

**Airshed Planning Professionals**, 2018. Air Quality Assessment for the Sishen DMS Upgrade Project. Report Number: 17EXM04.

**Atlegang Social Intelligence, 2023.** Social Impact Assessment

**Bamford, M**, 2020. Palaeontological Impact Assessment for the proposed Salene Manganese MR on MaCarthy 559, Kathu, Northern Cape.

**Beukes, NJ**, 1987. Facies relations, depositional environments, and diagenesis in a major early Proterozoic stromatolitic carbonate platform to basinal sequence, Campbellrand Subgroup, Transvaal Supergroup, Southern Africa. *Sedimentary Geology*, Volume 54.

**Demacon Mark Studies**, 2017. Kolomela Mine. Mining and Processing at Heuningkranz. Economic Impact Assessment Report.

**Demacon Market Studies**, November 2019. Sishen TSF Upgrade Impact Assessment.

**EARES**, 2020. Environmental Noise Impact Assessment – Salene Manganese.

**Gradient Consulting, 2023.** MaCarthy Zama Mine Hydrogeological Impact Assessment Report

**Mucina, L & Rutherford, MC**, 2018. Vegetation Map of South Africa, Lesotho, and Swaziland: A Description of Changes since 2006.

**Nurizon Consulting Engineers, 2023.** MaCarthy Zama Mine Stormwater Management Plan and Engineering Design Report.

**Pescali E.C.** 2020. Surface Water Assessment Report for Salene Manganese Mining Operations.

**R&G Kalahari**, 2023. Traffic Impact Assessment for the MaCarthy-Zama Project.

**Scientific Aquatic Services.** August 2022. Draft Freshwater Assessment for the proposed MaCarthy Mine near Kathu, Northern Cape.

**Scientific Aquatic Services, 2022.** For The Proposed MaCarthy-Zama Exploration Between Olifantshoek, Postmasburg and Kathu, Northern Cape Province.

**Trogon Biodiversity, 2022.** Terrestrial Biodiversity Impact Assessment Report for The MaCarthy-Zama Mine Project Located Near Olifantshoek, Northern Cape Province.

**The Biodiversity Company, 2022.** Proposed MaCarthy-Zama Mining Right – Terrestrial Biodiversity Assessment.

**van Schalkwyk, JA, 2022.** Phase 1 Heritage Impact Assessment for the MaCarthy mine to be located on the Remainder of the Farm MaCarthy 559.

**van Schalkwyk, JA, 2022.** Phase I Heritage Impact Assessment: Application for Environmental Authorisation for Open Pit Mining and Prospecting Activities in The Siyanda District Municipality, Northern Cape Province.

**Zimpande Research Collaborative, 2022.** Soil, Land use and Land Capability Assessment for the Proposed Mccarthy-Zama Mine Near Kathu, Northern Cape Province.

## 20. APPENDICES