



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**




**Part B**

**Environmental Management Programme in support of the EIR for Open Pit  
Mining and Prospecting Activities at MaCarthy-Zama**

**Draft For Public Comment**

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

 Office B101, Izulu Office Part, Rey's  
Place, Dolphin Coast, Ballito, 4399

 071 689 2229  [trevor@exm.co.za](mailto:trevor@exm.co.za)

## ZAMA MINING RESOURCES (PTY) LTD

August 2023

Revision 1




### Environmental Management Programme in support of the application for Open Pit Mining and Prospecting Activities at MaCarthy-Zama.

#### Draft for Public Comment

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

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|------------------|---|--|------------|
| Trevor Hallatt   | EXM Advisory Services (Pty) Ltd<br>Environmental Assessment Practitioner ("EAP")<br>EAPASA (Reg. nr. 2019/1758)<br><br>Report Author          |   | 2023/08/30 |
| Thashnee Moodley | EXM Advisory Services (Pty) Ltd<br>Candidate Environmental Assessment Practitioner ("EAP")<br>EAPASA (Reg. nr. 2019/358)<br><br>Report Writer |  | 2023/08/30 |
| Roelof Letter    | EXM Advisory Services (Pty) Ltd<br><br>Report Reviewer  |  | 2023/08/30 |

## TABLE OF CONTENTS

|           |  |           |
|-----------|--|-----------|
| <b>1.</b> | <b>INTRODUCTION .....</b>  | <b>i</b>  |
|           | <b>1.1 Project Background .....</b>  | <b>i</b>  |
|           | <b>1.2 Authorisations Required .....</b>   | <b>1</b>  |
|           | 1.2.1 Full Environmental Impact Assessment .....   | 1         |
|           | 1.2.2 Waste Management Licence Application .....   | 1         |
|           | 1.2.3 Water Use Licence Application .....  | 1         |
|           | <b>1.3 Objectives and Purpose of the Environmental Management Programme (“EMPr”) .....</b> | <b>1</b>  |
|           | <b>1.4 Public participation.....</b>   | <b>2</b>  |
| <b>2.</b> | <b>ENVIRONMENTAL ASSESSMENT PRACTITIONER.....</b>  | <b>3</b>  |
|           | <b>2.1 Details of EAP .....</b>  | <b>3</b>  |
|           | <b>2.2 Qualifications and Experience .....</b>   | <b>3</b>  |
|           | <b>2.3 Declaration of Independence.....</b>  | <b>4</b>  |
| <b>3.</b> | <b>DESCRIPTION OF THE ASPECTS OF THE ACTIVITY .....</b>                                    | <b>5</b>  |
|           | <b>3.1 Description of activities to be undertaken.....</b>                                 | <b>5</b>  |
|           | 3.1.1 MaCarthy Mining Operations.....  | 5         |
|           | <b>3.1.1.1 Life of Mine (“LoM”) Planning .....</b>   | <b>5</b>  |
|           | <b>3.1.1.2 Estimated Reserves and Production Rates .....</b>                               | <b>6</b>  |
|           | <b>3.1.1.3 Opencast Pits and Mining Method .....</b>                                       | <b>6</b>  |
|           | <b>3.1.1.3 Waste Rock Dumps .....</b>  | <b>7</b>  |
|           | <b>3.1.1.4 Backfilling .....</b>   | <b>7</b>  |
|           | <b>3.1.1.5 Internal, Access and Haul Roads .....</b>                                       | <b>7</b>  |
|           | <b>3.1.1.6 Water Requirements and Supply .....</b>   | <b>9</b>  |
|           | <b>3.1.1.7 Dirty Water and Stormwater Management .....</b>                                 | <b>9</b>  |
|           | <b>3.1.1.8 Electricity Supply .....</b>  | <b>10</b> |
|           | <b>3.1.1.9 Sewage Management .....</b>   | <b>10</b> |
|           | <b>3.1.1.10 Explosives Management .....</b>  | <b>10</b> |
|           | 3.1.2 Fuel Storage .....   | 10        |
|           | <b>3.1.2.1 Soil Stockpiling .....</b>  | <b>11</b> |
|           | <b>3.1.2.2 Future Infrastructure Area .....</b>  | <b>11</b> |
|           | 3.1.3 Dewatering Volume and Infrastructure .....   | 11        |
|           | <b>3.1.3.1 Supporting infrastructure .....</b>   | <b>11</b> |

|           |   |           |
|-----------|---|-----------|
| 3.1.3.2   | <b>Waste management</b> .....   | 12        |
| 3.1.4     | <b>Western Properties (Prospecting Activities)</b> .....  | 12        |
| 3.1.4.1   | <b>Background</b> .....   | 12        |
| 3.1.4.2   | <b>Description of Drilling Operations</b> .....   | 12        |
| 3.1.4.3   | <b>Rehabilitation measures</b> .....  | 13        |
| <b>4.</b> | <b>COMPOSITE MAP</b> .....  | <b>13</b> |
| <b>5.</b> | <b>IMPACT MANAGEMENT OBJECTIVES</b> .....   | <b>16</b> |
| 5.1       | <b>Proposed management objectives and the impact management outcomes for inclusion in the EMPr</b> .....      | <b>16</b> |
| <b>6.</b> | <b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b> .....   | <b>17</b> |
| <b>7.</b> | <b>FINANCIAL PROVISIONING</b> .....   | <b>37</b> |
| 7.1       | <b>Closure objectives and the extent to which they have been aligned with the baseline environment.</b> ..... | <b>37</b> |
| 7.2       | <b>Closure Principles</b> .....   | <b>37</b> |
| 7.3       | <b>Closure Objectives</b> .....   | <b>38</b> |
| 7.4       | <b>Confirmation of consultation of closure objectives with landowners</b> .....                               | <b>39</b> |
| 7.5       | <b>Explain how the rehabilitation plan is compatible with the closure objectives</b> .....                    | <b>40</b> |
| 7.6       | <b>Quantum of Financial Provision required to manage and rehabilitate the environment.</b> .....              | <b>41</b> |
| 7.7       | <b>Bill of Quantities</b> .....   | <b>41</b> |
| 7.8       | <b>Confirm how the financial provision will be provided.</b> .....  | <b>42</b> |
| 7.9       | <b>Financial Provision Estimate</b> .....   | <b>43</b> |
| 7.9.1     | <b>Closure Liability</b> .....  | <b>43</b> |
| <b>8.</b> | <b>MECHANISMS FOR MONITORING COMPLIANCE</b> .....   | <b>43</b> |
| 8.1       | <b>Control and auditing</b> .....   | <b>44</b> |
| 8.1.1     | <b>Appointment of an ECO</b> .....  | <b>44</b> |
| 8.1.2     | <b>Internal Environmental Compliance Audits</b> .....   | <b>44</b> |
| 8.1.3     | <b>External Compliance Audits</b> .....   | <b>44</b> |
| 8.1.4     | <b>External Water Use Licence Audit</b> .....   | <b>44</b> |
| 8.2       | <b>Noise Monitoring</b> .....   | <b>44</b> |

|     |  |    |
|-----|--|----|
| 8.3 | Dust Fall Monitoring.....                                      | 45 |
| 8.4 | Aquatic Biomonitoring.....                                     | 45 |
| 8.5 | Groundwater .....  | 48 |
| 9.  | SUBMISSION OF AUDIT REPORTS.....                               | 51 |
| 10. | SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY ..... | 51 |
| 11. | UNDERTAKING .....  | 52 |

### **LIST OF APPENDICES**

|   |    |
|---|----|
| Appendix A: Curriculum Vitae of EAP ..... | 53 |
| Appendix B: Scope of EMP .....            | 57 |

### **LIST OF TABLES**

|  |    |
|--|----|
| Table 1-1: Properties included in mining right application areas.....  | i  |
| Table 2-1: Details of the Independent EAP .....  | 3  |
| Table 2-2: Declaration of EAP.....   | 4  |
| Table 3-1: Summary of Opencast Pits.....   | 6  |
| Table 3-2: Summary of Waste Rock Dumps .....   | 7  |
| Table 3-3: MaCarthy Water Requirements .....   | 9  |
| Table 6-1: Measures to Prevent/Minimise Potential Environmental Impacts Associated with the Prospecting Activities .....             | 17 |
| Table 6-2: Measures to Prevent/Minimise Potential Environmental Impacts Associated with the Mining Activities at MaCarthy.....       | 24 |
| Table 6-3: Measures to Prevent/Minimise Potential Socioeconomic Impacts Associated with the Mining Activities (All Properties) ..... | 35 |
| Table 7-1: Mine Closure Principles.....  | 38 |
| Table 7-2: Physical, Biophysical and Social Closure Objectives.....  | 38 |
| Table 7-3: Operational Zones of the Zama Mining Project.....   | 42 |
| Table 8-1: Noise Monitoring Locations.....   | 44 |
| Table 8-2: Dust Fall Monitoring Locations .....  | 45 |
| Table 8-3: Biomonitoring Locations.....  | 45 |

|  |    |
|--|----|
| Table 8-4: Monitoring Boreholes .....            | 48 |
| Table 11-1: Details of the Undertaking EAP ..... | 52 |

## **LIST OF FIGURES**

|  |    |
|--|----|
| Figure 1-1: General Location Map .....                             | i  |
| Figure 3-1: MaCarthy Production Schedule .....                     | 6  |
| Figure 3-2: Access Road/Haul Routes .....                          | 8  |
| Figure 3-3: Conceptual/Typical Drill Site Layout .....             | 13 |
| Figure 4-1: Overall Environmental Sensitivity Map (MaCarthy) ..... | 14 |
| Figure 4-2: Overall Sensitivity (Priority Prospecting Areas) ..... | 15 |
| Figure 8-1: Dust and Noise Monitoring Locations .....              | 46 |
| Figure 8-2: Biomonitoring Locations .....                          | 47 |
| Figure 8-3: Groundwater Monitoring Location .....                  | 50 |

## ACRONYMS AND ABBREVIATIONS

| Abbreviations | Definition   |
|---------------|--|
| CA            | Competent Authority  |
| CAA           | Civil Aviation Authority                                     |
| CBA           | Critical Biodiversity Area                                   |
| DWS           | Department of Water and Sanitation (Northern Cape)           |
| EAP           | Environmental Assessment Practitioner                        |
| EIA           | Environmental Impact Assessment                              |
| EMPr          | Environmental Management Programme                           |
| ESA           | Ecological Support Area                                      |
| EXM           | EXM Environmental Advisory (Pty) Ltd                         |
| FEPA          | Freshwater Ecosystem Priority Areas                          |
| GNR           | Government Notice Regulation                                 |
| HIA           | Heritage Impact Assessment                                   |
| IAP           | Interested and Affected Party                                |
| IWWMP         | Integrated Water and Waste Management Plan                   |
| LoM           | Life Of Mine   |
| mamsl         | Metres above mean sea level                                  |
| NDCR          | National Dust Control Regulations                            |
| NEMA          | National Environmental Management 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                              |
| NIA           | Noise Impact Assessment                                      |
| NSRs          | Noise Sensitive Receptors                                    |
| NWA           | National Water Act   |
| PPP           | Public Participation Process                                 |
| SACNASP       | South African Council for Natural & Scientific Professionals |
| SAHRA         | South African Heritage Resource Agency                       |
| SANS          | South African National Standards                             |
| SLP           | Social Labour Plan   |
| SWSA          | Strategic Water Source Areas                                 |
| TOPS          | Threatened or Protected Species                              |
| TIA           | Traffic Impact Assessment                                    |
| WUL           | Water Use Licence  |

# 1. INTRODUCTION

## 1.1 Project Background

Zama Mining Resources (Pty) Ltd ("Zama Mining") is in the process of applying for a Mining Right application at the Department of Mineral Resources and Energy ("DMRE") on the 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. 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.

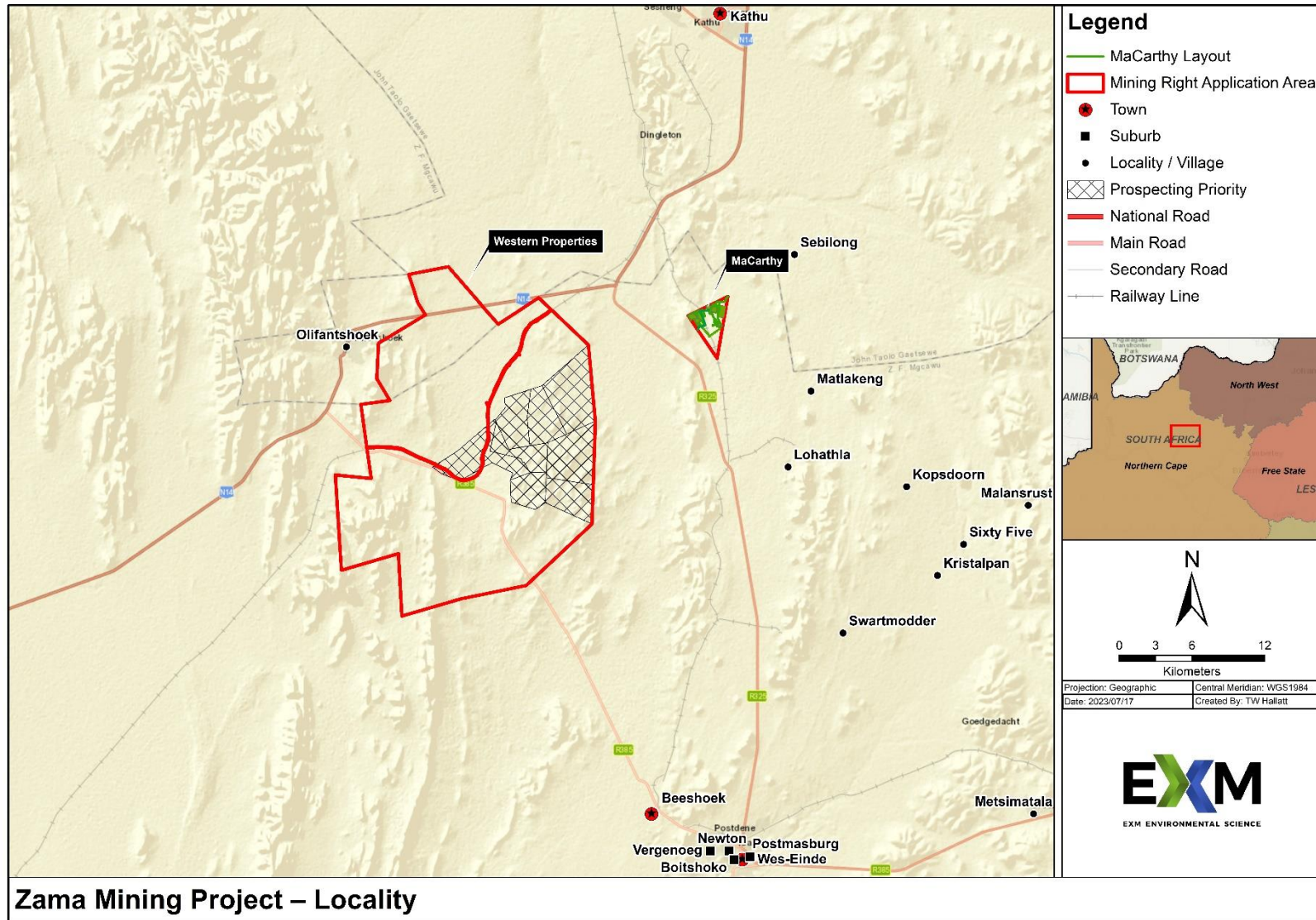
**Table 1-1: Properties included in mining right application areas.**

|                     |                     |                     |                    |                   |                |
|---------------------|---------------------|---------------------|--------------------|-------------------|----------------|
| 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 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.

### **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 therefore undertaken 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 Objectives and Purpose of the Environmental Management Programme ("EMPr")**

This Environmental Management Programme ("EMPr") has been developed according to the requirements of Appendix 4 of the EIA regulations. The content of this report, as

required by the regulations, and where each requirement is addressed within this report is provided in **Appendix B**. The purpose of the EMP phase of the EIA and the supporting report is as following:

- Details of the EAP who prepared the EMPr; and the expertise of that EAP to prepare an EMPr.
- A detailed description of the aspects of the activity.
- Maps illustrating the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site.
- A description of the impact management objectives outcomes identifying the impacts and risks that need to be avoided, managed, and mitigated for all phases.
- A description of the manner in which the impact management will be achieved.
- The method and frequency of monitoring the implementation of the impact management actions.
- An indication of the persons who will be responsible for the implementation of the impact management actions.
- The time periods within which the impact management actions must be implemented.
- The mechanism for monitoring compliance with the impact management actions and a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.

#### **1.4 Public participation**

EXM Advisory Services (Pty) Ltd ("EXM") has been appointed as the independent Environmental Assessment Practitioner ("EAP") to facilitate the EIA, including the supporting Public Participation Process ("PPP"). 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 and draft EMP 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). The final EIR and EMP is now being submitted to the CA for decision making.

## 2. ENVIRONMENTAL ASSESSMENT PRACTITIONER

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

### 2.1 Details of EAP

Table 2-1 below contain details of the EAP responsible to facilitate the EIA and public consultation process.

**Table 2-1: Details of the Independent EAP**

|                                  |   |
|----------------------------------|---|
| <b>Name of The Practitioner</b>  | Trevor Hallatt  |
| <b>Affiliation</b>               | EAP/Senior Environmental Scientist at EXM Environmental Advisory Services (Pty) Ltd |
| <b>Professional registration</b> | EAPASA (Reg. nr. 2019/1758)<br>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>                              |

### 2.2 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 honours and master's degrees (both 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 11 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 ISO 14001: 2004 and legal compliance audits, EIA, Compilation of Environmental Management Programmes, Environmental Risk Assessments and Environmental Management Systems. Furthermore, he performed different functions in the planning and delivery of environmental short courses, including the development of modules and presenting on different topics. 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).

### 2.3 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.
- Have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.
- Declare that no information provided to the Department was at no stage influenced by the applicant and that we as the appointed Environmental Assessment Practitioners have explained the potential consequences of submitting this application.
- Will perform all other obligations as expected from an EAP in terms of the Regulations; and
- Realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

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

| Name           | Affiliation                          | Designation                           | Signature  | Date       |
|----------------|--------------------------------------|---------------------------------------|--|------------|
| Trevor Hallatt | EXM Environmental Advisory (Pty) Ltd | Senior Environmental Scientist<br>EAP |  | 2023/08/30 |

### **3. DESCRIPTION OF THE ASPECTS OF THE ACTIVITY**

#### **3.1 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 **Error! Reference source not found.**), 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:

##### **3.1.1 MaCarthy Mining Operations**

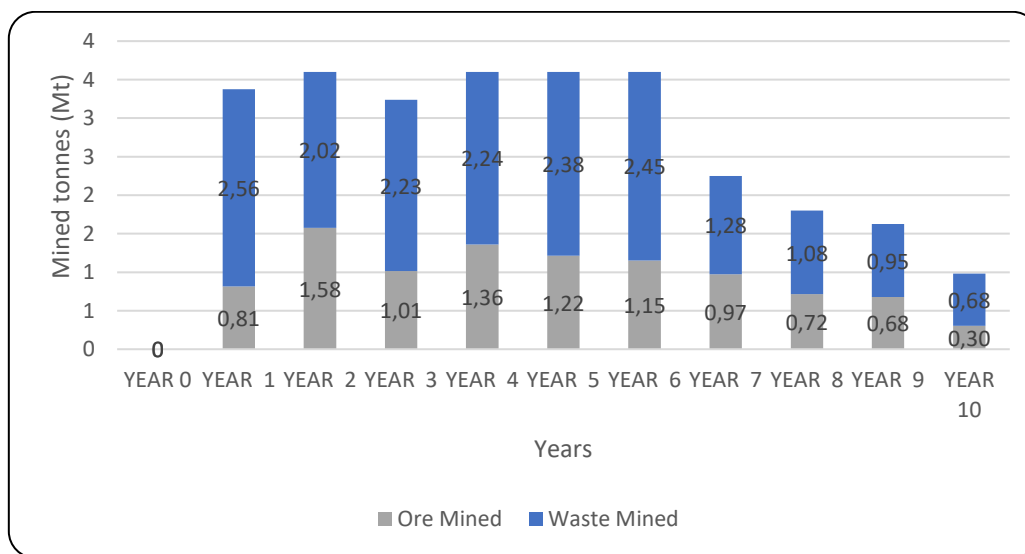
The project entails the development of an open cast mining operation on the Remaining Extent of the Farm MaCarthy 559 approximately 24 km south of the town of Kathu (2.7 km north of the R325 regional road) for the extraction of iron ore.

##### **3.1.1.1 *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.

### 3.1.1.2 Estimated Reserves and Production Rates

The production schedule for the LoM is provided in Figure 3-1. 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 3-1: 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 3-1. Pits 1 & 2 will be developed on the western section and Pits 3, 4 & 5 on the eastern section of the property.

**Table 3-1: 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/hauled to offsite customers where it will be beneficiated.

### 3.1.1.3 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 3-2.

**Table 3-2: 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                   |

### 3.1.1.4 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.

### 3.1.1.5 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 3-2. 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.



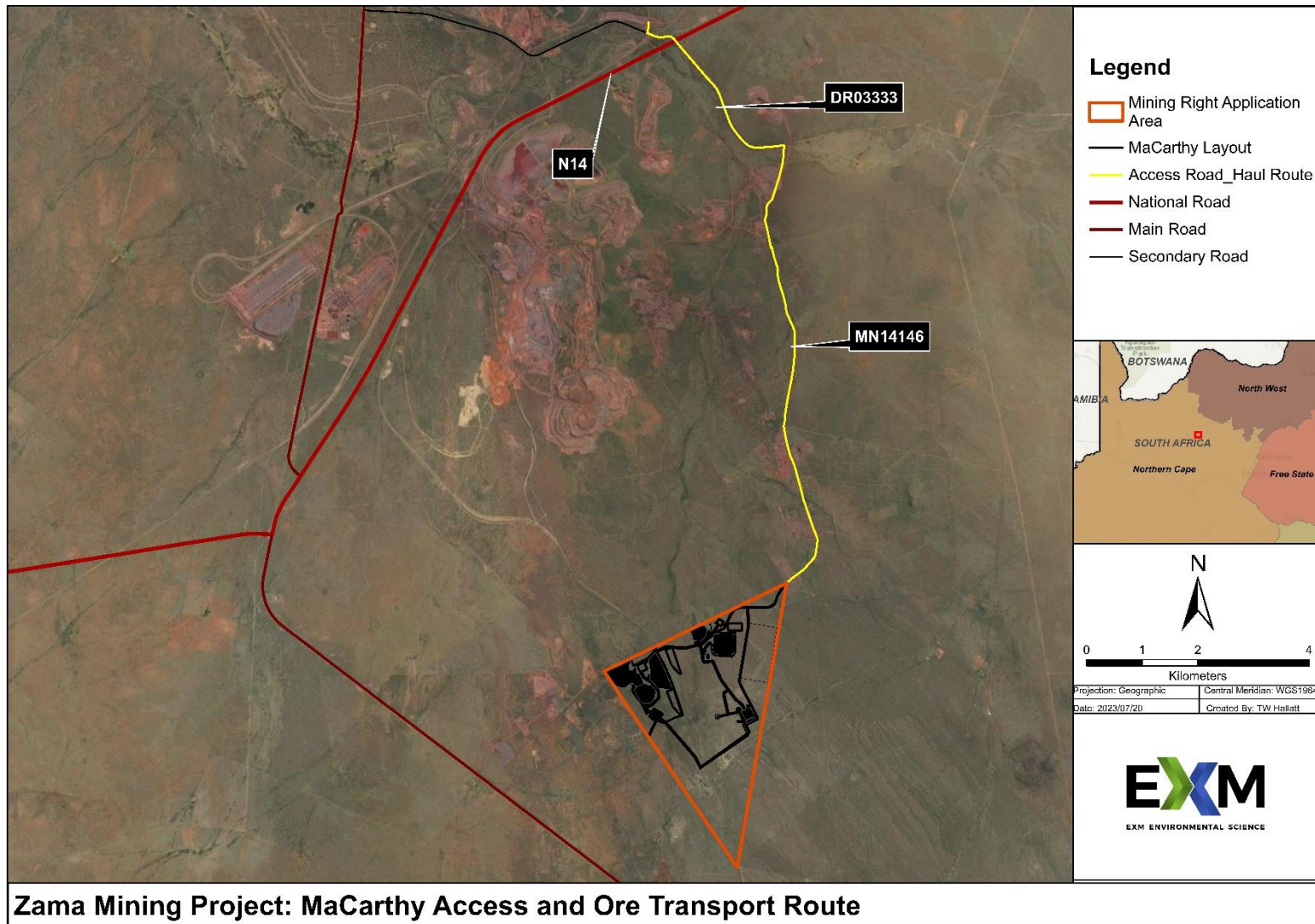


Figure 3-2: Access Road/Haul Routes

### 3.1.1.6 Water Requirements and Supply

Table 3-3 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. 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, 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 3-3: MaCarthy Water Requirements**

| Total Annual Water Requirements |                                    |                                  |
|---------------------------------|------------------------------------|----------------------------------|
| Items                           | Volumes<br>(m <sup>3</sup> /annum) | Volumes<br>(m <sup>3</sup> /day) |
| 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>                       |

### 3.1.1.7 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 (Details are provided in Section 6):

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

- Clean water channels; and
- Dirty water channels.

### **3.1.1.8 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). The alternative routes for the transmission line are discussed in Section 8.

### **3.1.1.9 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.

### **3.1.1.10 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.

## **3.1.2 Fuel Storage**

Fuel will be stored on site in two tanks with a combined capacity of 320 m<sup>3</sup>. Appropriately sized bunds will be established to place the tanks with sumps in place. A specific area will

be allocated for refuelling purposes with containment measures in place. Runoff from this area will be diverted to the PCD.

### **3.1.2.1 Soil Stockpiling**

Topsoil that will be stripped as part of the mining development will be stored at strategic locations. 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.

### **3.1.2.2 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.

### **3.1.3 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 370m<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. It is essential to monitor dewatering volumes on an ongoing basis.

#### **3.1.3.1 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. The workshop will be developed in the dirty water management area and runoff will be diverted to the PCD.

### **3.1.3.2 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.

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

#### **3.1.4.1 Background**

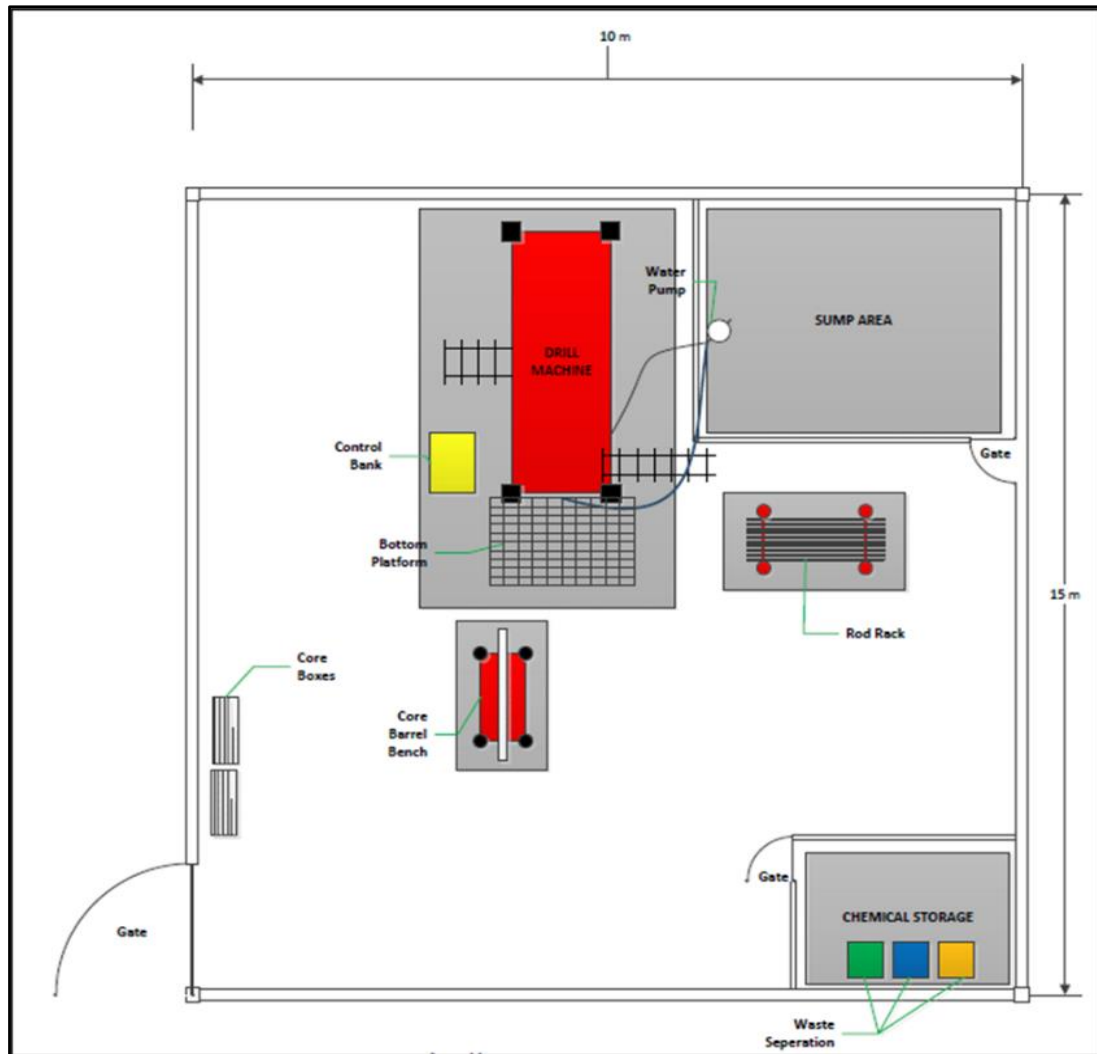
Prospecting activities are planned for the Western Properties. The following properties are being prioritised for prospecting and a prospecting work programme has been included as part of the mining right application:

- Hilliard Pt1 and RE/664
- Hilliard 1/664
- Uys Pt3,4&6/663
- Crossley RE/660
- Dikepeng 1&4/661

#### **3.1.4.2 Description of Drilling Operations**

Prospecting will involve diamond and percussion drilling. The layout of a typical drill site is given in Figure 3-3. 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.
- 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 3-3: Conceptual/Typical Drill Site Layout**

#### **3.1.4.3 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.

## **4. COMPOSITE MAP**

A map which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities showing how areas are to be avoided is provided as Figure 4-1. Sensitivities include water courses delineated, high biodiversity sensitive areas, heritage sites, and floodlines.

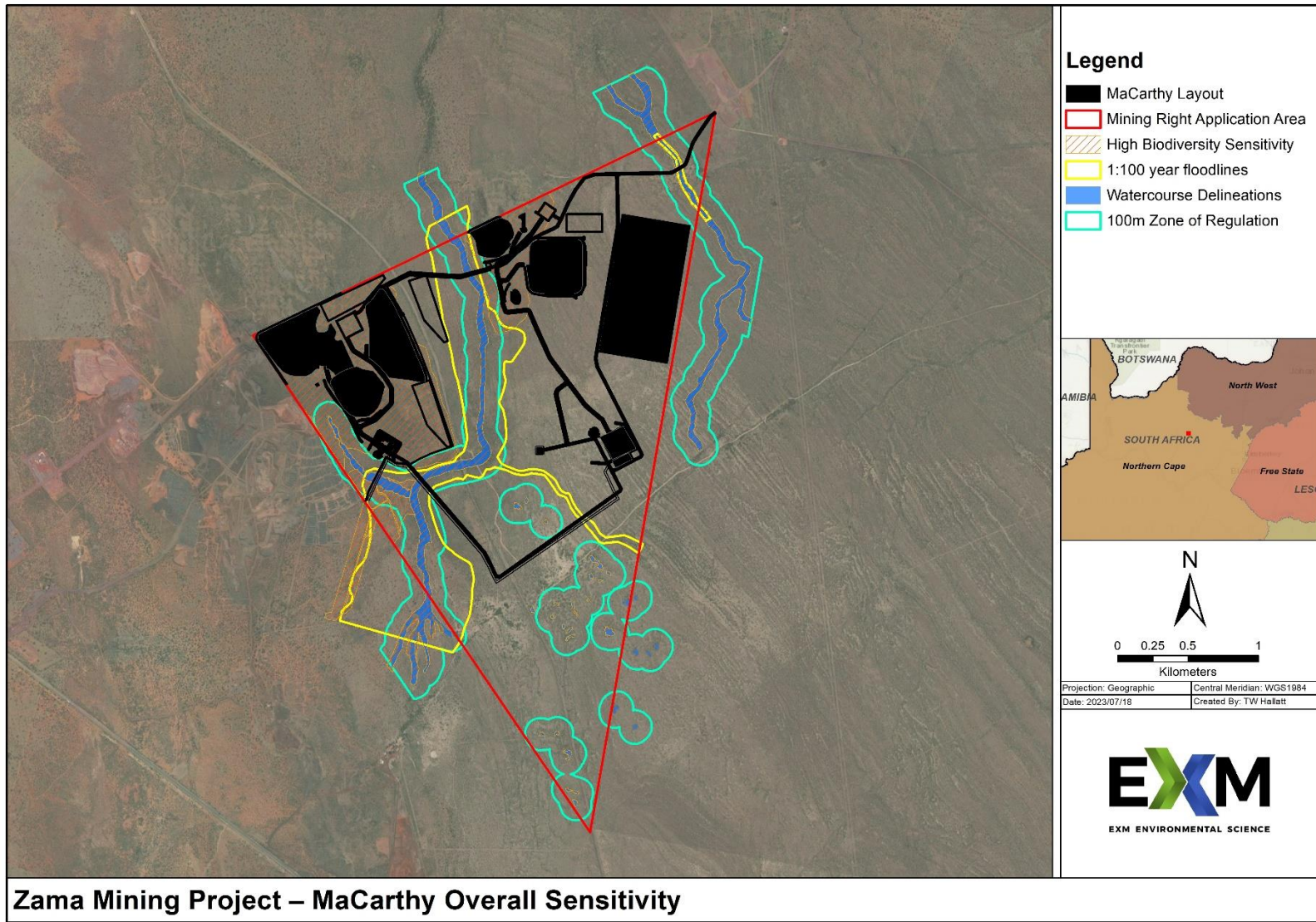
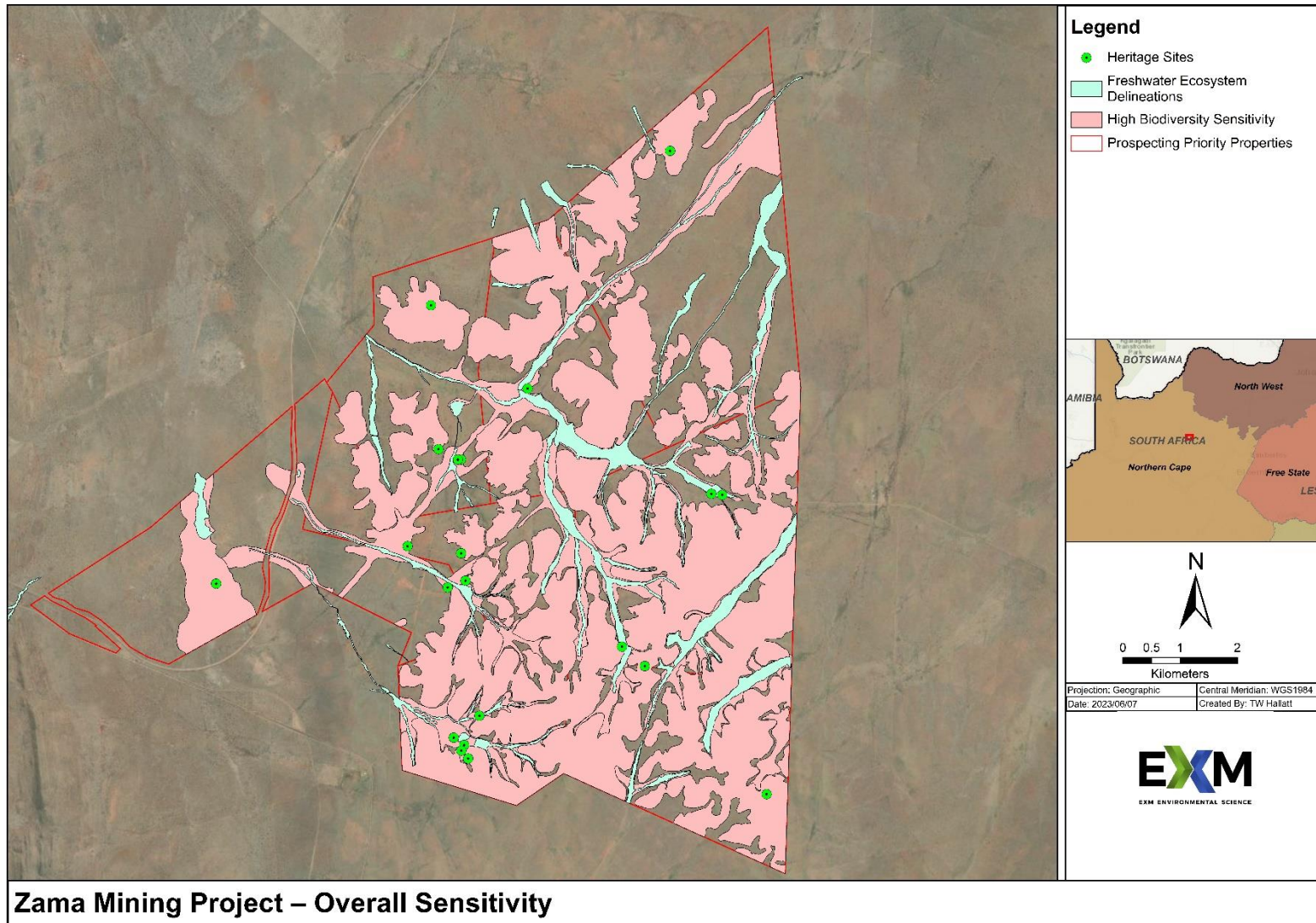


Figure 4-1: Overall Environmental Sensitivity Map (MaCarthy)



**Figure 4-2: Overall Sensitivity (Priority Prospecting Areas)**



## **5. IMPACT MANAGEMENT OBJECTIVES**

### **5.1 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.

## 6. ENVIRONMENTAL MANAGEMENT PROGRAMME

Table 6-1 below contain the measures that must be implemented to prevent/minimise potential environmental impacts associated with the prospecting activities and Table 6-2 for the Mining Operations at MaCarthy.

**Table 6-1: Measures to Prevent/Minimise Potential Environmental Impacts Associated with the Prospecting Activities**

| Aspect (activities, product, services)                               | Impact  | Objectives and management outcome       | Lice cycle phase   | Impact management actions   | Compliance with Standards/Acts                                      | Monitoring required                      |
|--|---|---|--|---|---|--|
| <b>Biodiversity Management</b>                                       |   |   |  |   |   |  |
| Removal of topsoil and vegetation during infrastructure development. | Impacts on floral habitat and Species of Conservation Concern   | Minimise disturbance to natural habitat | Planning Construction  | Clearly demarcate prospecting site footprint prior to commencement. | National Environmental Management Biodiversity Act (No 10 of 2004). | ECO to monitor site during construction. |
|  |   |   |  | Vegetation clearance only allowed in demarcated area.               |   |  |
|  | Avoid sensitive areas such as ridges/koppies (where possible)   |   |  |   |   |  |
|  | Existing farm roads to be used as far as possible. Additional roads only to be established in agreement with landowners.  |   |  |   |   |  |
|  | Obtain permits for the removal/relocation of protected species. Consideration should be given to rescue and relocation of protected succulent and bulbous species.                          |   |  |   |   |  |
|  | 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. |   |  |   |   |  |
| Encroachment of invader plant species                                |   |   | Develop and implement a plan which contains measures to eradicate Alien Invasive Plants. | National Forests Act (No 30 of 1998).                               |   |  |

| Aspect (activities, product, services) | Impact | Objectives and management outcome | Lice cycle phase | Impact management actions  | Compliance with Standards/Acts | Monitoring required |
|--|--------|-----------------------------------|------------------|--|--------------------------------|---------------------|
|  |        |                                   |                  | Use only registered Pest Control Operators (PCOs) for the use of any herbicides. |                                |                     |

| Aspect (activities, product, services)   | Impact   | Objectives and management outcome        | Lice cycle phase                       | Impact management actions  | Compliance with Standards/Acts                                     | Monitoring required  |
|--|--|--|--|--|--|--|
| Disturbance/ destruction of habitat  | Impacts on faunal habitat and Species of Conservation Concern<br><br>Impact on habitat units with High Site Ecological Importance.<br><br>Faunal mortalities | Minimise disturbance to natural habitat. | Planning, construction and operational | Implement strict speed limits to prevent vehicles colliding with or running over animals.  | National Environmental Management Biodiversity Act (No 10 of 2004) | None   |
|  |  |  |  | Prospecting area to be fenced to prevent animals from entering.  |  |  |
|  |  |  |  | Conduct a walk through to ensure that all faunal species (where practicable) have left the demarcated area prior to the commencement of construction activities.                         |  |  |
|  |  |  |  | Hunting/trapping or collecting of any faunal species is strictly prohibited.   |  |  |
|  |  |  |  | Awareness training during regarding the presence of faunal species on site.  |  |  |
| Limit disturbance to demarcated/authorised areas and restrict access to other areas. |  |  |  |  |  |  |
| <b>Surface water resources</b>   |  |  |  |  |  |  |
| Pollution caused by hazardous substances   | Pollution of surface water resources<br>Temporary toilets  | Prevent Spillages                        | Construction and operations            | Refer to section related to hazardous substances management.   | National Water Act (No 36 of 1998)                                 | None   |
|  |  |  |  | Servicing of vehicles to be conducted off site or in dedicated areas with measures in place for the containment of runoff.   |  |  |
|  |  |  |  | Temporary toilets must be located outside of the 100m buffer from water courses.   |  |  |
| Construction infrastructure  | Loss of wetlands and episodic drainage lines   | Protect cryptic wetlands                 | Planning and construction              | The 100m development buffer from water courses and 500m wetland buffers must be dedicated/marked no go areas. Obtain a WUL if prospecting activities will intrude regulated buffer zones | Water Use Licence  | Undertake biannual biomonitoring in pans close to the development.<br>None |
|  |  |  |  | Undertake concurrent rehabilitation of all prospecting areas   |  |  |
|  |  |  |  | Implement adequate measures for waste and hazardous substances management at all drill sites.  |  |  |

| Aspect (activities, product, services)  | Impact   | Objectives and management outcome                                 | Lice cycle phase                         | Impact management actions  | Compliance with Standards/Acts   | Monitoring required    |
|---|--|---|--|--|--|------------------------|
| Runoff from disturbed areas   | Soil Erosion and Sedimentation of Water Courses  | Manage disturbed areas correctly to minimise sediment load        | Construction and operations              | Refer to section related to soil management.   | Water Use Licence  |                        |
| <b>Groundwater</b>  |  |   |  |  |  |                        |
| Use of hazardous substances   | Spillages - seepage  | Potential pollution/Contamination of groundwater                  | Construction and operational             | Refer to section related to sewerage management<br>Use a drill sock to soak up any hydrocarbons in the boreholes once drilling has been completed  | National Water Act (No 36 of 1998)<br>Water Use Licence  | Groundwater Monitoring |
| <b>Soil Management</b>  |  |   |  |  |  |                        |
| Incorrect planning of stormwater infrastructure   | Loss of soil Sedimentation of downstream water courses   | Prevent Soil erosion  | Planning                                 | Implement a soil management procedure that stipulates measures for the removal, stockpiling and use of soil for rehabilitation purposes.   | National Environmental Management Biodiversity Act (No 10 of 2004)                                 | ECO to monitor site    |
| Removal of topsoil<br>Hazardous substances management.<br>Soil erosion<br>Contamination of soil | Incorrect Removal – loss of topsoil<br>Pollution of soil resources<br>Loss of soil and land capability | Prevent soil contamination  | Construction.<br>Operations.<br>Closure. | Clearly demarcate prospecting area and limit topsoil removal in the specified footprint.<br>Soil stockpiles not to exceed 2.5 meters and must be placed in a dedicated area separate from drill rig. | Conservation of Agricultural Resources Act (No 43 of 1983)<br>National Forests Act (No 30 of 1998) |                        |
| <b>Land capability</b>  |  |   |  |  |  |                        |
| Footprint development   | Loss of grazing land and change in land use.   | Effective management of the use and development of land resources | Operations and closure                   | Concurrent rehabilitation of drill sites and the success thereof must be signed off by the environmental officer.<br>Refer to section related to impacts on vegetation and soil.                     | None   | None                   |

| Aspect (activities, product, services)  | Impact   | Objectives and management outcome     | Lice cycle phase                       | Impact management actions   | Compliance with Standards/Acts  | Monitoring required                      |
|---|--|---------------------------------------|--|---|---|--|
|   | Impact on current farming activities                       |                                       |  |   |   |  |
| <b>Air quality management</b>   |  |                                       |  |   |   |  |
| Establishment and operations of prospecting sites<br>Exposed surfaces.<br>Vehicle movement on exposed areas | Increased dust fall<br>Nuisance conditions for landowners  | Minimise atmospheric emissions        | Construction, operations, and closure. | Implement strict speed limits on all roads/exposed areas.<br>Dust suppression on roads and exposed areas according to a schedule if increased dust fall is detected or if complaints are received.<br>Implement a community grievances and complaints management procedure. All complaints must be investigated and responded to.                                   | National Dust Control Regulations.<br>National Environmental Management Air Quality Act (No 39 of 2004) | Dust fall monitoring during construction |
| <b>Noise Management</b>   |  |                                       |  |   |   |  |
| Increased noise levels<br>Establishment and operations of prospecting sites                                 | Nuisance conditions for receptors/land owners in the area. | Minimise noise generation.            | Construction and Operations            | Implement a community grievances and complaints management procedure. All complaints must be investigated and responded to.<br>All diesel-powered equipment and plant vehicles should be kept at a high level of maintenance.<br>Avoid unnecessary equipment idling.<br>No drilling to be undertaken at night.<br>Avoid driving past homesteads as far as possible. | Noise Control Regulations (No. 627 of 1998)   | Biannual noise monitoring                |
| <b>Safety and security</b>  |  |                                       |  |   |   |  |
| Movement of drilling contractors and influx of workers  | Increase in crime  | Prevent access to adjacent properties | Construction and operations            | Establish access agreements with landowners with specific measures as agreed with regards to security.<br>Drilling contractors should not be allowed to move outside of designated areas.   | None  | None                                     |

| Aspect (activities, product, services)           | Impact   | Objectives and management outcome | Lice cycle phase            | Impact management actions   | Compliance with Standards/Acts  | Monitoring required   |
|--|--|-----------------------------------|-----------------------------|---|---|---|
| Prospecting activities                           |  |                                   |                             | Access of personnel related to the prospecting operations will only be allowed on approval by the project manager.                              |   |   |
|  |  |                                   |                             | All personnel that have access to the property needs to be made visible.  |   |   |
|  |  |                                   |                             | Drilling contractors to be housed off the drilling property.  |   |   |
| <b>Fire management</b>                           |  |                                   |                             |   |   |   |
| Lightning<br>Intentional fire starting           | The impact of potential fires on neighbouring farming activities | Efficient fire fighting           | Construction and operations | No smoking allowed at the prospecting sites, or only in dedicated areas according to internal procedures.                                       | Occupational Health and Safety Act (No 85 of 1993)  | Monitor fire breaks   |
|  |  |                                   |                             | 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.   |   |   |
|  |  |                                   |                             | Firefighting equipment must be placed at strategic locations and serviced according to manufacturer's specifications.                           |   |   |
|  |  |                                   |                             | Ensure adequate communication with neighbours regarding fires and collaborate with adjacent farmers with regards to fire management.            |   |   |
| <b>Sewage management</b>                         |  |                                   |                             |   |   |   |
| Management of sewage system<br>Temporary toilets | Pollution of surface water resources                             | Prevent sewage spillages          | Construction and operations | Any sewage spillages must be reported and cleaned appropriately.  | National Environmental Management: Waste Act (No 59 of 2008) and<br><br>Waste regulations/norms and standards | Regular emptying of temporary toilets<br><br>Groundwater Monitoring |
|  |  |                                   |                             | Temporary toilets during construction must be emptied as required by a registered contractor and sludge disposed at the municipal sewer system. |   |   |
|  |  |                                   |                             | Good housekeeping practices must be implemented at the temporary toilets to prevent nuisance conditions.  |   |   |

| Aspect (activities, product, services)  | Impact  | Objectives and management outcome                          | Lice cycle phase             | Impact management actions  | Compliance with Standards/Acts                               | Monitoring required                            |
|---|---|--|------------------------------|--|--|--|
| <b>Waste management</b>   |   |  |                              |  |  |  |
| Waste Management  | Waste/Land Pollution Impacts on Groundwater and Surface Water | Proper discarding of waste                                 | Construction and operations  | Provide designated labelled bins and skips at strategic positions for the placement of general and hazardous waste, separately. These containers must not be overfilled. | National Environmental Management: Waste Act (No 59 of 2008) | Implementation of waste/environmental audits   |
|   |   |  |                              | Good housekeeping practices must be implemented at the waste storage area.   |  |  |
|   |   |  |                              | No littering must be allowed on site.  |  |  |
|   |   |  |                              | All hydrocarbon contaminated material (rags, PPE, containers etc.) must be placed in a labelled, skip and disposed at a licenced facility.                               |  |  |
|   |   |  |                              | Contaminated soil must be managed as hazardous waste.  |  |  |
| Construction waste must be stored in a designated area and disposed at a licenced facility. |   |  |                              |  |  |  |
| <b>Hazardous substances management</b>  |   |  |                              |  |  |  |
| Prospecting activities<br><br>Generation and management of hazardous waste                  | Water and soil pollution<br>Spillages                         | Prevent water and soil pollution.<br><br>Prevent spillages | Construction and operations. | Incident management procedure.   | Hazardous Substances Act (No. 15 of 1973)                    | Quarterly ECO inspections during construction. |
|   |   |  |                              | Safety Data Sheets must be available.  |  |  |
|   |   |  |                              | Spill kits must be available in areas where hazardous substances are used/stored.  |  |  |
|   |   |  |                              | Spills must be cleaned timeously and appropriately.  |  |  |
|   |   |  |                              | Refuelling to be conducted off site.   |  |  |
| Hazardous substances must be stored in an area with containment measures in place.          |   |  |                              |  |  |  |



| Aspect (activities, product, services)     | Impact   | Objectives and management outcome     | Lice cycle phase                               | Impact management actions   | Compliance with Standards/Acts  | Monitoring required |
|--|--|---------------------------------------|--|---|---------------------------------|---------------------|
| <b>Cultural Heritage and Palaeontology</b> |  |                                       |  |   |                                 |                     |
| Footprint activities of                    | Impact on heritage resources<br>Impact on burial ground and graves | Minimise impact on heritage resources | Planning, Construction, Operations and Closure | Implement a chance find procedure during construction in case where possible heritage/fossil finds are uncovered. | National Heritage Resources Act | None                |
|  |  |                                       |  | Identified heritage resources must be dedicated no go areas.  |                                 |                     |
|  |  |                                       |  | Obtain relevant permits if heritage resources will be impacted.   |                                 |                     |

**Table 6-2: Measures to Prevent/Minimise Potential Environmental Impacts Associated with the Mining Activities at MaCarthy**

| Aspect (activities, product, services)                                       | Impact   | Objectives and management outcome       | Lice cycle phase          | Impact management actions  | Compliance with Standards/Acts   | Monitoring required                      |
|--|--|---|---------------------------|--|--|--|
| <b>Biodiversity Management</b>   |  |   |                           |  |  |  |
| Coalitions with vehicles<br><br>Vegetation removal for construction purposes | Faunal mortalities<br><br>Impact on faunal habitat units with High Site Ecological Importance. | Minimise disturbance to natural habitat | Planning and construction | Implement strict speed limits during construction to prevent vehicles colliding with or running over animals.  | National Environmental Management Biodiversity Act (No 10 of 2004)<br><br>National Forests Act (No 30 of 1998) | ECO to monitor site during construction. |
|  |  |   |                           | Construction area to be fenced to prevent animals from entering.   |  |  |
|  |  |   |                           | Conduct a walk through to ensure that all faunal species (where practicable) have left the demarcated area prior to the commencement of construction activities. |  |  |
|  |  |   |                           | Hunting/trapping or collecting of any faunal species is strictly prohibited.   |  |  |
|  |  |   |                           | Limit disturbance to demarcated/authorised areas and restrict access to other areas.   |  |  |

| Aspect (activities, product, services)  | Impact   | Objectives and management outcome             | Lice cycle phase                               | Impact management actions  | Compliance with Standards/Acts   | Monitoring required                      |
|---|--|---|--|--|--|--|
| Encroachment of Alien Invasive Plants in natural areas – outcompeting natural species. Transformation of habitats | Direct or indirect impacts on habitat Loss of protected species  | Prevent encroachment of Alien Invasive Plants | Planning, Construction, Operations and Closure | Develop and implement a plan which contains measures to eradicate Alien Invasive Plants.   | Conservation of Agricultural Resources Act (No 43 of 1983)   | ECO to monitor site during construction. |
|   |  |   |  | Topsoil stockpiles to be kept clear of Alien Invasive Plants.  | National Environmental Management Biodiversity Act (No 10 of 2004)   |  |
| Site clearance for the establishment of infrastructure, roads, WRD, Pits, etc.                                    | Impact on habitat units with High Site Ecological Importance<br><br>Fragmentation of habitat Impact on floral Habitat and Diversity<br><br>Destruction of protected plant species. | Minimise disturbance to natural habitat       | Planning and construction                      | Vegetation clearance only allowed in demarcated and approved footprints.   | National Forests Act (No 30 of 1998).<br><br>National Environmental Management Biodiversity Act (No 10 of 2004).<br><br>Conservation of Agricultural Resources Act (No 43 of 1983) | ECO to monitor site during construction. |
|   |  |   |  | 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. |  |  |
|   |  |   |  | Retain larger protected trees, where possible, especially along the road development. Obtain permits for the removal/ relocation of protected species.   |  |  |
|   |  |   |  | Rehabilitation of areas temporarily disturbed by construction activities.  |  |  |
|   |  |   |  | Limit road construction to the authorised access roads.  |  |  |
|   |  |   |  | Consideration should be given to rescue and relocation of protected succulent or bulbous species   |  |  |

| Aspect (activities, product, services)  | Impact   | Objectives and management outcome                  | Lice cycle phase                       | Impact management actions  | Compliance with Standards/Acts   | Monitoring required   |
|---|--|--|--|--|--|---|
| Permanent loss of biodiversity. Ineffective Indigenous Biodiversity Reestablishment Impedance onto wetlands due to decommissioning activities | Potential risk to biodiversity and habitat health. Possibility of failing to control alien invasive species on rehabilitated land. | Minimise impact on habitats and species            | Decommissioning and Closure            | Rehabilitation to be undertaken according to the Closure and Rehabilitation Plan   | National Environmental Management Biodiversity Act (No 10 of 2004)<br><br>National Forests Act (No 30 of 1998)<br><br>Conservation of Agricultural Resources Act (No 43 of 1983) | ECO to monitor site during construction.                            |
|   |  |  |  | Restrict activities to only designated areas to prevent further destruction of vegetation.                               |  |   |
|   |  |  |  | Use existing roads during closure to avoid additional scarring.  |  |   |
|   |  |  |  | Implement alien invasive control/eradication programme and monitor alien invasive species during the post closure phase. |  |   |
|   |  |  |  | Edge effect control needs to be implemented within affected areas.   |  |   |
|   |  |  |  | Continuous monitoring and maintenance of rehabilitated areas.  |  |   |
|   |  |  |  | Erosion protection measures must be implemented where deemed necessary.  |  |   |
| <b>Surface water resources</b>  |  |  |  |  |  |   |
| Footprint establishment Layout to directly impact cryptic wetlands  | Loss of wetlands and episodic drainage lines   | Protection of wetlands and episodic drainage lines | Planning, construction, and operations | Implement mitigated layout plan to avoid water courses.  | National Water Act (No 36 of 1998)<br><br>Water Use Licence  | Undertake biannual biomonitoring in pans close to the development . |
|   |  |  |  | Implement mitigated layout plan to avoid wetland pans and other freshwater microhabitats.                                |  |   |
|   |  |  |  | Water crossings must be designed with measures in place to prevent erosion in episodic drainage lines.                   |  |   |
|   |  |  |  | Water crossings must be designed to allow for connectivity between the up and downstream aquatic environment             |  |   |

| Aspect (activities, product, services)                             | Impact                                       | Objectives and management outcome            | Lice cycle phase          | Impact management actions   | Compliance with Standards/Acts                          | Monitoring required               |
|--|--|--|---------------------------|---|---|-----------------------------------|
|  |  |  |                           | <p>Implement stormwater control measures as stipulated in the stormwater management plan to prevent sedimentation of water courses.</p> <p>The 100m development buffer from water courses (not authorised in the WUL) must be dedicated/marked no go areas.</p> <p>Water courses must be monitored for the infestation of alien and invader plants and measures must be implemented to eradicate such plants.</p> |   |                                   |
| Storage and use of hazardous substances<br>Temporary toilets       | Potential spillages of hazardous substances. | Prevent pollution of surface water resources | Planning and construction | <p>Refer to section related to hazardous substances management.</p> <p>Servicing and washing of vehicles to be conducted in dedicated areas with measures in place for the containment of runoff.</p> <p>Maintenance to be conducted in a roofed area with containment measures in place.</p> <p>Temporary toilets must be located outside of the 100m buffer from water courses.</p>                             | National Water Act (No 36 of 1998)<br>Water Use Licence | Undertake biannual biomonitoring. |
| Runoff from exposed surfaces<br>Runoff from wash bay and workshops | Erosion and sedimentation of water courses   | Prevent pollution of surface water resources | Planning and construction | <p>Install dissipating structures (such as gabions) at stormwater discharge points, where necessary, as per the stormwater management plan.</p> <p>Implement measures contained in the site stormwater management plan.</p> <p>Rehabilitation/stabilisation of areas disturbed during construction that will not be used during operations.</p> <p>Monitor downstream for erosion problems.</p>                   | National Water Act (No 36 of 1998)<br>Water Use Licence | Undertake biannual biomonitoring. |

| Aspect (activities, product, services)   | Impact  | Objectives and management outcome  | Lice cycle phase            | Impact management actions  | Compliance with Standards/Acts                          | Monitoring required    |
|--|---|--|-----------------------------|--|---|------------------------|
| <b>Groundwater</b>   |   |  |                             |  |   |                        |
| Use of hazardous substances, including hydrocarbons                              | Potential pollution/Contamination of groundwater                      | Prevent spillages and seepage  | Construction and operations | Refer to section related to hazardous substances management and sewage management.   | National Water Act (No 36 of 1998)<br>Water Use Licence | Groundwater Monitoring |
| Dewatering activities<br>Use of natural resources                                | Potential impact on aquifer yield and groundwater users               | Conservation of natural resources  | Operational                 | Monitor and record dewatering volumes  |   |                        |
|  |   |  |                             | Dewatering volumes must not exceed authorised volumes.   |   |                        |
|  |   |  |                             | The groundwater flow model should be updated on a regular basis and prior to closure phase with the latest water level data. |   |                        |
|  |   |  |                             | Implement a complaints management procedure.   |   |                        |
|  |   |  |                             | Groundwater levels should be monitored on-site as well as on surrounding farms.  |   |                        |
| Sewage packaging plant.<br>Pollution control dam<br>Use of hazardous substances. | Spillages/seepage<br>Potential pollution/Contamination of groundwater | Prevent contamination of groundwater<br>Prevent contamination of groundwater | Operational                 | All leaks must be reported and repaired timeously.   |   |                        |
|  |   |  |                             | Refer to section related to hazardous substances management and sewage management.   |   |                        |
|  |   |  |                             | Refer to section related to sewerage management.   |   |                        |
|  |   |  |                             | Only competent employees to manage sewage packaging plant.   |   |                        |
|  |   |  |                             | Any sewage spills must be cleaned timeously and appropriately.   |   |                        |
|  |   |  |                             | Installation of PCD liner as per design report.  |   |                        |
|  |   |  |                             | Establish a Class D liner (base preparation layer) for WRDs.   |   |                        |

| Aspect (activities, product, services)                                | Impact   | Objectives and management outcome                | Lice cycle phase                       | Impact management actions   | Compliance with Standards/Acts                             | Monitoring required             |
|---|--|--|--|---|--|---------------------------------|
| Establishment of Waste Rock Dumps                                     | Contamination of groundwater resources which may affect groundwater users. |  |  | Undertake groundwater quality monitoring according to the monitoring programme in the EMPr.   |  |                                 |
| <b>Soil Management</b>  |  |  |  |   |  |                                 |
| Incorrect soil management<br>Increased volumes and velocity of runoff | Erosion and loss of soil   | Prevent loss of topsoil                          | Planning, construction, and operations | Plan soil stockpile positions according to other future footprints to prevent disturbance.<br>Stripping of topsoil only allowed in demarcated and approved footprints<br>Monitor stockpiles for erosion problems.<br>Topsoil stockpiles may not exceed 2.5 meters.<br>Soil stockpiles must be marked and be managed as no-go areas during operations.<br>No equipment will be allowed on top of stockpiles for any reason including deposition of soil.<br>Refer to section related to hazardous substances management. | Conservation of Agricultural Resources Act (No 43 of 1983) | Erosion monitoring each quarter |
| <b>Sewage management</b>  |  |  |  |   |  |                                 |
| Sewage spills/leaks<br>Temporary toilets<br>Sewage packaging plant    | Impacts on Surface Water   | Prevent contamination of surface water resources | Construction and operational           | Any sewage spillages must be reported and cleaned appropriately.<br>Temporary toilets during construction must be emptied as required by a registered contractor and sludge disposed at the municipal sewer system.   | National Water Act (No 36 of 1998)<br>Water Use Licence    | None                            |

| Aspect (activities, product, services)        | Impact  | Objectives and management outcome                                 | Lice cycle phase                              | Impact management actions  | Compliance with Standards/Acts | Monitoring required  |
|---|---|---|---|--|--------------------------------|----------------------|
|   |   |   |   | Good housekeeping practices must be implemented at the temporary toilets to prevent nuisance conditions.<br>Only competent employees to manage sewage packaging plant  |                                |                      |
| <b>Topography</b>                             |   |   |   |  |                                |                      |
| Construction of infrastructure and footprints | Change in topography  | Prevent alteration of landscape                                   | Operations and closure                        | Rehabilitation to be undertaken in terms of the Closure and Rehabilitation Plan.<br>Optimise backfilling of pits.  | None                           | None                 |
| <b>Land use and land capability</b>           |   |   |   |  |                                |                      |
| Establishment of footprint                    | Loss of grazing land and change in land use   | Effective management of the use and development of land resources | Operations and closure                        | Rehabilitation to be undertaken in terms of the Closure and Rehabilitation Plan.<br>Refer to section related to impacts on vegetation and soil.  | None                           | None                 |
| Closure and rehabilitation of facility.       | Topsoil deficit inability to adequately undertake rehabilitation activities to achieve post closure land use. |   |   | Ensure that maximum volume of topsoil is stripped for rehabilitation purposes.<br>Topsoil stockpiles must not exceed 2 meters and must be protected against erosion.<br>The aim of rehabilitation should be to change the land use from mining back to the desired ELU (grazing/wilderness)<br>Rehabilitation should be done according to guidelines set out in the Guidelines for Rehabilitation of Mined Land. |                                |                      |
| <b>Air quality</b>                            |   |   |   |  |                                |                      |
| Exhaust emissions, construction vehicles      | Contribution to greenhouse gas emissions.   | Prevention of air pollution                                       | Site Preparation Construction, and Operations | Implement strict speed limits on all roads/exposed areas.<br>Dust suppression on roads and exposed areas according to a schedule.  |                                | Dust fall monitoring |

| Aspect (activities, product, services)                              | Impact   | Objectives and management outcome | Lice cycle phase                              | Impact management actions   | Compliance with Standards/Acts                                    | Monitoring required       |
|---|--|-----------------------------------|---|---|---|---------------------------|
|   |  |                                   |   | Dust fall monitoring in the area surrounding the property during construction according to the National Dust Control Regulations. | National Environmental Management Air Quality Act (No 39 of 2004) |                           |
| Exhaust emissions, construction vehicles                            | Contribution to greenhouse gas emissions.                                  |                                   |   | Implement a community grievances and complaints management procedure. All complaints must be investigated and responded to.       | National Dust Control Regulations.                                |                           |
| <b>Noise management</b>   |  |                                   |   |   |   |                           |
| Increased noise levels from construction and operational activities | Nuisance conditions for receptors in the area.                             | Minimise noise disturbance        | Site Preparation Construction, and Operations | Biannual noise monitoring   | Noise Control Regulations (No. 627 of 1998)                       | Biannual noise monitoring |
|   |  |                                   |   | Implement a community grievances and complaints management procedure. All complaints must be investigated and responded to.       |   |                           |
|   |  |                                   |   | Communicate blasting schedule to neighbouring mines   |   |                           |
| <b>Fire management</b>  |  |                                   |   |   |   |                           |
| Construction of the proposed surface infrastructure                 | The impact of potential fires on neighbouring farming and other activities | Prevention of fires               | Site Preparation Construction, and Operations | Fire breaks must be established and maintained.   | Occupational Health and Safety Act (No 85 of 1993)                | Monitor fire breaks       |
|   |  |                                   |   | Implement an emergency preparedness plan with specific measures related to fire management.                                       |   |                           |
|   |  |                                   |   | Maintenance of grass/vegetation within the fenced area.   |   |                           |
|   |  |                                   |   | Firefighting equipment must be placed at strategic locations and serviced according to manufacturer's specifications.             |   |                           |
|   |  |                                   |   | Sufficient emergency water must be available on site for firefighting purposes.   |   |                           |



| Aspect (activities, product, services)                 | Impact  | Objectives and management outcome      | Lice cycle phase            | Impact management actions   | Compliance with Standards/Acts                               | Monitoring required                            |
|--|---|--|-----------------------------|---|--|--|
|  |   |  |                             | Ensure adequate communication with neighbours regarding fires and collaborate with adjacent farmers with regards to fire management.  |  |  |
| <b>Waste Management</b>                                |   |  |                             |   |  |  |
| Discarding of waste                                    | Waste/Land Pollution Impacts on Groundwater and Surface Water | Prevention of waste/land pollution     | Construction and operations | Provide designated labelled bins and skips at strategic positions for the placement of general and hazardous waste, separately. These containers must not be overfilled.                | National Environmental Management: Waste Act (No 59 of 2008) | Implementation of waste/environmental audits   |
|  |   |  |                             | Good housekeeping practices must be implemented at the waste storage area.  |  |  |
|  |   |  |                             | Investigate measures to separate and recycle different waste types.   |  |  |
|  |   |  |                             | All hydrocarbon contaminated material (rags, PPE, containers etc.) must be placed in a labelled, skip and disposed at a licenced facility.  |  |  |
|  |   |  |                             | Contaminated soil must be managed as hazardous waste.   |  |  |
|  |   |  |                             | Construction waste must be stored in a designated area and disposed at a licenced facility.   |  |  |
| <b>Hazardous substances management</b>                 |   |  |                             |   |  |  |
| Generation and management of hazardous waste Spillages | Water and soil pollution                                      | Prevention of water and soil pollution | Construction and operations | Implement an incident management procedure.   | Hazardous Substances Act (No. 15 of 1973)                    | Quarterly ECO inspections during construction. |
|  |   |  |                             | 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. |  |  |
|  |   |  |                             | Safety Data Sheets must be available on file.   |  |  |

| Aspect (activities, product, services)   | Impact                          | Objectives and management outcome | Lice cycle phase            | Impact management actions   | Compliance with Standards/Acts | Monitoring required |
|--|---------------------------------|-----------------------------------|-----------------------------|---|--------------------------------|---------------------|
|  |                                 |                                   |                             | <p>Spill kits must be available in areas where hazardous substances are used/stored.</p> <p>Spills must be cleaned timeously and appropriately.</p> <p>Large spills that cannot be managed by the site must be reported and additional external resources must be used for rectification.</p> <p>Refuelling to be conducted in a dedicated area with stormwater capturing measures in place to capture spillages.</p> <p>Hazardous substances must be stored in an area with containment measures in place.</p>   |                                |                     |
| <b>Visual Impacts</b>  |                                 |                                   |                             |   |                                |                     |
| Final rehabilitated footprints (incl. WRDs, Pits and other disturbed areas) and remaining infrastructure | Sense of place Visual intrusion | Minimise Visual intrusion         | Decommissioning and Closure | <p>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.</p> <p>Exposed areas need to be reshaped and revegetated as soon as possible.</p> <p>Backfilling of pits should be done during LOM where possible to reduce the volumes of waste going to the WRDs.</p> <p>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.</p> | None                           | None                |
| <b>Heritage</b>  |                                 |                                   |                             |   |                                |                     |

| Aspect (activities, product, services)  | Impact  | Objectives and management outcome                   | Lice cycle phase                       | Impact management actions   | Compliance with Standards/Acts | Monitoring required |
|---|---|---|--|---|--------------------------------|---------------------|
| Encroachment of identified heritage sites   | Impact on burial ground and graves  | Protection of heritage resources and infrastructure | Planning, Construction, and operations | Implement a chance find procedure during construction in case where possible heritage/fossil finds are uncovered.   | None                           | None                |
|   |   |   |  | 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 |                                |                     |
|   |   |   |  | All heritage sites must be dedicated no-go areas.   |                                |                     |
| <b>Traffic</b>  |   |   |  |   |                                |                     |
| Additional dust from construction vehicles driving on provincial road. Additional heavy vehicles crossing N14 | Poor visibility - increased safety risk for road users<br><br>Safety of existing road users travelling on N14 | Safety of road users                                | Construction, and operations           | Implement dust suppression on provincial road.  | None                           | None                |
|   |   |   |  | Avoid crossing N14 during peak traffic periods.   |                                |                     |
|   |   |   |  | All drivers must have valid driver's licences.  |                                |                     |
|   |   |   |  | Risk of crossing the N14 must be clearly communicated to drivers and included in Safety Risk Assessments.   |                                |                     |

| Aspect (activities, product, services)   | Impact  | Objectives and management outcome | Lice cycle phase             | Impact management actions   | Compliance with Standards/Acts | Monitoring required |
|--|---|-----------------------------------|------------------------------|---|--------------------------------|---------------------|
| <b>Community safety</b>  |   |                                   |                              |   |                                |                     |
| Community access to open pit/voids post operational phase<br>Access to an open water body, i.e., increase safety risk. | Unsafe conditions for surrounding landowners and community members leading to injury or death | Community safety                  | Construction, and operations | Prevent access to the remaining void (not backfilled) by constructing an abandonment bund and trench around the entire pit perimeter. | None                           | None                |
|  |   |                                   |                              | Locate the access control measures outside the ZoR or potential failure zone of the backfilled material.                              |                                |                     |
|  |   |                                   |                              | Erect a security fence around the mining area, reducing the risk of free access to the area by people.                                |                                |                     |
|  |   |                                   |                              | Decommission ramps into the pit, i.e., drill and blast, excavate trenches or dump waste rock.   |                                |                     |

**Table 6-3: Measures to Prevent/Minimise Potential Socioeconomic Impacts Associated with the Mining Activities (All Properties)**

| Aspect (activities, product, services) | Impact                      | Objectives and management outcome                                | Lice cycle phase | Impact management actions  | Compliance with Standards/Acts | Monitoring required |
|--|-----------------------------|--|------------------|--|--------------------------------|---------------------|
| <b>Social Impacts (All Properties)</b> |                             |  |                  |  |                                |                     |
| Local Employment                       | Employment of local persons | Upskilling of local persons to improve employment opportunities. | Construction     | Maximise the employment of local persons (unemployed youth) by contractors.  | SLP<br>MPRDA                   | None                |
| Local Procurement                      | Local Procurement           | Local contractors used in construction                           | Construction     | Procurement plan to set aside contracts for local contractors where such contracts are suitably sized for local contractors and do not require specialised work.<br>Maximise expenditure within the area of influence. |                                |                     |

| Aspect (activities, product, services)  | Impact  | Objectives and management outcome                   | Lice cycle phase            | Impact management actions   | Compliance with Standards/Acts | Monitoring required |
|---|---|---|-----------------------------|---|--------------------------------|---------------------|
| Community expectations  | Action from community due to failed expectations  | To manage expectations and inform communities.      | Construction                | Stakeholder engagement aimed at transparency regarding employment and procurement opportunities.  |                                |                     |
| Infrastructure challenges   | Increased pressure on infrastructure and services linked to influx of job seekers and workers | Decrease pressure on infrastructure and services    | Construction and operations | Develop, communicate, and implement an employment strategy focused on local employment.   |                                |                     |
|   |   |   |                             | Information regarding employment needs should be communicated well in advance of each phase of the project in which employees will be required.                               |                                |                     |
|   |   |   |                             | Hiring at both construction and operation phase should take place formally in accordance with relevant legislative requirements and nationally acceptable methods.            |                                |                     |
| Infrastructure challenges   | Social pathologies linked to influx of workers and job seekers.                               | Decrease risk of getting and transmitting diseases. | Construction and operations | To mitigate the potential increase in drug and alcohol abuse, Zama Mining should develop and implement a Code of Conduct (CoC). The CoC should address drug and alcohol abuse |                                |                     |
| Change in sense of place and nuisance factor due to mining and prospecting activities | Change in sense of place  | Limit impacts on change in sense of place           | Construction and operations | To limit air quality impacts, noise impacts, and impacts of traffic the recommendations of the respective specialist impact assessments should be followed.                   |                                |                     |

## 7. FINANCIAL PROVISIONING

A Final Rehabilitation, Decommissioning And Mine Closure Plan (**Appendix K of Part C**) (EXM, 2023) was developed in terms of the Regulation pertaining to the financial provisioning for prospecting, exploration, mining or production operations of 2015 (GN R.1147 of 2015) ("NEMA Financial provisioning regulation, 2015") published in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA") for the proposed mining and prospecting activities in support of the application for an integrated EA and WML.

The main purpose of the plan is to provide Zama Mining and the DMRE with a measurable and auditable closure plan that considers the inherent closure risks and takes into consideration the closure criteria required to ultimately achieve the proposed post-mining end land use for the Zama Mining Project.

### 7.1 Closure objectives and the extent to which they have been aligned with the baseline environment.

The closure vision for the Zama Mining Project is stated below:

***"To render a safe, stable, and non-polluting post-mining landform and promoting a sustainable post-closure utilisation of land that is integrated into the current land uses. The post-closure situation should leave behind a positive legacy for the receiving community and our shareholders."***

This closure vision is underpinned by a rehabilitation mission to progressively reduce the extent of land affected by mining through implementation of concurrent rehabilitation projects during the operational LoM. In addition, Zama Mining aims to promote the development of innovative solutions to support its rehabilitation initiatives and the implementation of the concurrent rehabilitation plan, aimed at achieving the identified End Land Use ("ELU").

### 7.2 Closure Principles

Underpinned by the closure vision, Zama Mining aims to achieve the following closure targets:

- Mine closure should be efficient and cost effective.
- Mine closure should be conducted peacefully.
- Closure actions should ensure an ELU with positive socio-economic benefits and no long-term liabilities.
- Issuance of a closure certificate to Zama Mining.

The closure targets, as set out above are supported by the closure principles, which in turn is used to define specific physical, biophysical, and social closure objectives. Table 7-1 defines the overarching mine closure principles for the Zama Mining Project.

Closure principles should be used to guide the closure plan to ultimately realise the closure vision and should be applied in the development of closure objectives and criteria.

**Table 7-1: Mine Closure Principles**

| Closure Aspect                   | Closure Principle  |
|----------------------------------|--|
| Legal and Regulatory             | Legislative compliance, including industry good practices, must be ensured during Decommissioning, Rehabilitation, and Mine Closure planning and implementation.<br>Mitigate all environmental impacts and aspects according to the provisions and actions of the EMPr(s) and this plan.<br>Achieve a 'walk-away' closure scenario with limited long-term liabilities that require minimal to no management and reduce the need for post-closure intervention.<br>Facilitate the issuing of a closure certificate with achievable conditions by relevant authorities |
| Integration of land use          | Rehabilitation initiatives should aim to integrate the post-mining landscape back into the regional land use.<br>Key objectives for mine closure, including the structural and ecological stability of landforms and associated pollution control (air, soils, groundwater, surface water, etc.) must guide project design development and management of environmental impacts. The objectives must be aligned to the concept of sustainable development and the ELU.  |
| Protection of biodiversity value | The post-closure landscape should ensure the protection of biodiversity value by aiming to minimise degradation and maximise improvement of biodiversity indicators.<br>Residual and possible latent environmental impacts must be identified and quantified   |
| Economic sustainability          | The operational costs associated with post closure opportunities should have no reliance on mine-provided funding in order to be sustainable. Where relevant, this excludes capital costs required for the initiation of potential opportunities.  |
| Socio-economic value creation    | Long-term social performance objectives should be anchored around the objective of building sustainable communities. The post closure landscape should aim to reduce community dependence on the Mine.   |

### 7.3 Closure Objectives

The overarching mine closure objectives aim to ensure sustainability beyond mine closure and to leave behind a positive legacy. Detailed objectives relating to the physical, biophysical and social closure aspects are given in Table 7-2. The current closure objectives may also be refined as the end of LoM approaches and this plan matures.

**Table 7-2: Physical, Biophysical and Social Closure Objectives**

| Aspect                                  | Environmental Objective   |
|---|---|
| <b>Topography, Stability and Visual</b> | <ul style="list-style-type: none"> <li>Long-term stability of all rehabilitated sites.</li> <li>Rehabilitation of residue and waste stockpiles to be done according to engineering design.</li> </ul> |

| Aspect                          | Environmental Objective   |
|---------------------------------|---|
|                                 | <ul style="list-style-type: none"> <li>• Ensure that all residue and waste stockpiles are shaped to manage water and to be free draining.</li> <li>• Minimal visual impact on surrounding observers.</li> </ul>   |
| <b>Soil and Land Capability</b> | <ul style="list-style-type: none"> <li>• Topsoil fertility and quality should accommodate successful vegetation establishment aligned to the requirements of the ELU.</li> <li>• Vegetation cover on all rehabilitated sites to avoid erosion.</li> <li>• Topsoil placement on disturbed areas according to specification for rehabilitation, as far possible.</li> <li>• Restoring the land to the desired land capability aligned to the requirements of the ELU.</li> </ul>  |
| <b>Biodiversity</b>             | <ul style="list-style-type: none"> <li>• Maximise improvement of biodiversity indicators and minimise degradation.</li> <li>• Revegetation to enhance the settlement of the local indigenous vegetation, vegetation communities and habitat types aligned to the region.</li> <li>• Ensuring the restoration of affected wetlands and watercourses.</li> <li>• Limited weeds, alien and invasive vegetation proliferation on site.</li> <li>• To ensure that the rehabilitated habitat will promote the settlement of fauna that migrated out of the area and that similar pre-mining fauna numbers and diversity is achieved.</li> </ul> |
| <b>Surface Water</b>            | <ul style="list-style-type: none"> <li>• Clean surface water runoff from all rehabilitated sites, including WRD's.</li> <li>• To maximise diversion of surface water runoff around rehabilitated sites and prevent sinks.</li> <li>• To ensure that there are no sources of surface water contamination.</li> <li>• To ensure that affected drainage patterns and flow is reinstated.</li> </ul>  |
| <b>Groundwater:</b>             | <ul style="list-style-type: none"> <li>• To ensure that there are no sources of groundwater contamination.</li> <li>• To ensure that decanting (if any) is managed, not to impact on surface water resources.</li> <li>• To ensure no long-term groundwater impacts on surrounding users and communities.</li> </ul>  |
| <b>Socio-economic</b>           | <ul style="list-style-type: none"> <li>• Ensure that proposed post-closure land uses are sustainable and pose an acceptable level of risk to public health and safety;</li> <li>• Ensure that meaningful stakeholder engagement is undertaken and that stakeholder views are considered in the closure planning process.</li> <li>• Restore the land to a final, sustainable end land-use that has been defined by the interaction with the regulating agencies and communities affected.</li> <li>• Manage final closure of operations in accordance with the approved Social &amp; Labour Plan.</li> </ul>                              |

#### 7.4 Confirmation of consultation of closure objectives with landowners

The application is subjected to the required public participation process as defined by the EIA Regulations, 2017. Specific details regarding the Public Participation Process ("PPP") can be found in the EIA report and has also been included in a PPP Report. PPP involved the



placement of site notices on the boundary of the affected properties as well as publicly accessible areas, issuance of notification letters and publishing advertisements to invite interested and affected parties ("I&APs") (including landowners) to register on a database and submit comments on the project.

The comments, as well as response by the Environmental Assessment Practitioner ("EAP"), are captured in the draft EIA report as a comments and response section that forms part of the draft EIA report. Additionally, this Rehabilitation and Closure Plan also forms part of the draft EIA report issued for public review. Comments received during this review period will be captured and included in the Final EIA Report for submission to the Authorities for review and consideration.

### **7.5 Explain how the rehabilitation plan is compatible with the closure objectives.**

As part of the closure strategy, various objectives have been established to ensure the affected environment can be rehabilitated to achieve long term sustainability. The identified end land use ("ELU") is therefore a function of the status of the land, feasibility of rehabilitation options that can be applied to certain infrastructure, changes of long-term success, and aligning to surrounding land uses. These factors ultimately aim to achieve the proposed ELU aligned to the closure vision.

Amongst the wide variety of potential ELU options proposed, the agricultural use of the Zama Mining Project properties post-closure is deemed to be the most appropriate in the regional context, and the most likely to achieve long-term sustainability. The proposed agricultural ELU options include livestock farming (cattle, sheep, and goats). Light industrial uses could also be considered and would include repurposing selected surface infrastructure (workshops, stores etc.) for commercial use and/or to support of the agricultural activities.

It should also be noted that a large portion of the land will not be changed or disturbed during LoM and therefore the current land utilisation will remain.

The activities associated with the proposed Project will be aligned and integrated with the overarching ELU plan which is defined as:

- Reinstating the grazing potential of the land, over an area as large as possible.
- Reinstating the grazing potential on the mining areas, including the backfilled pits and WRDs, but control the grazing utilisation to protect the rehabilitated areas that will remain more sensitive and be more prone to erosion (e.g., steeper slopes) than the surrounding natural or other grazing areas.

- Allow grazing by game and/or livestock on sensitive biodiversity areas (as determined to be appropriate by a Biodiversity Management Plan (“BMP”)), but control the grazing utilisation to protect the biodiversity; and
- Restrict access to remaining voids due to the safety risk; these areas will therefore have a zero to limited land use after closure (until feasible, novel land uses are identified in the future).

## **7.6 Quantum of Financial Provision required to manage and rehabilitate the environment.**

Refer to Annexure K of Part C for the Closure Plan which contains the methodology used for the quantum calculations.

The quantum of financial provision for the MaCarthy Mine activities have been estimated (FY 2022) using available information and current high-level mine closure objectives as described in this report and/ or appendices. The financial provision associated with the prospecting activities has been calculated separately. The basis of the methodology is aligned with the requirements detailed in regulation 6 of the NEMA Financial Provisioning Regulation, 2015. These regulations prescribe the required minimum content as follows: “a detailed itemisation of all activities and costs, calculated based on the actual costs of implementation of the measures required.” The regulation further outlines that closure cost estimation must include the following:

1. An explanation of the closure cost methodology.
2. Auditable calculations of costs per activity or infrastructure; and
3. Cost assumptions.

Cognisance has also been given to the MPRDA Regulations and Guidelines for Evaluation of the Quantum for Closure Related Financial Provision for a Mine issued by DMRE (January 2005) and other relevant industry guidelines<sup>1</sup>. The aim is however to align with the NEMA financial Provisioning Regulation, 2015.

## **7.7 Bill of Quantities**

The bill of quantities (“BOQ”) used to estimate the decommissioning and rehabilitation liability was developed using Geographic Information System (“GIS”) software and Microsoft Excel. The BOQ included all proposed activities associated with the Zama Mining Project (refer to Appendix 4 of the Closure Plan).

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<sup>1</sup> Land Rehabilitation Guidelines for Surface Coal Mines. Land Rehabilitation Society of Southern Africa, Coaltech, Minerals Council of South Africa. 2018.

The BOQ includes an itemised list of all the required closure actions, and the costing calculations referenced the areas and specific type of infrastructure that would need to be demolished and disturbance that requires rehabilitation. It also provides for estimated volumes associated with the required earthworks and measurements of the areas to be rehabilitated. Where the information was available the BOQ has also been detailed to include specific sub-infrastructure of buildings to improve the accuracy and completeness thereof.

The closure cost model categorised operational areas into "Zones" according to the specific activities proposed to be undertaken in these zones. Activities within a certain zone generally have similar rehabilitation actions and objectives. The zones relevant to the Zama Mining Project is given in Table 7-3.

**Table 7-3: Operational Zones of the Zama Mining Project**

| <b>Zone</b> | <b>Description</b>                               |
|-------------|--|
| A           | Offices, Contractors & Support                   |
| B           | Plant  |
| C           | Other Onsite Infrastructure                      |
| D           | Pits   |
| E           | MRD's  |
| F           | Ore Stockpiles, Topsoil Stockpiles & Borrow Pits |
| G           | Water Related Infrastructure                     |
| H           | Overland & General                               |
| I           | Monitoring and Additional Studies                |
| J           | Prospecting Activities                           |

The Zones were further sub-divided into management areas, describing the specific activity which would need to be decommissioned and rehabilitated. The areas of disturbance considered in the financial provision assessment was largely based on high-level information available at the time of the assessment. Closure actions were based on the closure criteria as described in Appendix K.

**7.8 Confirm how the financial provision will be provided.**

Zama Mining will make financial provision for closure by means of a rehabilitation trust, bank guarantee or cash deposit, with any shortfall between the immediate closure cost estimate and the balance in the Trust Account being funded by means of bank guarantees. Annual reviews will be conducted to evaluate the closure costing and to check whether sufficient provision has been made.

## 7.9 Financial Provision Estimate

The quantum of financial liability defines both the final (scheduled) and premature (unscheduled) closure estimates for the Zama Mining Project. The quantum includes additional allowances for contingencies at 15% and Preliminary and General ("P&G's") allowance for contractors at 15% and has been reported as excluding VAT. In accordance with the requirements of the NEMA Financial Provision Regulations, the reported quantum of financial liability is not discounted against the potential salvage value of any demolished infrastructure, even though there may be possible re-sale value associated with it. The detailed BOQ and closure cost model is given as Appendix 4 of the Closure Plan with associated layout plans given in Appendix 3 of the Closure Plan.

The reported scheduled and unscheduled closure liability estimates include provision for management of residual risks, i.e., aftercare and maintenance and monitoring. Latent liability estimates are reported as part of the ERR (Part B).

### 7.9.1 Closure Liability

Premature closure (unscheduled) cost represents the liability, should the mine close and all decommissioning and rehabilitation actions need to be undertaken immediately. The reported premature closure liability for the proposed activities reflects the liability expected to be realised within the 12-month period following approval of the MaCarthy Mine Project. The quantum therefore only considered activities expected to commence within the 12 months following approval. Premature closure liability for the mining activities on the farm MaCarthy is estimated at **R18 271 097,12 (excl. VAT)** and liability associated with the proposed prospecting activities is estimated at **R325 715,45 (excl. VAT)**. The total premature closure liability for the Zama Mining Project is therefore estimated at **R18 596 812,57 (excl. VAT)**. The results of the assessment for premature closure liability of the proposed mining operations (Zama Mining Project) are summarised in Table 16-10 (Appendix K) with a detailed breakdown of decommissioning and rehabilitation costs given in Table 16-11 (Appendix K) and Figure 16-2 (Appendix K). The liability associated with the proposed prospecting activities of the Zama Mining Project is given in Table 16-12 (Appendix K). Please also refer to ERR (Part B of Appendix K), containing details regarding the residual and latent liability costs.

## 8. MECHANISMS FOR MONITORING COMPLIANCE

A monitoring programme assists in determining whether mitigation and management measures are being implemented and/or if they are effective. Monitoring of the environment prior to the start of activities (establishment of baseline conditions) and continued monitoring throughout the life of the operation will help identify environmental impacts by identifying and

tracking potential pollution trends. The monitoring data collected will also provide input into the planning for closure at the end of the life of the MaCarthy Zama project as a whole.

## **8.1 Control and auditing**

### **8.1.1 Appointment of an ECO**

An adequately qualified and experienced Environmental Control Officer ("ECO") will be appointed to oversee the monitoring and ensure implementation of mitigation measures.

An independent qualified and experienced ECO should also be appointed to audit compliance with the EMPr on a bi-annual basis (every 6 months) during construction. During the operational phase, a Health, Safety and Environment ("HSE") Officer or site manager will be appointed to manage the site.

### **8.1.2 Internal Environmental Compliance Audits**

The ECO will audit compliance with environmental management programme on a quarterly basis during the construction phase. Remediation actions for non-compliances are identified and signed-off by the environmental office once implemented.

### **8.1.3 External Compliance Audits**

Compliance Audits will be undertaken in accordance with legislative requirements, i.e., Regulation 34 of the EIA Regulations (GN. 982 of 4 December 2014, as amended). The Compliance audits will be submitted in accordance with the Environmental Authorisation.

### **8.1.4 External Water Use Licence Audit**

An audit of the IWUL must be undertaken in accordance with the requirements and conditions of the IWUL. The outcome of the audits should be solution focused with an action plan. The action plan should however concentrate on prioritising actions to ensure annual targets are achievable and high risks are rectified first. It is proposed that an annual external compliance audit be undertaken by an independent suitably qualified party to monitor compliance with the conditions of the IWUL.

## **8.2 Noise Monitoring**

A biannual noise survey must be undertaken according to the South African National Standards (SANS 10103:2008), IFC Guidelines (IFC 2007) and World Health Organisation ("WHO") Guidelines for Community Noise (WHO 1999) at the receptors indicated in Table 8-1 and Figure 8-1.

**Table 8-1: Noise Monitoring Locations**

| Monitoring location | Coordinates   |               |
|---------------------|---------------|---------------|
|                     | Latitude      | Longitude     |
| 1                   | 27°56'50.58"S | 23°2'1.58"E   |
| 2                   | 27°56'18.63"S | 23° 2'25.29"E |

### 8.3 Dust Fall Monitoring

Dust fall monitoring must be undertaken according to the National Dust Control Regulations on a monthly basis at the locations indicated in Table 8-2 and Figure 8-1.

**Table 8-2: Dust Fall Monitoring Locations**

| Monitoring location | Coordinates   |               |
|---------------------|---------------|---------------|
|                     | Latitude      | Longitude     |
| 1                   | 27°56'50.58"S | 23°2'1.58"E   |
| 2                   | 27°55'42.88"S | 23° 3'24.97"E |
| 3                   | 27°54'38.11"S | 23° 2'13.19"E |

### 8.4 Aquatic Biomonitoring

Undertake biomonitoring on a bi-annual basis in the Episodic Drainage Lines and annually at the Cryptic Wetlands as indicated in Table 8-3 and Figure 8-2: Biomonitoring Locations for water quality (if water is present), Diatoms (if water is present), sediment (if water is not present) and Habitat Integrity Assessment.

**Table 8-3: Biomonitoring Locations**

| Monitoring location | Coordinates   |               |
|---------------------|---------------|---------------|
|                     | Latitude      | Longitude     |
| 1                   | 27°56'24.01"S | 23° 2'56.04"E |
| 2                   | 27°56'10.28"S | 23° 2'55.64"E |
| 3                   | 27°56'3.59"S  | 23° 2'7.92"E  |
| 4                   | 27°54'52.08"S | 23° 2'14.28"E |

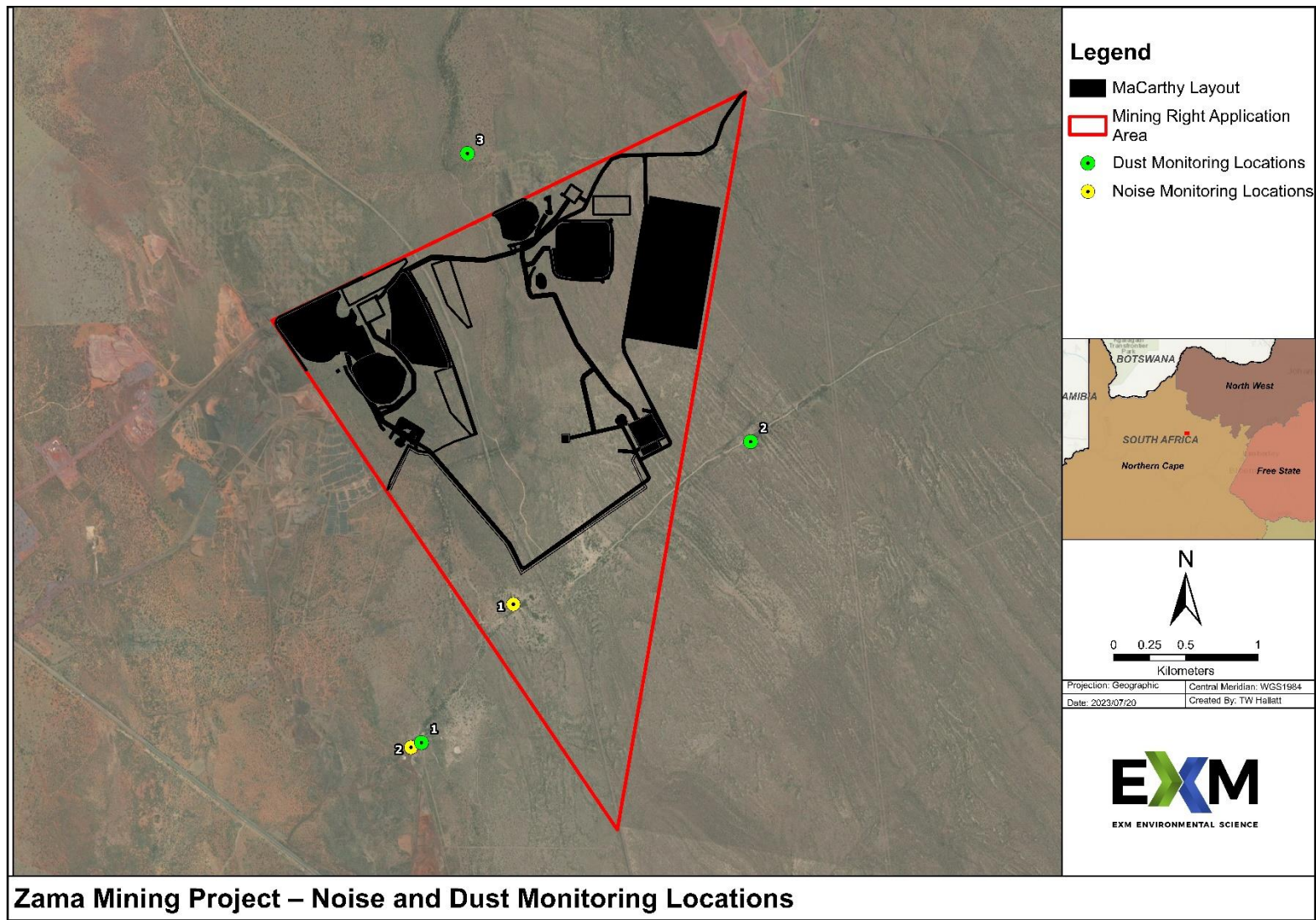


Figure 8-1: Dust and Noise Monitoring Locations

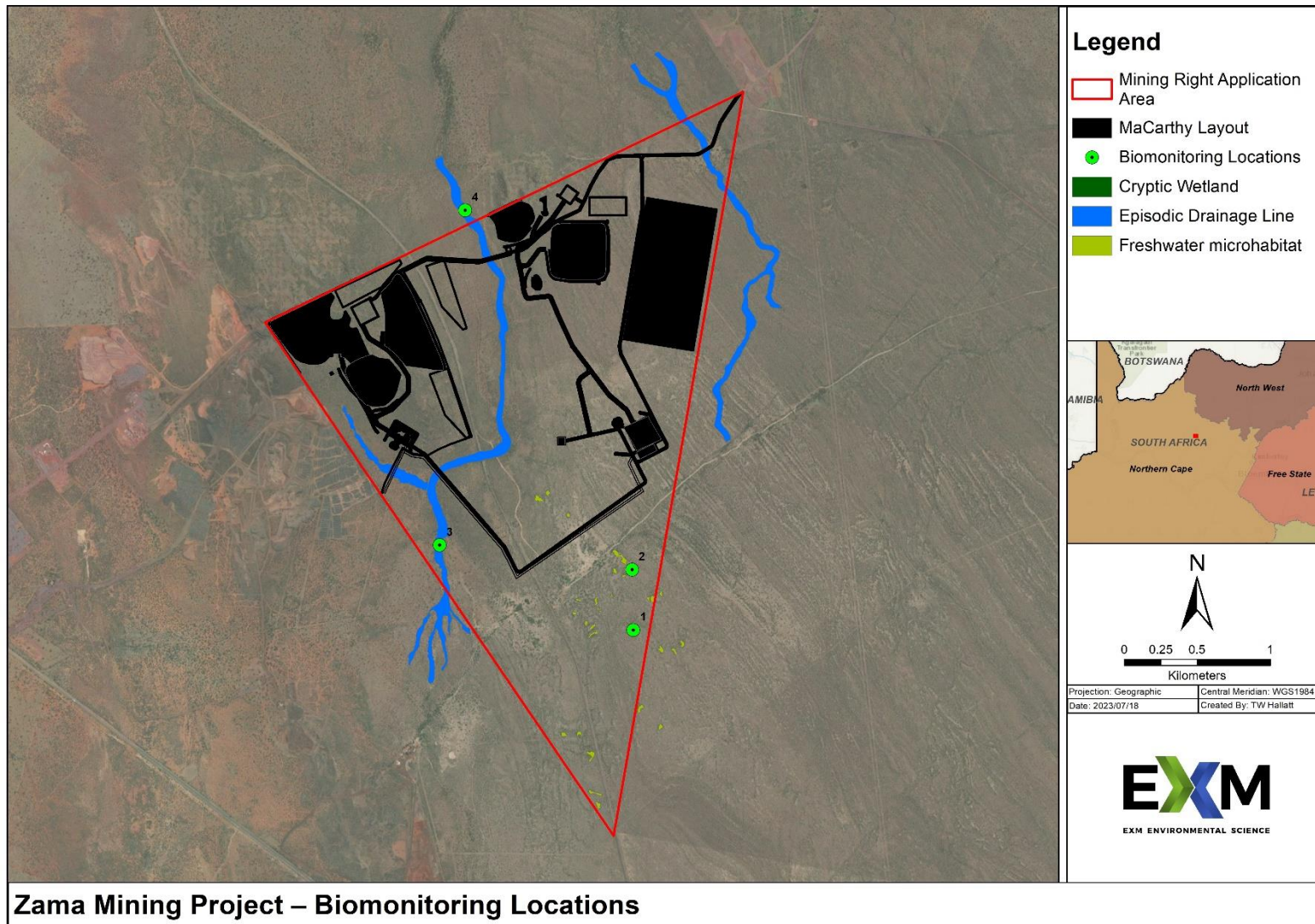


Figure 8-2: Biomonitoring Locations



## 8.5 Groundwater

### 8.5.1.1 Monitoring Localities

The Geohydrological Assessment includes a groundwater monitoring programme for MaCarthy. Table 8-4 contains the proposed boreholes that are included in the programme as well as the frequency for quality and water level monitoring.

**Table 8-4: Monitoring Boreholes**

| Site ID   | Latitude   | Longitude  | Facility / Receptor Monitored                                  | Monitoring frequency |             | Parameters             |
|---|------------|------------|--|----------------------|-------------|------------------------|
|   |            |            |  | Water quality        | Water level |                        |
| <b>Proposed Monitoring Boreholes – Existing boreholes</b>     |            |            |  |                      |             |                        |
| AKM1/77   | -27,911450 | 23,043130  | Eastern open pit<br>Eastern waste dump<br>Off-site, downstream | Quarterly            | Monthly     | As per Chapter 8.9.1.2 |
| MAC5  | -27,909953 | 23,054375  | Unnamed drainage   |                      |             |                        |
| Mokaning 1  | -27.913200 | 23,044900  | Eastern waste dump<br>Eastern open pit 4                       |                      |             |                        |
| Mokaning 2  | -27,913500 | 23,038000  | Eastern waste dump<br>Eastern open pit 3<br>Eastern open pit 4 |                      |             |                        |
| MZBH07  | -27,946833 | 23,034359  | Offsite, upstream  |                      |             |                        |
| MZBH10  | -27,938556 | 23,043601  | Onsite, upstream   |                      |             |                        |
| MZBH16  | -27,919523 | 23,041570  | Eastern open pit 5   |                      |             |                        |
| Monitoring borehole 1   | 27.978619° | 23.064433° | Near proximity to site   |                      |             |                        |
| Monitoring borehole 2   | 27.980911° | 23.049503° |  |                      |             |                        |
| <b>Proposed Monitoring Boreholes – Proposed New boreholes</b> |            |            |  |                      |             |                        |
| MZBH22  | -27,929977 | 23,032312  | Western waste dumps<br>Gamagara tributary                      | Quarterly            | Monthly     | As per Chapter 8.9.1.2 |
| MZBH23  | -27,918321 | 23,037728  | Western waste dumps<br>Gamagara tributary                      |                      |             |                        |
| MZBH24  | -27,915043 | 23,038491  | Eastern open pit 4<br>Gamagara tributary                       |                      |             |                        |
| MZBH25  | -27,918833 | 23,029107  | Western open pit (1&2)   |                      |             |                        |

### **8.5.1.2 Determinants for Analysis**

The South African National Standards (SANS 241: 2015) should be applied as benchmark for monitoring purposes. Supplementary guidelines i.e., Water Use Licence (WUL) conditions as well as WMA Resource Quality Objectives (RQO) should also be considered as part of the monitoring protocol. All monitoring localities should be subjected to an initial comprehensive water quality analysis to evaluate hydrochemical composition and identify potentially elevated parameters going forward<sup>2</sup>. Chemical variables to form part of the sampling run are listed below.

- **Physical and aesthetic determinants:** pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS).
- **Macro determinants:** Total Alkalinity (MAIk), Sulphate (SO<sub>4</sub>), Nitrate (NO<sub>3</sub>), Chloride (Cl), Fluoride (F), Calcium (Ca), Magnesium (Mg), Potassium (K) and Sodium (Na).
- **Micro determinants:** Aluminium (Al), Iron (Fe), Manganese (Mn), Arsenic (As), Cadmium (Cd), Free Cyanide (CN), Copper (Cu), Lead (Pb), Mercury (Hg), Selenium (Se) and Zinc (Zn).

### **8.5.1.3 Pit Dewatering Volumes**

A calibrated mechanical or electronic flow meter must be installed at all pit operations i.e., abstraction points/ sumps in order to monitor and record abstraction volumes. The latter should be included into monitoring reports submitted to the Regional Head: DWS and used as part of the groundwater flow model update.

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<sup>2</sup> It is recommended that a comprehensive water quality analysis be repeated annually. Also note that should additional parameters be requested in existing permits/licence conditions, these should be adhered to.

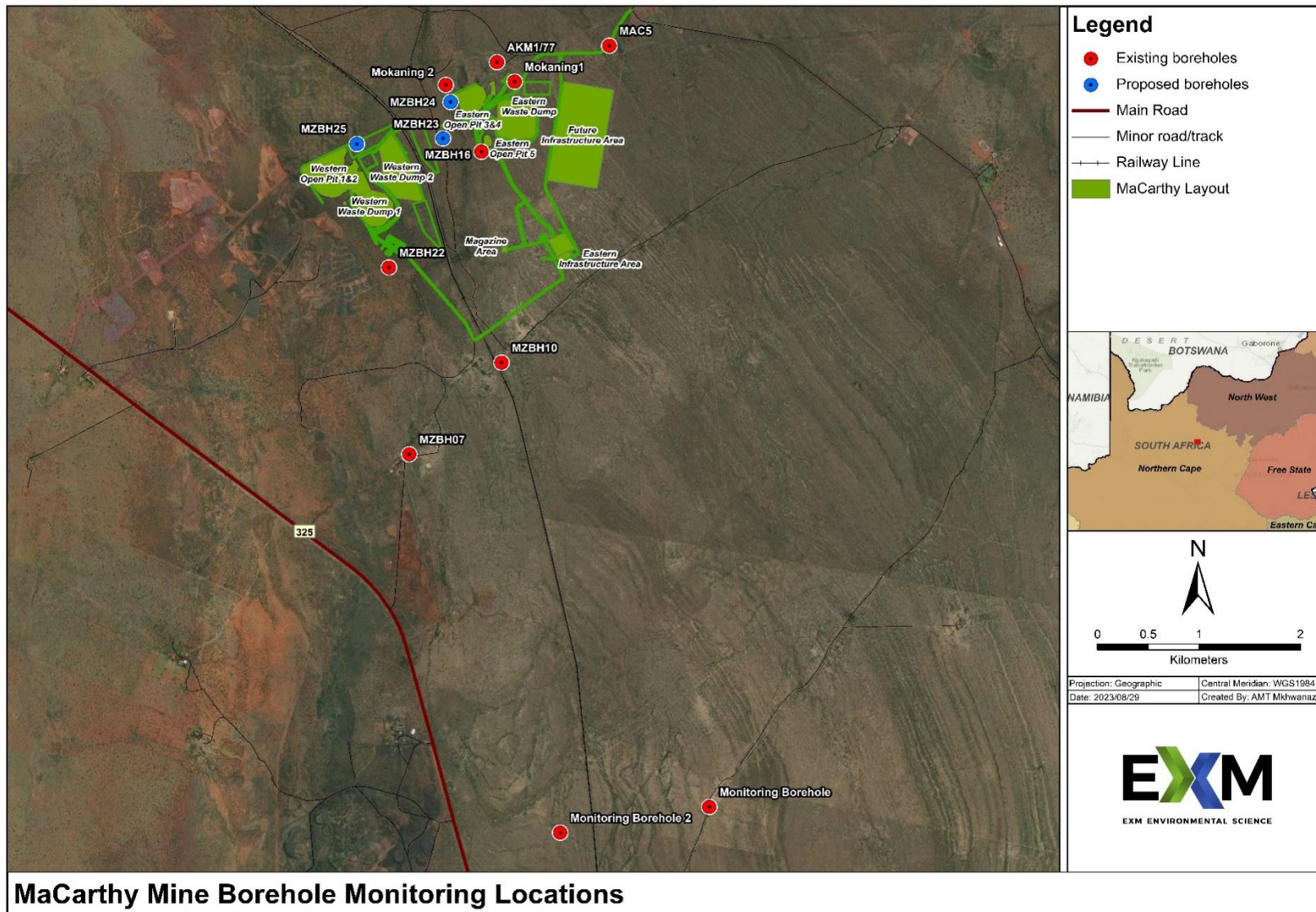


Figure 8-3: Groundwater Monitoring Location

## **9. SUBMISSION OF AUDIT REPORTS**

Compliance Audits will be compiled in accordance with legislative requirements (as applicable at the time) including:

- 1) Regulation 34 of the EIA Regulations;
- 2) Regulation 55 of the Minerals and Petroleum Resource Development Act.

The compliance audits will be submitted in accordance with the Environmental Authorisation.

## **10. SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY**

Non applicable.

## **11. 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.

## 12. UNDERTAKING

I, **Trevor Hallatt**, acting as independent environmental assessment practitioner hereby confirm:

- The correctness of the information provided in the reports.
- The inclusion of comments and inputs from stakeholders and I&APs.
- The inclusion of inputs and recommendations from specialist reports, where relevant; and
- The acceptability of the project in relation to the finding of the assessment and the level of mitigation proposed.

**Table 12-1: Details of the Undertaking EAP**

| Report Sign-Off |   |  |            |
|-----------------|---|--|------------|
| Name            | Designation   | Signature  | Date       |
| Trevor Hallatt  | EAP<br>Senior Environmental Scientist<br>Pr.Sci.Nat |  | 2023/08/30 |

## **Appendix A: Curriculum Vitae of EAP**



**Surname:** Hallatt  
**Names:** Trevor Winston  
**Position:** Senior Environmental Scientist  
**Nationality:** RSA  
**Experience:** 11 years environmental consultant in mining and industrial sectors  
**Professional Registration/Affiliations:** South African Council for Natural Scientific Professions (Reg nr: 300123/15).  
 EAPASA Registration  
**Qualification:** MA Environmental Management  
 North West University

Trevor Hallatt has more than 11 years of environmental management experience in mining, power generation, industrial and local government sectors. His duties entail the planning and execution of projects related to environmental management, including Environmental Impact Assessments (EIA), Water Use Licence Applications and IWWMPs, ISO 14001: 2004 and legal compliance audits, Financial Provisioning, Compilation of Environmental Management Programmes, Environmental Risk Assessments and Environmental Management Systems. Trevor also has extensive experience in the application of Geographic Information Systems (GIS) in environmental projects. Trevor is a registered Natural Science Professional with the South African Council for Natural Scientific Professions (Reg nr: 300123/15).

**KEY AREAS OF EXPERTISE**

- Environmental Impact Assessments;
- Water Use Licence Applications;
- Atmospheric Emissions Licence Applications;
- Geographic Information Systems;
- Environmental Audits (Legal and EMS);
- Environmental Control Officer: and
- Public Consultation.

**SUMMARY RECENT PROFESSIONAL EXPERIENCE RELATED TO ENVIRONMENTAL IMPACT ASSESSMENT**

| Client                   | Designation                      | Description  |
|--------------------------|----------------------------------|--|
| Zinoju Coal              | EAP and Project Manager          | BA and WUL application for the refurbishment of the old Balgray Colliery near Dundee<br>Compliance Management  |
| Vereeniging Refractories | EAP and Project Manager          | Vereeniging Refractories Hammanskraal Clay Quarry Waste Management Licence and EMPr amendment<br>Environmental Legal Audits<br>ECO Functions   |
| Izazi Mining Services    | EAP and Project Manager          | Three Prospecting Right Applications and Basic Impact Assessment Processes   |
| Aquarella Investment     | Specialist                       | Prospecting Right Application and Basic Impact Assessment Process  |
| Sishen Iron Ore Mine     | Environmental specialist         | Lylyveld Expansion EIA<br>Macarthy EIA and WUL   |
| Ceramic Industries       | EAP                              | Warehouse Development Basic Impact Assessment.<br>Atmospheric Emissions Licence and full EIA for Phoenix Factory.<br>WUL Applications (Pegasus and Phoenix Factories)<br>Environmental Legal Audits  |
| Barberton Mines          | Environmental specialist         | IWWMPs review 2019/2020<br>Environmental Control Officer   |
| Evander Gold Mines       | Auditor                          | EMP Performance Assessments<br>Basic Assessment and EA Amendment Solar Plant and Waste Water Treatment Plant   |
| Kolomela Iron Ore Mine   | Project Manager<br>EAP           | Various external audits<br>Various EIA / EMP's for expansion projects<br>Various mining permit applications<br>EIA and WUL for Airport Development   |
| Canyon Coal              | Environmental specialist         | BA for a coal siding development near Bronkhorstspuit<br>EIA Review and PPP for Prospecting Right Applications   |
| Kangra Coal              | Environmental specialist         | IWWMP for Kusipongo Project  |
| Ceramic Industries       | EAP                              | Warehouse Development Basic Impact Assessment.<br>Atmospheric Emissions Licence and full EIA for Phoenix Factory.<br>WUL Applications (Pegasus and Phoenix Factories)<br>Environmental Legal Audits  |
| ArcelorMittal            | EAP and Environmental specialist | EIA and Scoping as well as BAR for the decommissioning of the Existing Metallurgical Disposal Site and the Construction of a New Class B Disposal Site<br>Galvanising Line Conversion to Combi-Line Basic Impact Assessment.<br>Environmental Legal Audits |
| Universal Oil Solutions  | EAP and Environmental specialist | Waste Management Licence Application<br>Environmental Legal Audits<br>ECO Functions  |
| TerraNova Ceramics       | EAP and Environmental specialist | Atmospheric Emissions Licence and full EIA;  |
| Columbus Stainless       | Environmental specialist         | Basic Assessment for the Storage of Hazardous Substances.  |
| Bumatech                 | Environmental specialist         | Expansion Project Basic Impact Assessment Process.<br>Environmental Legal Audits<br>ECO Functions  |
| AfriSam SA               | Environmental specialist         | Environmental Legal Audits<br>ECO Functions  |

**RECENT EMPLOYMENT RECORD**

|              |  |
|--------------|--|
| 2019-current | <b>EXM Advisory Services</b><br>Senior Environmental Scientist |
|--------------|--|



|             |  |
|-------------|--|
| 2015 – 2019 | <b>Zantow Environmental Consulting Services</b><br>Senior Environmental Scientist                    |
| 2010 – 2014 | <b>Centre for Environmental Management (North-West University)</b><br>Junior Environmental Scientist |

## Appendix B: Scope of EMP

| Requirement of Appendix 4 - GN 326   | EMP Sections  |
|--|---|
| 1 (a) details of—<br>(i) the EAP who prepared the report; and<br>(ii) the expertise of the EAP, including a curriculum vitae;  | Section 2- Environmental Assessment Practitioner  |
| (b) a detailed description of the aspects of the activity that are covered by the EMP as identified by the project description;  | Section 3- Description of The Aspects of The Activity   |
| (c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;  | Figure 2-2: Preliminary Project Layout Map<br>Figure 4 1: Overall Environmental Sensitivity Map |
| (d) a description of the impact management objectives outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed, and mitigated as identified through the environmental impact assessment process for all phases of the development including—<br>(i) planning and design;<br>(ii) pre construction activities;<br>(iii) construction activities;<br>(iv) rehabilitation of the environment after construction and where applicable post closure; and<br>(v) where relevant, operation activities;  | Section 5- Impact Management Objectives   |
| A description and identification of impact management objectives outcomes required for the aspects contemplated in paragraph (d)   | Section 5- Impact Management Objectives   |
| (f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraph (d) and (e) will be achieved, and must, where applicable, include actions to —<br>(i) avoid, modify, remedy, control or stop any action, activity, or process which causes pollution or environmental degradation;<br>(ii) comply with any prescribed environmental management standards or practices;<br>(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and<br>(iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable; | Section 5- Impact Management Objectives   |
| (g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);  | Section 8- Mechanisms for Monitoring Compliance   |
| (h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);   | Section 8- Mechanisms for Monitoring Compliance   |
| (i) an indication of the persons who will be responsible for the implementation of the impact management actions;  |   |
| (j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;   |   |
| (k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);  | Section 8- Mechanisms for Monitoring Compliance   |
| (l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;  | Section 9- Submission of Audit Reports  |
| (m) an environmental awareness plan describing the manner in which—  |   |

| Requirement of Appendix 4 - GN 326   | EMP Sections   |
|--|--|
| (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and<br>(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and |  |
| (n) any specific information that may be required by the competent authority.  | Section 10- Specific Information Required by The Competent Authority |