

**SISHEN IRON ORE COMPANY (PTY) LTD**

**SISHEN MINE**

**EXPANSION OF MINING AND ASSOCIATED ACTIVITIES AT  
LYLYVELD NORTH & LYLYVELD SOUTH, SISHEN MINE**

**(LYLYVELD EXPANSION PROJECT)**

**KATHU, NORTHERN CAPE**

**SCOPING REPORT**

**FINAL**

**SAMRAD REFERENCE: NC-00112-MR/259**

## **SISHEN IRON ORE COMPANY (PTY) LTD**

### **EXPANSION OF MINING AND ASSOCIATED ACTIVITIES AT LYLYVELD NORTH & LYLYVELD SOUTH, SISHEN MINE**

### **(LYLYVELD EXPANSION PROJECT)**

**KATHU, NORTHERN CAPE**

## **SCOPING REPORT**

**FINAL**

**NAME OF APPLICANT:** Sishen Iron Ore Company (Pty) Ltd – Sishen Mine

**TEL NO:** 053 739 2203

**FAX NO:** 053 739 2000

**POSTAL ADDRESS:** Private Bag X 506, Kathu, 8446

**PHYSICAL ADDRESS:** Sishen Mine, Hendrik van Eck Street, Kathu

**SAMRAD REF NUMBER:** NC-00112-MR/259

**SUBMITTED FOR AUTHORISATION IN TERMS OF:**

**SECTION 102 OF THE MINERALS AND PETROLEUM RESOURCES DEVELOPMENT ACT**


**LISTED ACTIVITIES UNDER THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT AND NATIONAL  
ENVIRONMENTAL MANAGEMENT: WASTE ACT**

**PREPARED BY:** EXM Advisory Services (Pty) Ltd

**Date:** 16 August 2018

This document has been prepared by EXM Advisory Services (Pty) Ltd and is intended for the use and distribution of the readers included in the distribution list.

Distribution List			
No.	Name	Designation	Affiliation
1	Raisebe Sekepane		Mpumalanga Department of Mineral Resources

Report Sign-Off			
Name	Designation	Signature	Date
Kerry Fairley	EAP Director Pr.Sci.Nat		16 August 2018

## TABLE OF CONTENTS

<b>1. EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>2. PROJECT AND EAP DETAILS .....</b>	<b>4</b>
<b>2.1 Details of EAP .....</b>	<b>4</b>
2.1.1 The EAP who prepared the report.....	4
2.1.2 Expertise of the EAP.....	4
<b>3. DESCRIPTION OF THE PROPERTY .....</b>	<b>5</b>
<b>4. LOCALITY MAP .....</b>	<b>6</b>
<b>5. DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY .....</b>	<b>7</b>
<b>5.1 Listed and specified activities .....</b>	<b>7</b>
<b>5.2 Description of activities to be undertaken.....</b>	<b>9</b>
<b>6. POLICY AND LEGISLATIVE CONTEXT.....</b>	<b>14</b>
<b>6.1 Mineral and Petroleum Resources Development Act (No. 28 of 2002) .....</b>	<b>14</b>
<b>6.2 National Environmental Management Act (No. 107 of 1998).....</b>	<b>15</b>
<b>6.3 National Environmental Management: Waste Act (No. 59 of 2008).....</b>	<b>15</b>
<b>6.4 National Environmental Management Act: Air quality Act (No. 39 of 2004).....</b>	<b>16</b>
<b>6.5 National Environmental Management: Biodiversity Act (No. 10 of 2004).....</b>	<b>16</b>
<b>6.6 Northern Cape Nature Conservation Act (No. 9 of 2009) .....</b>	<b>17</b>
<b>6.7 National Water Act (No. 36 of 1998).....</b>	<b>17</b>
<b>6.8 National Heritage Resources Act (No. 25 of 1999).....</b>	<b>17</b>
<b>7. NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES .....</b>	<b>18</b>
<b>8. PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED .....</b>	<b>18</b>
<b>9. DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED PREFERRED ALTERNATIVES .....</b>	<b>18</b>
<b>9.1 Site Layout Alternatives.....</b>	<b>18</b>
9.1.1 Lylyveld North – Expansion of Waste Rock Dumps .....	18
<b>9.2 Option of not implementing the activity.....</b>	<b>20</b>
<b>9.3 Details of the Public Participation Process Followed .....</b>	<b>20</b>
9.3.1 Identification of Interested and Affected Parties .....	20
9.3.2 Notifications .....	21
9.3.3 Media advertisements and Site Notices .....	21
9.3.4 Public meetings .....	22
9.3.5 Public and authority review of draft scoping report .....	22
<b>9.4 Summary of issues raised by IAPs.....</b>	<b>23</b>
<b>9.5 The environmental attributes associated with the sites .....</b>	<b>26</b>
9.5.1 Baseline environment .....	26

9.5.1.1	Type of environment affected by the proposed project.....	26
9.5.2	Description of current land uses .....	42
9.5.3	Description of specific environmental features and infrastructure on the site .....	42
9.5.4	Environmental and current land-use map.....	44
<b>9.6</b>	<b>Impacts identified .....</b>	<b>45</b>
<b>9.7</b>	<b>Methodology used in determining the significance of environmental impacts.....</b>	<b>48</b>
<b>9.8</b>	<b>The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected....</b>	<b>48</b>
<b>9.9</b>	<b>The possible mitigation measures that could be applied and the level of residual risk. ....</b>	<b>48</b>
<b>9.10</b>	<b>The outcome of the site selection - Final site layout plan .....</b>	<b>54</b>
<b>9.11</b>	<b>Motivation where no alternative sites were considered.....</b>	<b>54</b>
<b>9.12</b>	<b>Statement motivating the preferred site .....</b>	<b>54</b>
<b>10.</b>	<b>PLAN OF STUDY FOR THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS .....</b>	<b>55</b>
<b>10.1</b>	<b>Description of Alternatives to be Considered including the Option of Not Going Ahead with the Activity.....</b>	<b>55</b>
10.1.1	No-Go alternative.....	55
10.1.2	Layout alternatives.....	55
<b>10.2</b>	<b>Description of the aspects to be assessed as part of the environmental impact assessment process (including aspects to be assessed by specialists).....</b>	<b>55</b>
10.2.1	Biodiversity .....	56
10.2.2	Air Quality .....	56
10.2.3	Heritage Impact Assessment.....	57
10.2.4	Closure Costing .....	57
10.2.5	Other Specialist Fields.....	57
<b>10.3</b>	<b>Proposed method of assessing the environmental aspects including the proposed method of assessing alternatives .....</b>	<b>58</b>
10.3.1	Impact ranking criteria .....	58
10.3.2	The proposed method of assessing duration significance .....	61
<b>10.4</b>	<b>Stages at which the competent authority will be consulted .....</b>	<b>61</b>
<b>10.5</b>	<b>Particulars of the public participation process with regard to the impact assessment process that will be conducted .....</b>	<b>61</b>
10.5.1	Steps to be taken to notify IAPs .....	61
10.5.2	Details of the engagement process to be followed.....	61
<b>10.6</b>	<b>Description of the tasks that will be undertaken during the environmental impact assessment process.....</b>	<b>62</b>
<b>10.7</b>	<b>Measures to avoid, reverse, mitigate, or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored. ....</b>	<b>65</b>
<b>11.</b>	<b>OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY .....</b>	<b>65</b>
<b>11.1</b>	<b>Impact on the socio-economic conditions of any directly affected person.....</b>	<b>65</b>

11.2 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act. 65	
<b>12. OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE ACT .....</b>	<b>65</b>
<b>13. UNDERTAKINGS BY THE EAP .....</b>	<b>66</b>
<b>14. REFERENCES.....</b>	<b>67</b>

## LIST OF FIGURES

FIGURE 4-1: LOCALITY MAP OF THE LYLYVELD EXPANSION PROJECT	6
FIGURE 5-1: PROPOSED EXPANSIONS - LYLYVELD NORTH	11
FIGURE 5-2: PROPOSED EXPANSIONS - LYLYVELD SOUTH	12
FIGURE 5-3: PROPOSED EXPANSIONS – WIDENING AND REALIGNMENT OF HAUL ROAD	13
FIGURE 9-1: ORIGINAL LAYOUT OF LYLYVELD NORTH	19
FIGURE 9-2: REVISED LAYOUT OF LYLYVELD NORTH	19
FIGURE 9-3: AVERAGE MONTHLY CLIMATE FOR SISHEN MINE (DESIGN POINT, 2017)	26
FIGURE 9-4: PERIOD AVERAGE WIND ROSE FOR SISHEN MINE JULY 2015 TO JUNE 2016	26
FIGURE 9-5: LOCAL TOPOGRAPHY	27
FIGURE 9-6: LOCATION OF DUST MONITORING STATIONS AND KEY RECEPTORS AT SISHEN MINE	29
FIGURE 9-7: SISHEN MINE BIODIVERSITY SENSITIVITY MAP (2013)	32
FIGURE 9-8: GAMAGARA RIVER FLOW MODELLED: 1988 -2006 (SHANGONI, 2017)	33
FIGURE 9-9: SURFACE WATER RESOURCES IN THE VICINITY OF SISHEN MINE	34
FIGURE 9-10: PROPOSED CUT-OFF BERM AND CANAL AT LYLYVELD SOUTH MINING AREA	35
FIGURE 9-11: SISHEN COMPARTMENTS WITH GEOLOGICAL STRUCTURES AND CURRENT IMPACT ZONE	37
FIGURE 9-12: EXISTING GROUNDWATER MONITORING POINTS AT SISHEN MINE	39
FIGURE 9-13: SISHEN IRON ORE COMPANY LAND OWNERSHIP	40
FIGURE 9-14: EXISTING LAND USE AND INFRASTRUCTURE MAP SHOWING LOCATION OF LYLYVELD NORTH AND SOUTH EXPANSION AREAS	44

## LIST OF TABLES

TABLE 9-1: SUMMARY OF PM10 CONCENTRATIONS FOR THE SISHEN MINE FOR 2016 (BASED ON SCREENED DAILY DATA RECEIVED FROM SISHEN)	28
TABLE 9-2: SUMMARY OF PM2.5 CONCENTRATIONS FOR THE SISHEN MINE FOR 2016 (BASED ON SCREENED DAILY DATA RECEIVED FROM SISHEN)	28
TABLE 9-3: SUMMARY OF MONTHS DURING WHICH DUSTFALL EXCEED ACCEPTABLE LEVELS AS SPECIFIED IN THE NATIONAL DUST CONTROL REGULATIONS (JULY 2015-JUNE 2016)	30
TABLE 9-4: ENVIRONMENTAL HEALTH AND SAFETY GUIDELINES FOR NOISE	31
TABLE 9-5: ARITHMETIC PREVAILING NOISE LEVELS DURING THE WINTER	31
TABLE 9-6: ARITHMETIC PREVAILING NOISE LEVELS DURING THE SUMMER	31

TABLE 9-7: POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS	45
TABLE 9-8: PROJECT IMPACTS, MITIGATION MEASURES AND THE LEVEL OF RESIDUAL RISK	49
TABLE 10-1: CRITERIA FOR ASSESSING THE IMPACT SIGNIFICANCE	58
TABLE 10-2: EIA TASKS AND TIMING	64

## LIST OF APPENDICES

APPENDIX A: PROOF OF EAP REGISTRATION AND CURRICULUM VITAE OF EAP
APPENDIX B: PUBLIC PARTICIPATION REPORT

## ACRONYMS AND ABBREVIATIONS

	<b>Definition</b>
BID	Background Information Document
DMR	Department of Mineral Resources
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GNR	Government Notice Regulation
IAP	Interested and Affected Party
IWWMP	Integrated Water and Waste Management Plan
LOM	Life of Mine
mamsl	Metres above mean sea level
Mtpa	Million tons per annum
MPRDA	Mineral and Petroleum Resources Development Act
NAAQS	South African National Ambient Air Quality Standards
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
PM10	Particulate matter less than 10 microns
PM2.5	Particulate matter less than 2.5 microns
ROM	Run of mine
SACNASP	South African Council for Natural & Scientific Professionals
SAHRA	South African Heritage Resource Agency
SAMRAD	South African Mineral Resources Administration (System)
SANRAL	The South African National Roads Agency Limited
SANS	South African National Standards
SIOC	Sishen Iron Ore Company (Pty) Ltd
SLP	Social Labour Plan
TOPS	Threatened or Protected Species
WRD	Waste Rock Dump



## 1. EXECUTIVE SUMMARY

Sishen Iron Ore Company (Pty) Ltd currently undertakes satellite mining activities as part of the Sishen Mine on the Remaining Extent of the Farm Lylyveld 545, approximately 12 km south south west of Kathu. Mining takes place at two sections, namely Lylyveld North and Lylyveld South located on either side of the N14 and the Gamagara River. The Lylyveld Expansion project is proposed to extend the existing mining and associated activities at Lylyveld aimed at extending the current life of the operations. The expansion will allow for the continuation of the current mining activities beyond the originally planned life (i.e. until 2022) in line with current production rates of approximately 1 million tons per annum until 2030.

In order to facilitate the increased life of the Lylyveld operations, provision is now being made for the expansion and development of: new mining pit areas, waste rock dumps, product stockpile areas as well as haul roads.

The following expansions are proposed for Lylyveld North:

- Expansion of the mining pit;
- Expansion of the north eastern waste rock dump (WRD);
- Expansion of the eastern WRD;
- Expansion of stockpile area;
- Development of new waste rock dump to the south; and
- Development of new haul road.

The following expansions are proposed for Lylyveld South:

- Expansion and revision of location of the authorised mining pits at Lylyveld South
- Development of a new mining pit at Lylyveld South
- Expansion of WRD at Lylyveld South
- Development of new WRD dump at Lylyveld South
- Development of a new stockpile area at Lylyveld South.

Widening the main haul road (with the exception of the section that crosses the Gamagara River) from Lylyveld South to Lylyveld North to 35 m is proposed. The widening excludes the section across the Gamagara River, which will remain unchanged. The haul road from Lylyveld North to the main Sishen mining area will be increased in width to 45 m. It is also proposed that the route be realigned. The increase in width and the realignment is required to facilitate the safe movement and passing of haul trucks on the road.

The Lylyveld Expansion project will not require additional dewatering for mining or water to be abstracted for use at the operations. In addition, the project will not provide any additional employment or procurement opportunities, but the current socio-economic benefits will be extended.

An application is being sought for environmental authorisation of the expanded activities in terms of the following:

- Section 102 of the Minerals and Petroleum Resources Development Act for the amendment of the Sishen Mine Environmental Management Programme, as amended.
- Environmental Impact Assessment Regulations GNR. 982-985 of 4 December 2014, as amended for Activities 24 & 56 of Listing Notice 1 and Activities 6 and 15 of Listing Notice 2 for the development new and the widening of existing haul roads, the amendment of the Sishen Mine water use licence and for the clearance of indigenous vegetation
- Waste Management Activities 7, 11 and 13 of Regulation GN. 921 of 29 November 2013, as amended under National Environmental Management: Waste Act for the deposition of waste rock material.

Application is also being made for the licensing of water use activities in terms of the National Water Act:

- Section 21(g) - Disposal of waste in a manner which may detrimentally impact on a water resource for the deposition of waste rock material.

The application will be supported by a Scoping and Environmental Impact Assessment Report. This report comprises the Scoping Report for the project.

The Lylyveld Expansion Project will take place within areas which have largely been disturbed by previous mining activities. However, new areas will need to be cleared to facilitate the expansion of the pits, waste rock dumps, stockpile areas and roads. In addition, the expanded mining activities will take within close proximity to a National Road (N14), the Sishen Saldanha Iron Ore Rail Line and Eskom Power Lines. Haul trucks will also continue to cross the road to Dingleton over the extended life of the project. Key potential impacts identified in the scoping phase include:

- Biodiversity and heritage impacts related to site clearance;
- Increased dust levels due to expanded and new emission sources;
- Damage to infrastructure due to the proximity of future mining activities';
- Safety risks associated to haul trucks crossing the road to Dingleton;
- Safety risk to road users due to increased dust levels in close proximity to roads;

- Disturbance or pollution of surface water resources including the Gamagara River and a wetland pan located adjacent to the main haul road from Lylyveld to Sishen's plant area;
- Pollution of groundwater due to seepage or spillage of pollutants.

The key issues raised during the public consultation process largely relate to potential impacts on neighbouring infrastructure and sustained safety risk due to the long-term crossing of the road to Dingleton by haul trucks traversing from Lylyveld South to Lylyveld North.

The environmental impact assessment (EIA) phase will aim at quantifying the significance of the impacts identified in scoping as well as any additional impacts which may still become apparent. Where the environmental assessment practitioner does not have the necessary expertise, specialist input will be obtained to quantify impacts and identify mitigation measures required. The following specialist input will be obtained in the EIA phase:

- Biodiversity impact assessment;
- Air quality assessment; and
- Heritage impact assessment;

In addition, the following will need to be addressed as part of the EIA phase:

- Review of stormwater management measures;
- Assessment of the risks to surface water resources;
- Assessment of the risks to groundwater and review of the current groundwater monitoring programme;
- Consultation with SANRAL, Transnet and Eskom to ensure requirements for protection of infrastructure are met.

SIOC will be required to undertake the legislated risk assessment to determine the impacts on associated infrastructure before mining activities can commence within the new pit areas at Lylyveld South.

Feedback will be given to commenting authorities, interested and affected parties as to the outcomes of the EIA and persons will be invited to provide further comment.

## **2. PROJECT AND EAP DETAILS**

### **2.1 Details of EAP**

#### **2.1.1 The EAP who prepared the report**

**Name of The Practitioner:** Kerry Fairley

**Affiliation:** Head Environmental Management Services and Director

**Tel No.:** 082 871 2959 or 010 007 3617

**E-mail address:** kerry@exm.co.za

#### **2.1.2 Expertise of the EAP**

##### **Qualifications**

- BSc Botany Honours (University of the Witwatersrand)
- Registered as Professional Natural Scientist with the South African Council for Natural and Scientific Professionals (SACNASP) Registration Number: 400054/03

##### **Expertise and Experience**

Kerry Fairley has over 18 years of experience in environmental management in the mining industry as one of the most experienced environmental assessment practitioners in South Africa. Kerry is the author of numerous environmental impact assessment reports for both green fields mining projects as well as for expansions and amendment to existing mining operations in South Africa and as well as other African countries (Namibia, Malawi).

### 3. DESCRIPTION OF THE PROPERTY

<b>Farm Name:</b>	Remaining extent of the Farm Lylyveld 545
<b>Application area (Ha)</b>	Sishen Mine has a mining right area of approximately 26 000 ha, of which the entire Lylyveld North and South Mining area will be affected by the application. The new areas to be authorised as part of the proposed expansion which includes approximately 31 ha at Lylyveld North mining area and 92 ha at the Lylyveld South mining area and 7 ha of haul roads (approximately 6.5 km in length) linking these areas to existing haul roads at Sishen Mine.
<b>Magisterial district:</b>	District Hay (Gamagara Local Municipality)
<b>Distance and direction from nearest town</b>	The Lylyveld Expansion Project is located with the Sishen Mine Mining Right area, approximately 12 km south south west of the town of Kathu
<b>21-digit Surveyor General Code for each farm portion</b>	CO41C04100000000054500000
<b>Locality map</b>	Figure 4-1.
<b>Description of the overall activity.</b> <b>(Indicate Mining Right, Mining Permit, Prospecting right, Bulk Sampling, Production Right, Exploration Right, Reconnaissance permit, Technical co-operation permit, Additional listed activity)</b>	Sishen Mine is planning to expand and amend the existing authorised mining and associated activities taking place within the Lylyveld North and Lylyveld South mining areas. This includes the expansion and development of: new mining pit areas, waste rock dumps, product stockpile areas as well as haul roads.

4. LOCALITY MAP

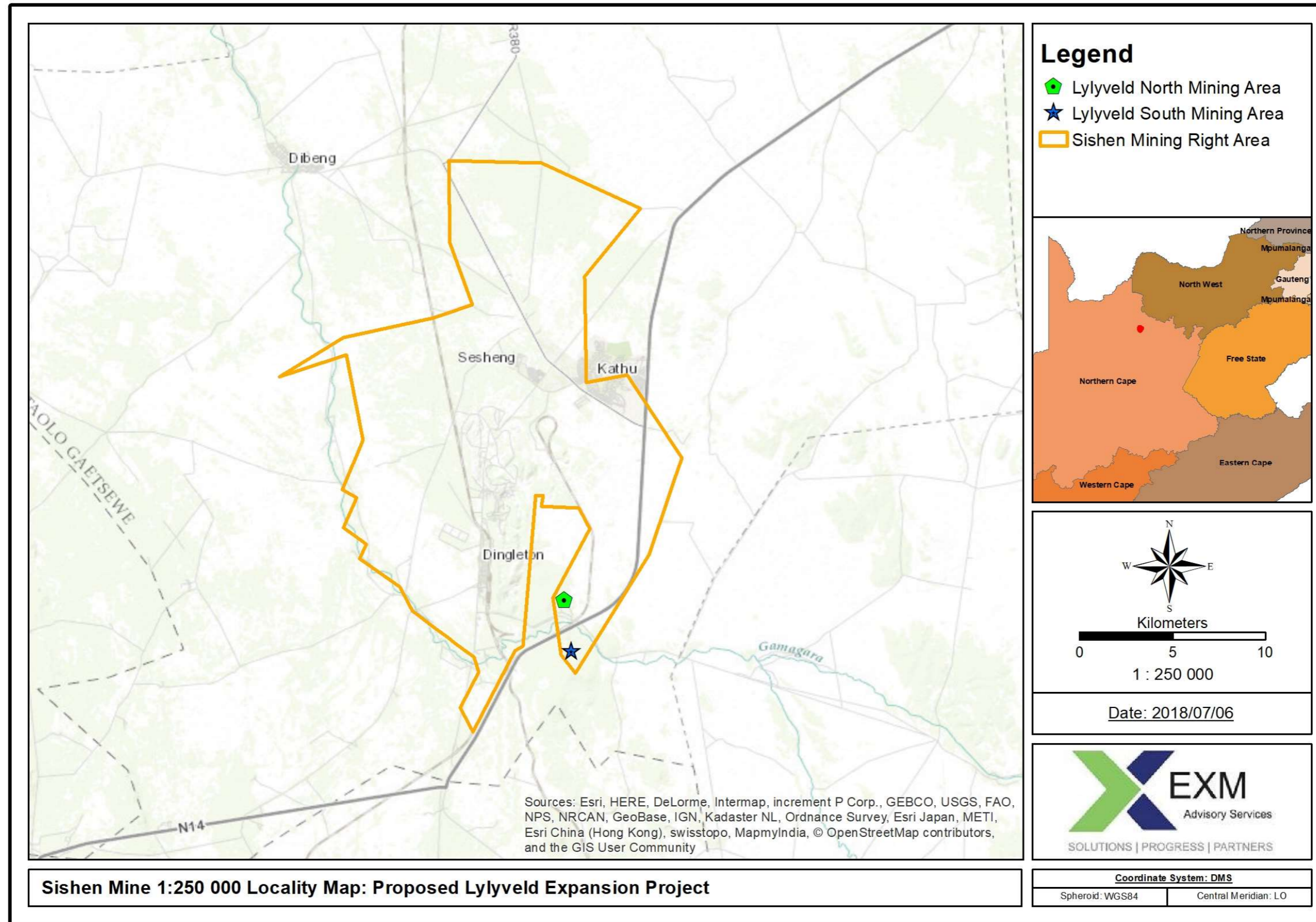


FIGURE 4-1: LOCALITY MAP OF THE LYLYVELD EXPANSION PROJECT

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

### 5.1 Listed and specified activities

<b>NAME OF ACTIVITY</b>  (E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc  E.g. for mining, - excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)	<b>Aerial extent of the Activity</b>  <b>Ha or m<sup>2</sup></b>	<b>LISTED ACTIVITY</b>  (Mark with an <b>X</b> where applicable or affected).	<b>APPLICABLE LISTING NOTICE</b>  (GNR 983, GNR 984 or GNR 985)	<b>WASTE MANAGEMENT AUTHORISATION</b>  (Indicate whether an authorisation is required in terms of the Waste Management Act).  (Mark with an <b>X</b> )	<b>APPLICABLE LISTING NOTICE</b>  (GNR 921 as amended by GN 633)
(1) Expansion of mining pit at Lylyveld North	Current ~14 ha Additional ~4 ha Revised ~18 ha	<b>X</b>	<b>GNR 984</b>  15 (site clearance)	-	-
(2) Expansion of the north eastern WRD at Lylyveld North	Current ~2.5 ha Additional ~9 ha Revised ~11.5 ha	<b>X</b>	<b>GNR 984</b>  6 (water use licence) 15 (site clearance)	<b>X</b>	<b>Category A:</b>  <b>Activity 13</b>  (expansion of a residue deposit)
(3) Expansion of eastern WRD at Lylyveld North	Current ~11 ha Additional ~12 ha Revised ~23 ha		<b>GNR 984</b>  6 (water use licence) 15 (site clearance)		
(4) Expansion of the stockpile area at Lylyveld North	Current ~4.8 ha Additional ~6.2 ha Revised ~11 ha		<b>GNR 984</b>  15 (site clearance)		
(5) Development of a new WRD at Lylyveld North	New ~16 ha	<b>X</b>	<b>GNR 984</b>  6 (water use licence) 15 (site clearance)	<b>X</b>	<b>Category B</b>  <b>Activity 7</b>  (disposal of hazardous waste to land)  <b>Activity 11</b>  (establishment of residue deposit)

<b>NAME OF ACTIVITY</b>  (E.g. For prospecting - drill site, site camp, ablation facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc  E.g. for mining, - excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablation, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)	<b>Aerial extent of the Activity</b>  <b>Ha or m<sup>2</sup></b>	<b>LISTED ACTIVITY</b>  (Mark with an <b>X</b> where applicable or affected).	<b>APPLICABLE LISTING NOTICE</b>  (GNR 983, GNR 984 or GNR 985)	<b>WASTE MANAGEMENT AUTHORISATION</b>  (Indicate whether an authorisation is required in terms of the Waste Management Act).  (Mark with an <b>X</b> )	<b>APPLICABLE LISTING NOTICE</b>  (GNR 921 as amended by GN 633)
(6) Development of new haul road at Lylyveld North	New ~1 ha	<b>X</b>	<b>GNR 983</b> 24 (new haul road)	-	-
(7) Expansion and revised location of mining pits at Lylyveld South	Current ~18 ha Revised ~38 ha	<b>X</b>	<b>GNR 984</b> 15 (site clearance)	-	-
(8) Development of a new mining pit at Lylyveld South	New ~16 ha	<b>X</b>	<b>GNR 984</b> 15 (site clearance)	-	-
(9) Expansion of WRD at Lylyveld South	Current ~34 ha Additional ~30 ha Revised ~ 64 ha	<b>X</b>	<b>GNR 984</b> 6 (water use licence) 15 (site clearance)	<b>X</b>	<b>Category A:</b> <b>Activity 13</b> (expansion of a residue deposit)
(10) Development of new WRD dump at Lylyveld South	New – 45 ha	<b>X</b>	<b>GNR 984</b> 6 (water use licence) 15 (site clearance)	<b>X</b>	<b>Category B</b> <b>Activity 7</b> (disposal of hazardous waste to land) <b>Activity 11</b> (establishment of residue deposit)
(11) Development of new stockpile area at Lylyveld South.	New ~8 ha	<b>X</b>	<b>GNR 984</b> 15 (site clearance)		



<b>NAME OF ACTIVITY</b>  (E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc  E.g. for mining, - excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)	<b>Aerial extent of the Activity</b>  <b>Ha or m<sup>2</sup></b>	<b>LISTED ACTIVITY</b>  (Mark with an <b>X</b> where applicable or affected).	<b>APPLICABLE LISTING NOTICE</b>  (GNR 983, GNR 984 or GNR 985)	<b>WASTE MANAGEMENT AUTHORISATION</b>  (Indicate whether an authorisation is required in terms of the Waste Management Act).  (Mark with an <b>X</b> )	<b>APPLICABLE LISTING NOTICE</b>  (GNR 921 as amended by GN 633)
(12) Widening and realignment of parts of the main haul road from Lylyveld from Lylyveld South to Lylyveld North and then from Lylyveld North to the Sishen processing plant area	Current ~26 ha  Additional ~7 ha	<b>X</b>	<b>GNR 983</b>  24 (new section of road)  56 (widening of road)	-	-

## 5.2 Description of activities to be undertaken

Satellite mining activities which form part of the Sishen Mine operations are currently taking place at Lylyveld North and on the farm Lylyveld 545. The activities involve a truck and shovel operation, with the material being hauled from Lylyveld South to Lylyveld North for stockpiling and then from there to the existing processing infrastructure at Sishen Mine. Currently the operations contribute approximately 1 million tonnes per annum (Mtpa) run of mine (ROM) to the Sishen Mine production. There are currently two contractors responsible for the load and haul operations, employing 132 people, operating in 2 shifts.

Sishen Mine is proposing on expanding the activities at both Lylyveld North and South to allow continued production from these operations. Current indications are that the operations will continue in line with current production rates of 1 Mtpa until 2030 and thus beyond the originally anticipated life ending in 2022. In order to facilitate the increased life of the Lylyveld operations, provision is now being made for the expansion and development of: new mining pit areas, waste rock dumps, product stockpile areas as well as haul roads.

The following expansions are proposed for Lylyveld North (see Figure 5-1):

- Expansion of the mining pit;
- Expansion of the north eastern waste rock dump (WRD);
- Expansion of the eastern WRD;

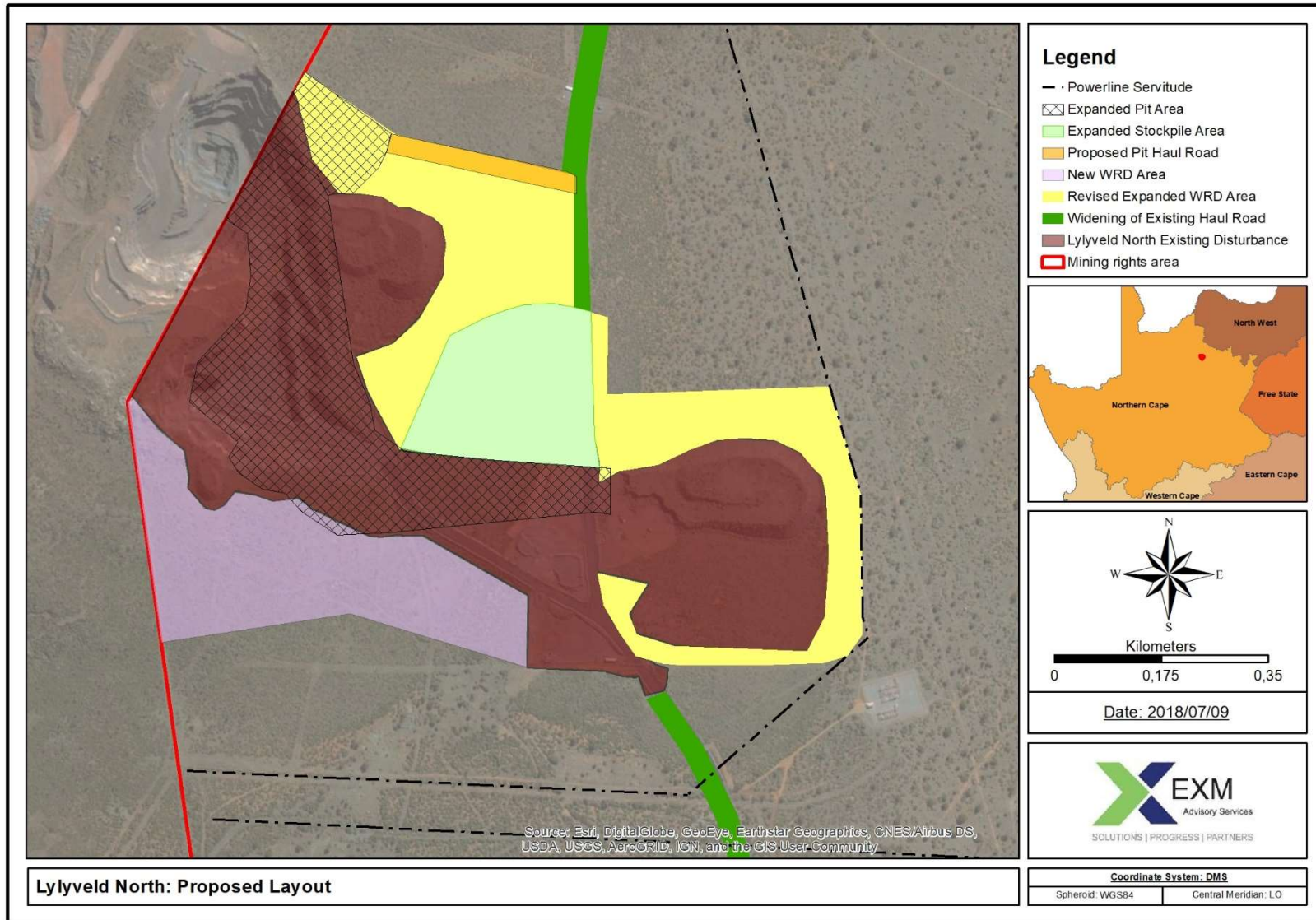
- Expansion of stockpile area;
- Development of new waste rock dump to the south; and
- Development of new haul road.

The following expansions are proposed for Lylyveld South (see Figure 5-2):

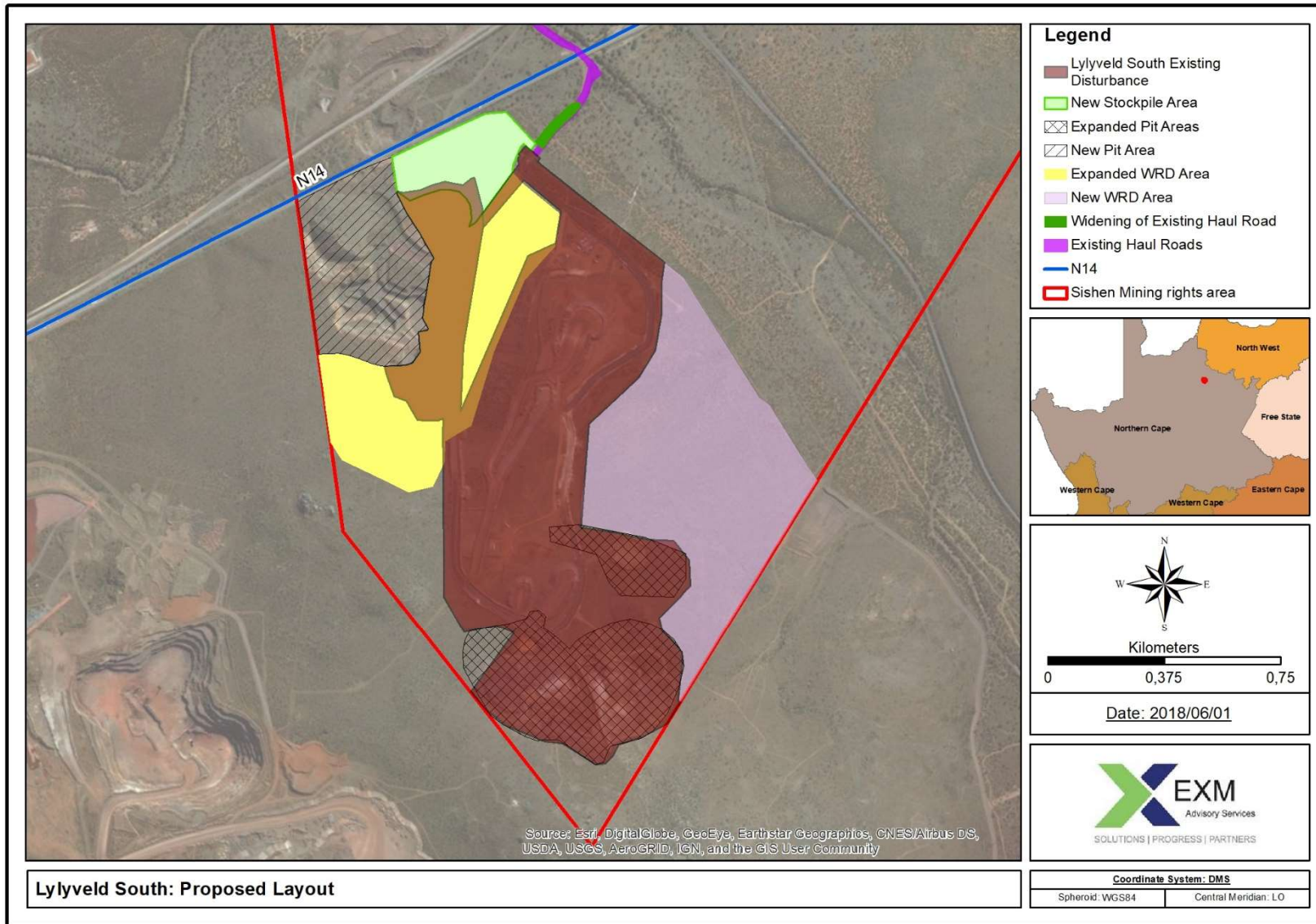
- Expansion and revision of location of the authorised mining pits at Lylyveld South
- Development of a new mining pit at Lylyveld South
- Expansion of WRD at Lylyveld South
- Development of new WRD dump at Lylyveld South
- Development of a new stockpile area at Lylyveld South.

Widening the main haul road (with the exception of the section that crosses the Gamagara River) from Lylyveld South to Lylyveld North – to 35 m is proposed. The widening excludes the section across the Gamagara River, which will remain unchanged. The haul road from Lylyveld North to the main Sishen mining area will be increased in width to 45 m. It is also proposed that the route be realigned (as indicated in Figure 5-3). The increase in width and the realignment is required to facilitate the safe movement and passing of haul trucks on the road.

.

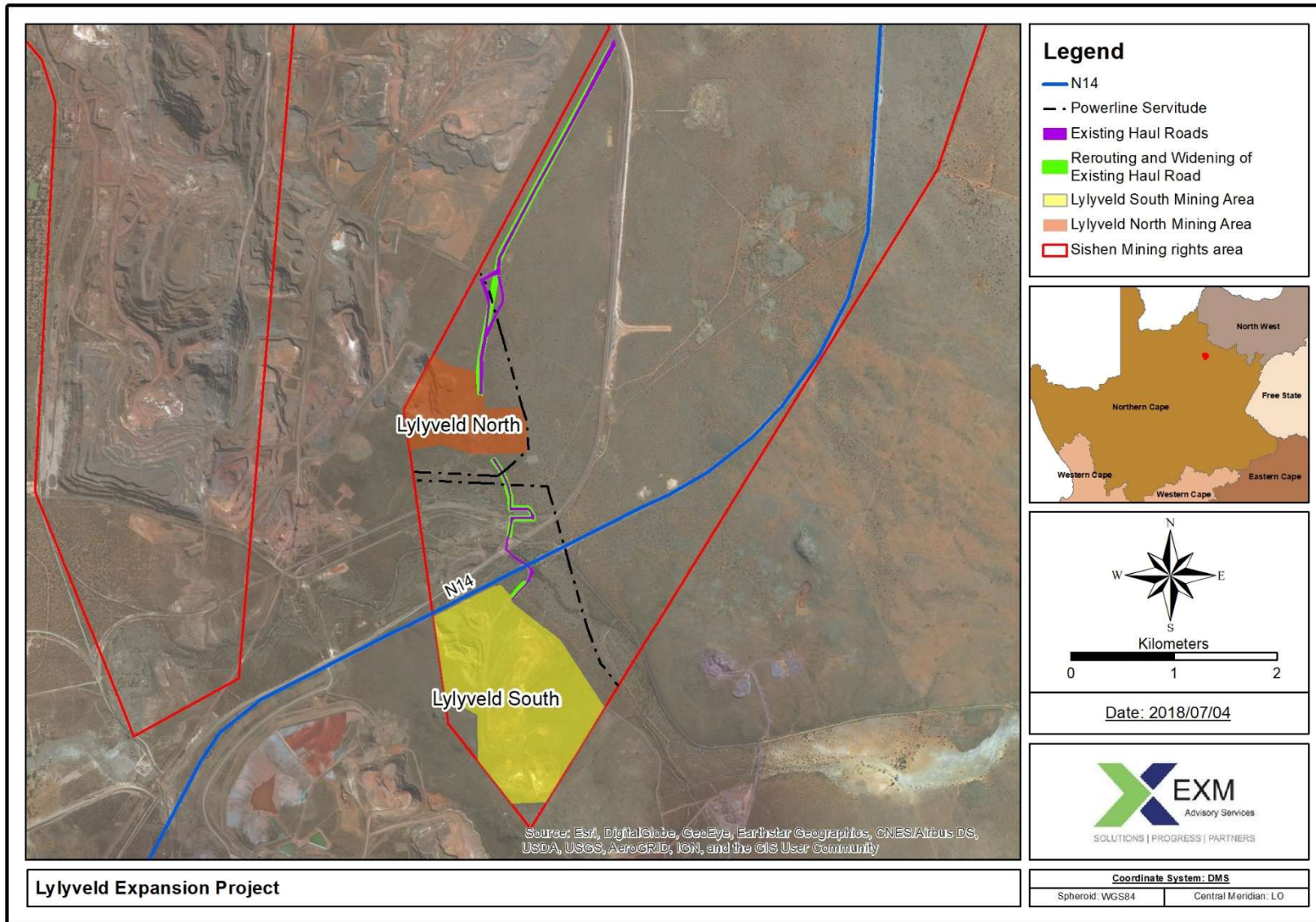


**FIGURE 5-1: PROPOSED EXPANSIONS - LYLYVELD NORTH**



**FIGURE 5-2: PROPOSED EXPANSIONS - LYLYVELD SOUTH**





**FIGURE 5-3: PROPOSED EXPANSIONS – WIDENING AND REALIGNMENT OF HAUL ROAD**

## **6. POLICY AND LEGISLATIVE CONTEXT**

This document has been prepared strictly in accordance with the DMR Report template format and was informed by the guidelines posted on the official DMR website. This is in accordance with the requirements of the MPRDA. In addition, this report complies with the requirements of the National Environmental Management Act (NEMA) (Act 107 of 1998) and the EIA Regulations (2014).

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

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

The MPRDA regulates the requirements for a mining right in order to mine a mineral and undertake associated activities. Mining can either include removal of an underground mineral or mineral occurring in a residue deposit or residue stockpile. The MPRDA requires the holder of a mining right not to cause any significant pollution or environmental degradation. The Sishen mining right is valid until 2039. The holder of a mining right is required to comply with the requirements of the approved EMPr (2002), as amended.

The Sishen Mine EMPr and its amendments are approved under Section 39 of the MPRDA, and despite the section being repealed with all future environmental authorisations being regulated under NEMA, existing authorisations remain valid and activities can be considered to be environmentally authorised.

The expansion of mining and association activities at Lylyveld are not included in the existing approved Sishen Mine EMPr or any amendment thereto. The EMPr thus requires amendment to include:

- A description of the additional activities to take place including: new and expanded pits, new and expanded WRDs, new and expanded stockpile areas, new haul roads and changes to the existing haul roads;
- A description of the baseline environment to be affected by the expanded footprint areas;
- A description of additional impacts because of the expanded activities;
- Identification of additional mitigation measures required.

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

considered to applicable.

**Application has been in terms of Section 102 of the MPRDA for the amendment of the Sishen Mine EMPr.**

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

Section 24 of NEMA provides for the Minister of Environmental Affairs to include activities in a list that require environmental authorisation before commencement. This has resulted in the promulgation of Listing Notices 1 (GN. 983), 2 (GN. 984) and 3 (GN. 985) with the Environmental Impact Assessment (EIA) Regulations (GN. 982) of December of 2014 as amended by GN. 324-327 of 7 April 2017, guiding the requirements to undertake an environmental impact assessment and apply for an environmental authorisation should a listed activity be triggered. As of 4 December 2014, activities at mining operations are also to be authorised under NEMA, with the DMR acting as the Competent Authority.

From the initial review, the activities under Listing Notice 2 (GN. 984) are triggered and thus the application for environmental authorisation requires completion of a scoping and environmental impact assessment (EIA) process in support of environmental authorisation of listed activities.

This includes:

### Listing Notice 1 (GNR. 983):

Activity 24: The development of a road...where no reserve exists where the road is wider than 8 metres; and

Activity 56: The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 km...where the existing road is wider than 8 metres.

### Listing Notice 2 (GNR. 984):

Activity 6: The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent....; and

Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation....

**Authorisation is being sought for activities applicable to the Lylyveld Expansion Project in terms of the EIA Listing Notices 1 & 2 of GNR. 983-945, as amended.**

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

In terms of Schedule 3 of NEM: WA, mining waste (residue stockpiles and deposits) are defined wastes falling under Category A – Hazardous Wastes of NEM: WA. This includes waste rock. In

terms of the amendment list of waste management activities GN. 921 of 20 November 2013 as amended by GN. 633 of 2015 the following are applicable:

#### Category A

Activity 13: The expansion of a waste management activity listed in Category A or B...which does not trigger an additional waste management activity...

#### Category B

Activity 7: The disposal of any quantity of hazardous waste to land.

Activity 11: The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right...in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).

The new and expanded waste rock dumps will require authorisation in terms of NEM: WA. Note that the application is combined with the NEMA application and supported by the same process.

**Application is made for a Waste Management Licence for the authorisation of Waste Management Activities Regulation GN. 921 as amended by GN. 633 of 24 July 2015 under NEM: WA for the disposal of waste rock.**

### **6.4 National Environmental Management Act: Air quality Act (No. 39 of 2004)**

NEMA: AQA controls and regulates atmospheric emissions and provides for Listed Activities (GN. 893, November 2010) which have or may have a significant effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage. Any activity captured under this list require the person undertaking the activity to apply for an Atmospheric Emission Licence. The project will not trigger any activities listed in the Regulation and there is therefore no need for an atmospheric emissions licence.

Sishen Mine is also required to comply with the National Dust Control Regulations (GN. 827 of 1 November 2013) and the National Ambient Air Quality Standards (NAAQS, GN 1210 of 24 December 2009). The regulations provide limits for PM<sub>10</sub> and dust fallout in residential and industrial areas.

Any changes in dust emissions resulting from the proposed Lylyveld Expansion Project will be identified as part of the EIA process and additional mitigation measures will be put in place as required.

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

Section 57 of NEM: BA restricts certain activities involving threatened and protected species (as listed in Regulation GN. 151 and 152, February 2007) without a permit. Restricted activities



applicable to the project are limited to the removal of Threatened or Protected Species (TOPS) and plants during the clearance of vegetation.

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

Section 49 and 50 of the Northern Cape Nature Conservation Act 9 of 2009 requires any person that intends to undertake a restricted activity in respect of protected plants as set out in Schedule I and Schedule II of the Act to apply for a permit from the Northern Cape Department of Environment and Nature Conservation. Restricted activities include the removal, replanting or selling of these plants. The project is a red fields development and no disturbance of plant species is required. Application will need to be made for the necessary permits prior to the commencement of site clearance in areas where protected plants are present.

### **6.7 National Water Act (No. 36 of 1998)**

Sishen Mine has an Integrated Water Use Licence (amended in 2016). The licence will need to be amended to accommodate the proposed expansions to provide for the expanded and new waste rock dumps under Section 21(g) of the Act. No additional water is required under Section 21(a) and no additional dewatering under Section 21(j) is required to accommodate the expansions to the pits. Application for amendment of the water use licence is in process.

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

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

Exemption will need to be sought in terms of Regulation 3 for activities that do not comply with GNR. 704.

### **6.8 National Heritage Resources Act (No. 25 of 1999)**

The National Heritage Resources Act controls and regulates the interaction with heritage, archaeological, and paleontological artefacts and structures. Sections 34, 35 and 36 require

that no person may demolish or alter any structure which is older than 60 years without a permit issued by the relevant provincial heritage resources agency. The NHRA further requires any person that disturbs any archaeological site, paleontological site or grave cannot do so without a permit. A Heritage Impact Assessment will be undertaken in order to identify any heritage sites within the expanded footprint area. Should any site need to be altered or destroyed, a permit will need to be obtained in terms of the NHRA.

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

The proposed Lylyveld expansion is required to extend the life of the current operations. The expansion will allow for the continuation of the current mining activities beyond the originally planned life (i.e. until 2022). Current indications are that the operations will continue in line with current production rates of approximately 1 Mtpa until 2030.

## **8. PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED**

The Sishen Mine mining right expires in 2039 and it is thus requested that the authorisation be given to coincide with the mining right to allow for the mining activities at Lylyveld.

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

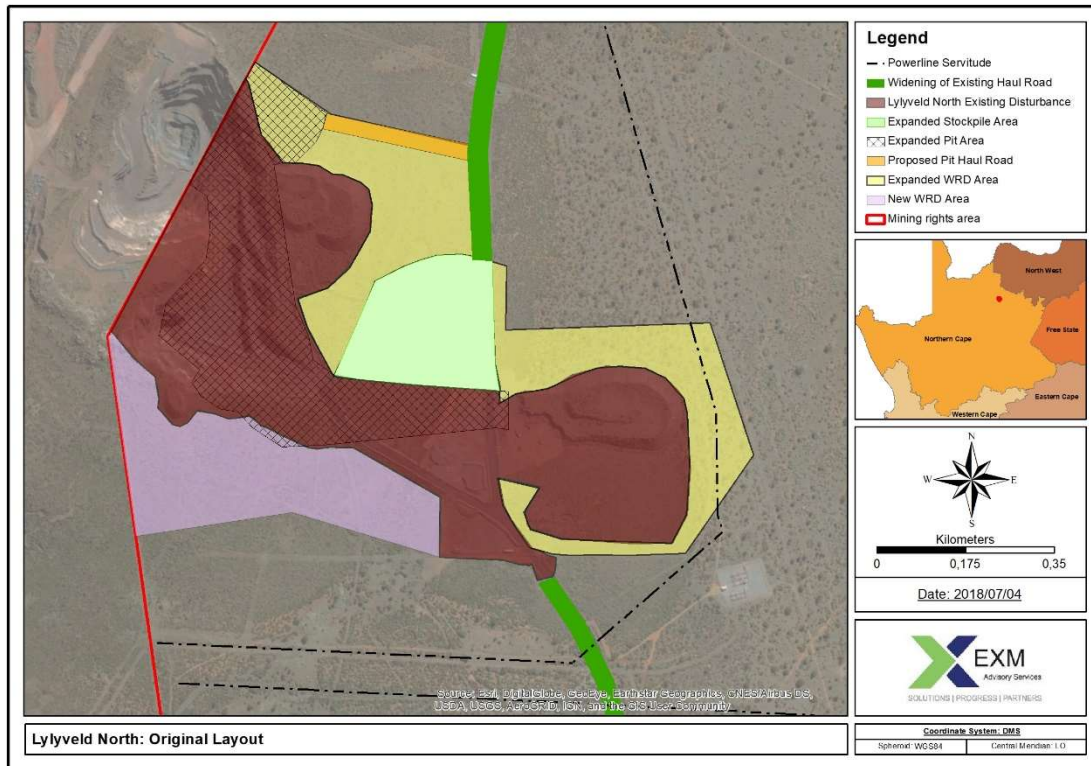
The final site layout will be determined taking into consideration (1) environmental features (2) current land uses (3); and issues raised by interested and affected parties (IAPs).

### **9.1 Site Layout Alternatives**

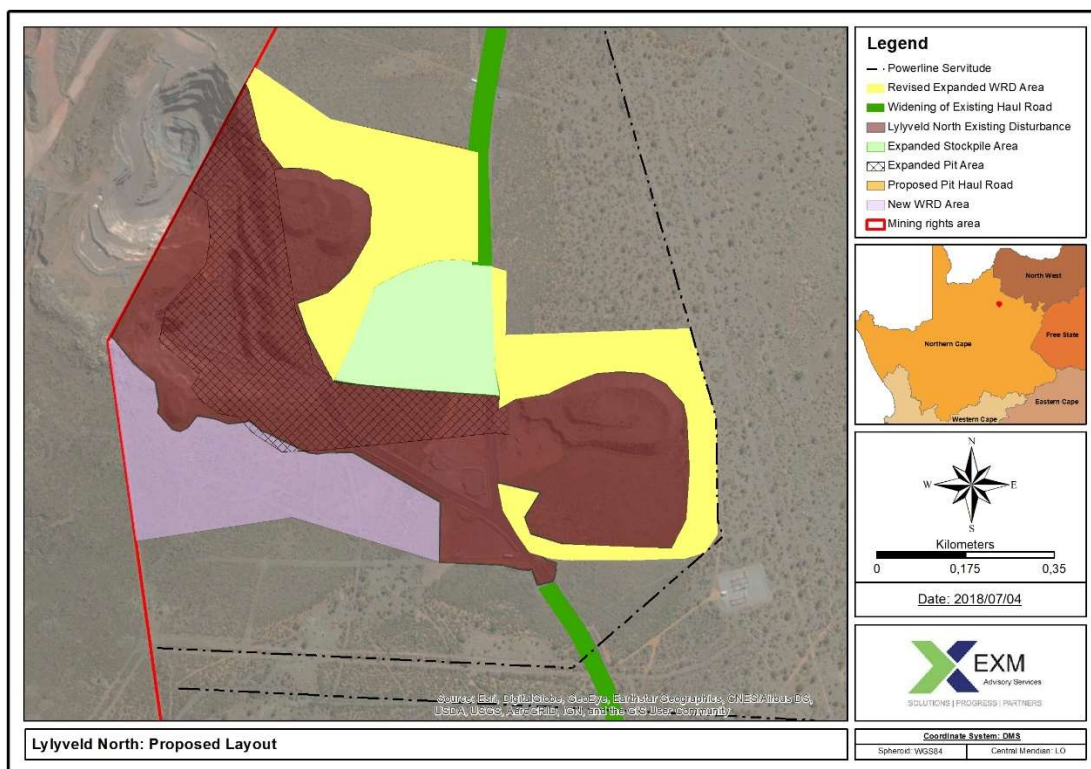
Based on the outcomes of the Scoping Study the following amendments have been made to the proposed layout.

#### **9.1.1 Lylyveld North – Expansion of Waste Rock Dumps**

It is proposed that the eastern waste rock dump will be expanded. The original proposed layout is provided in Figure 9-1. However, based on feedback provided by Eskom, the originally proposed footprint will impact on the existing power line servitude. Based on the outcomes of the issues raised by Eskom, the layout has been revised to ensure that the power line is not impacted on by the waste rock dump extension (see Figure 9-1 & 9-2). The minimum distance to the servitude will be confirmed in consultation with Eskom.



**FIGURE 9-1: ORIGINAL LAYOUT OF LYLYVELD NORTH**



**FIGURE 9-2: REVISED LAYOUT OF LYLYVELD NORTH**

## **9.2 Option of not implementing the activity**

In accordance with the NEMA Regulations, the no-go alternative is required to be investigated and assessed. The no-go alternative would mean that the life of the current satellite operations at Lylyveld will not be extended. This would mean that the additional contribution of these operations to Sishen Mine would end. In addition, the socio-economic benefits of the operations will continue to be realised. Contractors will continue to be used for the operations and thus the benefits of employment related to these contracts will continue for an extended period. However, the negative impacts of the activities will continue over the same period. Current negative impacts including those related to traffic and safety at the haul road crossing, dust and noise will take place over an extended period. Furthermore, possible additional impacts on air quality, biodiversity, surface water systems, neighbouring infrastructure, groundwater and heritage may take place. The actual social and economic benefits associated with the project as well as the biophysical impacts will be investigated as part of EIA phase of the project.

## **9.3 Details of the Public Participation Process Followed**

### **9.3.1 Identification of Interested and Affected Parties**

Existing databases held by Sishen Mine were updated for the purposes of this project. Potential Interested and Affected Parties (IAPs) were identified based on the definition of IAPs in the EIA regulations. This includes:

- Landowners or tenants adjacent to or within 100 m from the proposed study area.

Since the project occurs within the Sishen Mine fenced-off area, this definition was expanded to include neighbours to the mine.

- Any organisation of ratepayers that represent the community in the area (if applicable).
- Representatives of the local municipality/ward councillor with jurisdiction in the area.

This definition was expanded for the purposes of the assessment to include the mayor, councillors of the local council as well as members of the district municipality. This included representatives of:

- Gamagara Municipality
  - Joe Morolong Municipality
  - Ga Segonyana Municipality
  - John Taolo Gaestsewe District Municipality
- Authority or organs of state having jurisdiction in respect of any aspect of the activity, including. The following organs of state have been notified:

- Department of Water and Sanitation (Northern Cape)
  - Department of Agriculture, Forestry and Fisheries (Northern Cape)
  - Department of Mineral Resources (Northern Cape)
  - Department of Environment and Nature Conservation (Northern Cape)
  - Department of Land Reform and Rural Development (Northern Cape)
  - Department of Economic Development and Tourism (Northern Cape)
  - Department of Roads and Public Works (Northern Cape)
  - Department of Social Development (Northern Cape)
  - South African Heritage Resources Agency
- Persons who responded to the Background Information Document (BID), press advertisements and site posters
  - Persons who attended the public meeting during the scoping phase

A list of all parties that have been identified thus far is included as Appendix B1

Note that the IAP database will continue to be updated as IAPs become apparent throughout the scoping and EIA phases.

### **9.3.2 Notifications**

In accordance with Section 41(2)(b) of Chapter 6 of the EIA Regulations (GN. 982 of 4 December 2014, as amended), written notification (including BID document by email or facsimile) has been given to all persons on the IAP database.

Proof of the notification is provided in Appendix B2.

Persons on the IAP database were notified of the project and invited to the public information-sharing meeting by:

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

### **9.3.3 Media advertisements and Site Notices**

Press advertisements were placed in the following newspapers:

- The Volksblad on 21 June 2017 in Afrikaans; and
- The Kalahari Bulletin on 21 June 2017 in English.

The advertisements included an invitation to the public information-sharing meeting.

Site notices (A2 size) were placed (one in English and one in Afrikaans) at the entrance to Sishen Mine and at the entrance to Lylyveld South.

Notices were also placed at strategic public locations in Kathu including Food Zone, Pick 'n Pay and Spar.

Proof of placement of advertisements and site notices is included in Appendix B3.

#### **9.3.4 Public meetings**

A public information-sharing meeting was held at Kathu Country Club on Wednesday 27 June 2018. The minutes of the meetings and authority meetings are included in Appendix B4.

#### **9.3.5 Public and authority review of draft scoping report**

This draft scoping report will be made available for review from 13 July – 13 August 2018 (30 calendar days) in accordance with Section 40 (3) of the 2014 EIA regulations.

## 9.4 Summary of issues raised by IAPs

Please refer to Appendix B4, for the full comments in minutes and correspondence with IAPs and authorities. Correspondence received to date is included in Appendix B5.

DATE	NAME	CORRESPONDENCE RECEIVED	EAPs RESPONSE TO ISSUES AS MANDATED BY THE APPLICANT	CONSULTATION STATUS (consensus, dispute, not finalised, etc.)
<b>AFFECTED PARTIES</b>				
<b>Landowners/Lawful Occupiers of Adjacent Properties</b>				
22/06/2018	Phillip Coetzee	Our office reference LS.BFX.25/3/34 refers: Due to figure 1 on the application, the newly deviated right of way will directly be affected by the proposed expansion as it crosses the railway lines (KH0993). If you need more information, we will need co-ordinates of the proposed site to enable us to provide a discussion or locality plan to reflect the physical encumbrance area. Thanking you	Transnet will continue to be consulted as part of the EIA process. Sishen will need to comply with the legal requirements with respect to the mining requirements next to infrastructure	Ongoing
22/06/2018	Marina Lourens	Good day Hannah We received this notification but received some questions as below: It is not clear on the plan exactly how close both expansions (metre) will be to our railway line? Will the product be transported over our railway line? Will the vehicles have to make use of our service road? Will there be any effect of de-watering and possible sinkholes? Thanks Marina	The proposed new pit at Lylyveld South will be located within ~150 m of the railway line. Transnet will continue to be consulted with respect to impacts on infrastructure. There is no current indication that the vehicles will make us use of the service road. No additional dewatering is required for the expansion of the activities.	Ongoing
27/06/2018 (Public Meeting)*	Jurgens Becker	Jurgens Becker was questioned as to whether the operation would run for 24-hours a day.	Siko Solofelang indicated that it would continue as current, which is a double-shift operation.	Finalised
27/06/2018 (Public Meeting)*	Jaap Hoffman	Jaap Hoffman questioned if there would be more dust as a result of the expansion	Kerry Fairley indicated that since the dumps were expanding, the dust levels could increase. Traffic levels are likely to remain the same, thus the source of dust from traffic would remain the same.	Not Finalised To be investigated as part of the EIA.

DATE	NAME	CORRESPONDENCE RECEIVED	EAPs RESPONSE TO ISSUES AS MANDATED BY THE APPLICANT	CONSULTATION STATUS (consensus, dispute, not finalised, etc.)
27/06/2018 (Public Meeting)*	Jaap Hoffman & Alfred Markram	Jaap Hoffman indicated that the haul road crossing from Lylyveld South to North presents a safety risk to users on the road. The dust along the road is a problem which affects visibility for persons using the road. In addition, the haul trucks crossing causes delays to be people using the road. The issue of dust and safety at the haul road crossing was seconded by Jurgens Becker and Alfred Markram		
27/06/2018 (Public Meeting)*	Jaap Hoffman	JH questioned if the road to Dingleton will remain a public road once persons have been relocated from Dingleton	Siko Solofelang indicated that it is a public road and the mine has no intention of closing the road.	Finalised
27/06/2018 (Public Meeting)*	Attendees at Public Meeting	Concern was raised with respect to mining within close proximity to the N14.	SANRAL will be consulted as part of the EIA process. Sishen will need to comply with the legal requirements with respect to the mining requirements next to infrastructure	Ongoing
23 July 2018	Annelize Harmse	<i>Please see a copy of the full letter received from Transnet in Appendix B5.1(a). In Summary, Transnet raised concerns regarding mining on its properties in terms of Section 28 (1) of the MPRDA, 2002 stating that they do not "grant permission or consent to any prospecting or mining activities on its properties." They also raised concerns regarding mining within 100 m of a railway, in terms of Regulation 17 (6) (a) of the Mine Health and Safety Act, 1996.</i>	<i>Please see a copy of the full response to Transnet in Appendix B5.1(b). In summary, it was confirmed that no mining activities are proposed to take place on any of Transnet's properties, nor within 100 m of its railway line. Further, the widening of the haul road where it crosses the railway line, will not commence before the necessary permissions are obtained.</i>	Finalised
<b>Local Authorities</b>				
17/07/2018	Philani Msimango	<p>Good Day Kerry</p> <p>I trust that you are well. The above-mentioned project makes reference. I have received the above-mentioned scoping report today for comment. My questions are as follows:</p> <ul style="list-style-type: none"> <li>• [1] Is this project the same as the one included in the consolidated water use licence application?</li> <li>• [2] Do you need separate comments for this or can this be addressed as part of the existing application? I would like to include as part of the documentation submitted as part of the authorisation so that any outstanding issues that need to be addressed, can be addressed during the WULA assessment process.</li> </ul> <p>Your response and assistance will be highly appreciated.</p>	<p>Hi Philani</p> <p>Thanks for your email. See responses below.</p> <ol style="list-style-type: none"> <li>1) Yes, it is.</li> <li>2) That is 100%. Note that this is however the draft version of the report which is out for public and authority comment. We will note your response as such in the report submitted to the DMR. <p>Kind regards Kerry Fairley</p> </li></ol>	Finalised



DATE	NAME	CORRESPONDENCE RECEIVED	EAPs RESPONSE TO ISSUES AS MANDATED BY THE APPLICANT	CONSULTATION STATUS (consensus, dispute, not finalised, etc.)
		Regards Mr. Philani P. Msimango		
<b>Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA etc.)</b> No comments received yet.				
<b>Traditional Leaders</b> No comments received yet.				
<b>Competent Authorities affected</b> No comments received yet.				
<b>INTERESTED PARTIES</b> No comments received yet				

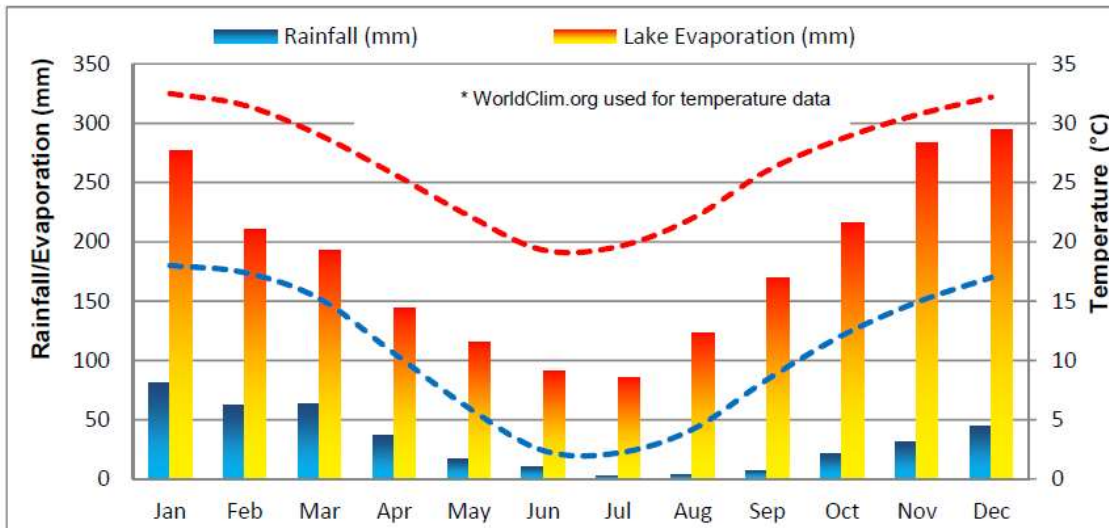
## 9.5 The environmental attributes associated with the sites

### 9.5.1 Baseline environment

#### 9.5.1.1 Type of environment affected by the proposed project

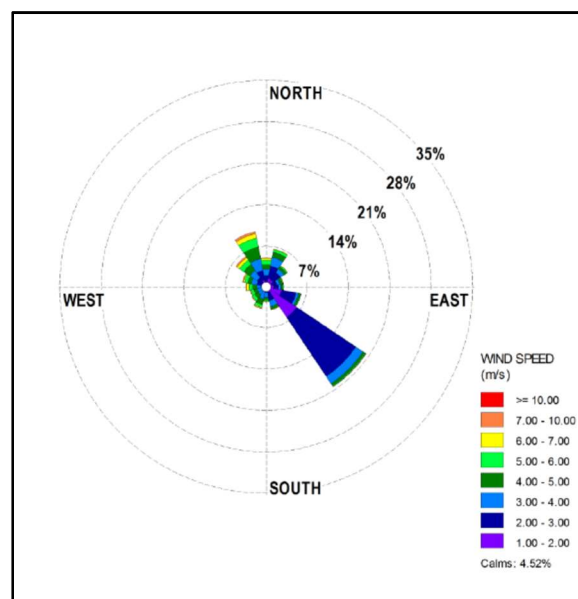
#### Climate

Figure 9-3 illustrates the significant difference between the evaporation and rainfall, which is the cause of the semi-arid landscape associated with the site and surrounds.



**FIGURE 9-3: AVERAGE MONTHLY CLIMATE FOR SISHEN MINE (DESIGN POINT, 2017)**

The regional wind direction and speeds are of importance as they provide an indication of the receptors areas that will experience the greatest impacts resulting from atmospheric emissions and dust. The wind rose for the period of July 2015 to June 2016 (as provided by Airshed, January 2018) is provided in Figure 9-4. The wind field is dominated by winds from the north-west and south east with calm conditions occurring only 5% of the time.



Source: Air Quality Impact Assessment (Airshed, January 2018)

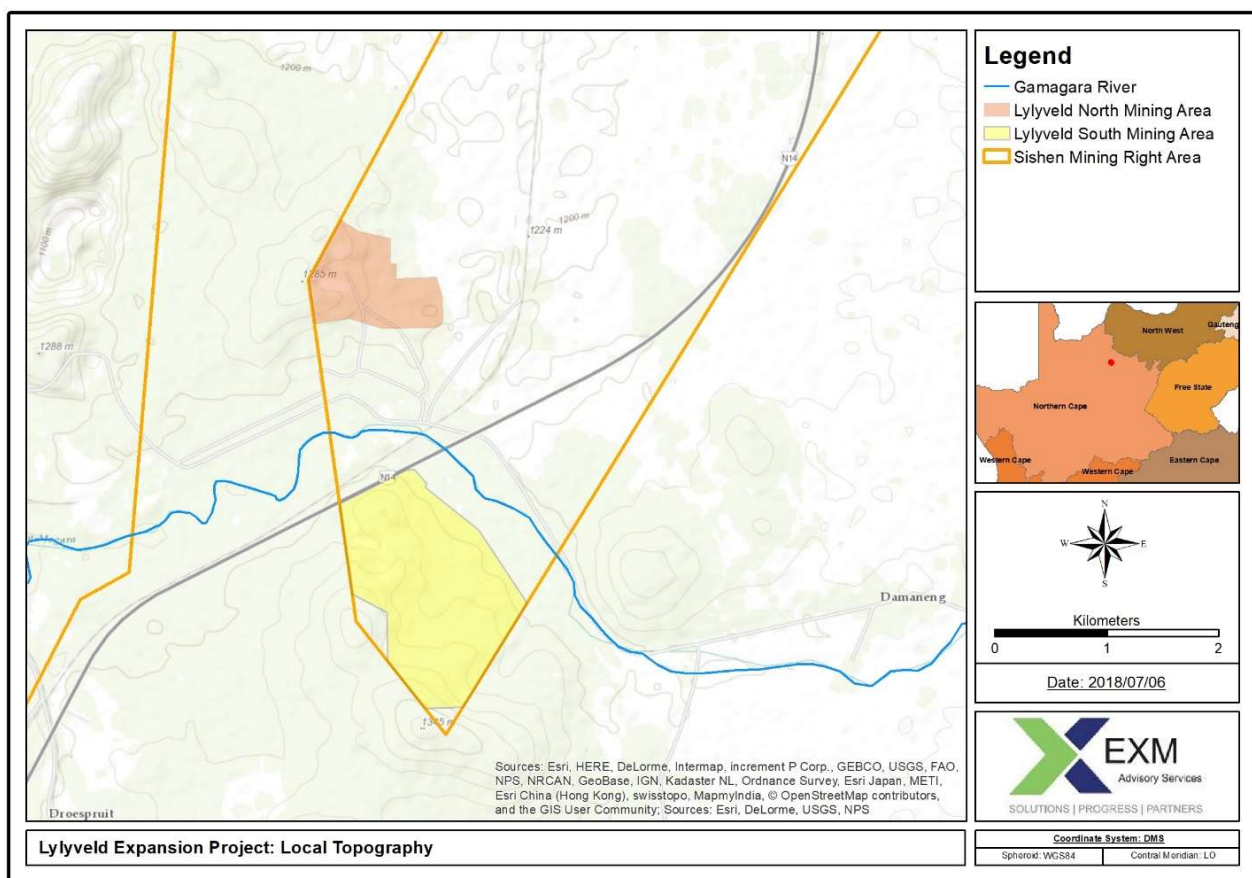
**FIGURE 9-4: PERIOD AVERAGE WIND ROSE FOR SISHEN MINE JULY 2015 TO JUNE 2016**

## Topography

The Lylyveld mining areas are located amongst the hills located to the south east of the main Sishen Mine area (see Figure 9-5). Mining at Lylyveld North takes place on the eastern slopes of a small hill (height 1 280 mamsl) with the waste rock dumps and stockpile areas located on the flat areas to the east (1 225 mamsl).

Lylyveld South is located between of a series of small hills (1 257 mamsl) to the west and the Gamagara River (1 208 mamsl) to the east. The top of the closest hill has been historically mined and is included in the proposed mining included in this application.

The N14 and the Sishen Saldanha Iron Ore Export Rail Line run between the hills and the two mining areas along the Gamagara flood plain area.



**FIGURE 9-5: LOCAL TOPOGRAPHY**

## Air Quality

It is expected that the air quality impacts resulting from activities at Lylyveld will be most significant to the north-west and the south-east of the operations. See Figure 9-6 for the location of receptors and monitoring stations.

The monitored ambient PM<sub>10</sub> and PM<sub>2.5</sub> and collected dust fallout data are screened against the NAAQS (based on international best practice PM<sub>10</sub> and PM<sub>2.5</sub>) and the National Dust Control Regulations (GN. 827 of 1 November 2013), respectively. The ambient measurements account for all emission contributions in the region, not just the mine. The results of the 2016 PM<sub>10</sub> and PM<sub>2.5</sub> monitoring are shown in Table 9-1 and Table 9-2, respectively. The PM<sub>10</sub> concentrations at Dingleton and Sesheng are not in compliance with the NAAQS. The ambient air quality also does not meet the Anglo internal air quality target as it contributes more than 70% of the EC Limit Value (28 µg/m<sup>3</sup> for annual and 35 µg/m<sup>3</sup> for daily). The PM<sub>2.5</sub> concentrations at all three receptors (Dingleton, Sesheng, and Kathu) are, however, in compliance with NAAQS.

**TABLE 9-1: SUMMARY OF PM10 CONCENTRATIONS FOR THE SISHEN MINE FOR 2016 (BASED ON SCREENED DAILY DATA RECEIVED FROM SISHEN)**

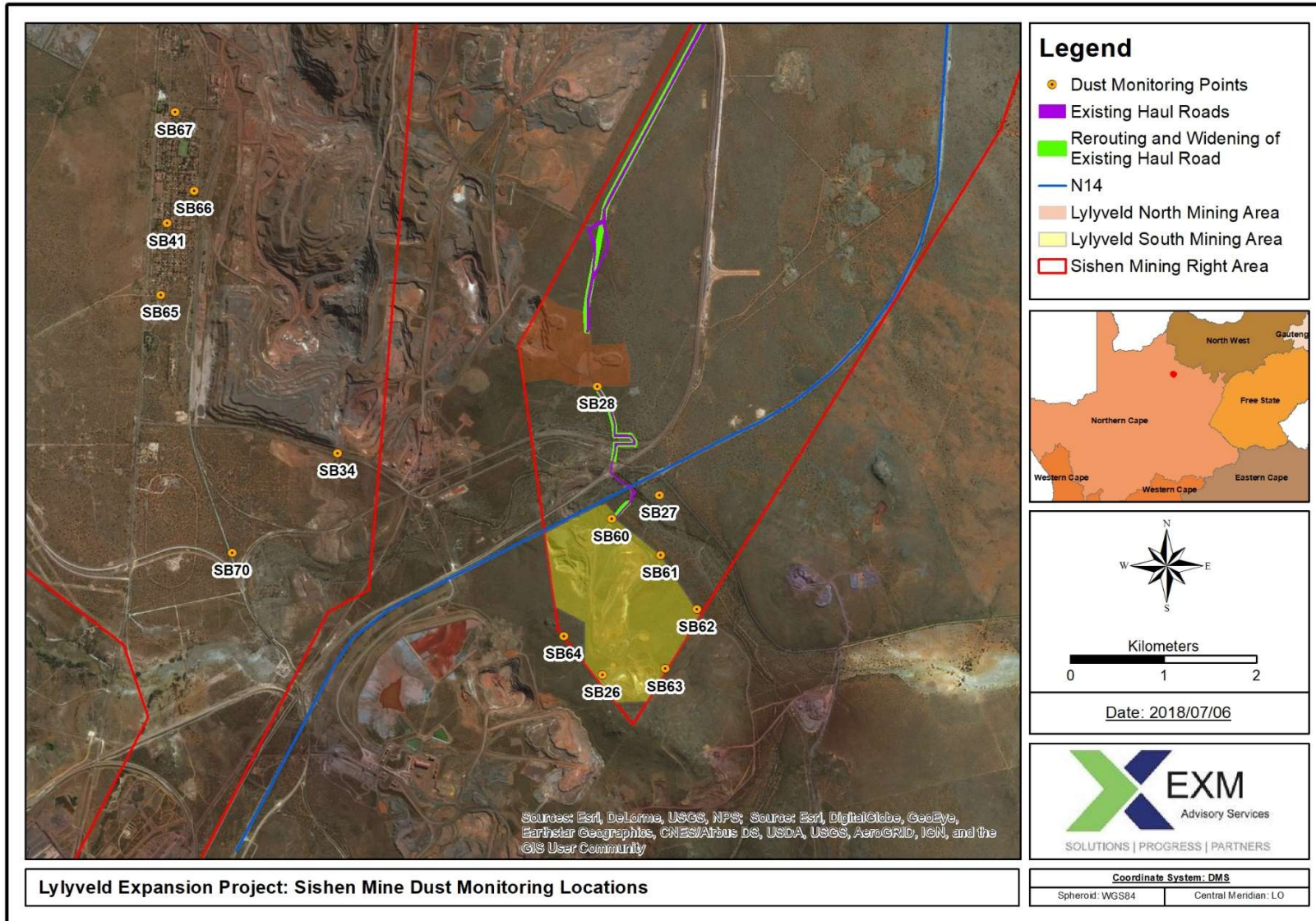
Receptor	Annual Average Conc. (µg/m <sup>3</sup> )	Days of Exceedance of 75 µg/m <sup>3</sup>	Days of Exceedance of 35 µg/m <sup>3</sup>	Data availability (%)
Dingleton	39	30	131	78
Sesheng	47	35	227	90
Kathu	28	2	87	84
<b>NAAQS (Daily and annual)</b>	<b>40</b>	<b>4</b>	<b>35 (EC)</b>	

Source: Air Quality Impact Assessment (Airshed, January 2018)

**TABLE 9-2: SUMMARY OF PM2.5 CONCENTRATIONS FOR THE SISHEN MINE FOR 2016 (BASED ON SCREENED DAILY DATA RECEIVED FROM SISHEN)**

Receptor	Annual Average Conc. (µg/m <sup>3</sup> )	Days of Exceedance of 40 µg/m <sup>3</sup>	Data availability (%)
Dingleton	8.3	0	67
Sesheng	13.4	1	86
Kathu	7.9	1	78
<b>NAAQS (Daily and annual)</b>	<b>20</b>	<b>4</b>	

Source: Air Quality Impact Assessment (Airshed, January 2018)



**FIGURE 9-6: LOCATION OF DUST MONITORING STATIONS AND KEY RECEPTORS AT SISHEN MINE**



Dust fall also shows non-compliance with the national dust fallout limits. Non-compliances with the National Dust Control Regulations during the 2015 - 2016 monitoring campaign are given in Table 9-3. The national dust fall limit for residential areas is 600 mg/m<sup>2</sup>/day, and for non-residential areas is 1 200 mg/m<sup>2</sup>/day (Airshed, January 2018). Site classification according to residential or non-residential was done by Gondwana who also manage the dust fallout network (Gondwana Environmental Solutions, 2016; Airshed, 2018).

**TABLE 9-3: SUMMARY OF MONTHS DURING WHICH DUSTFALL EXCEED ACCEPTABLE LEVELS AS SPECIFIED IN THE NATIONAL DUST CONTROL REGULATIONS (JULY 2015-JUNE 2016)**

<b>Residential Areas (limit = 600 mg/m<sup>2</sup>/day)</b>	<b>Months of Non-Compliance</b>
SB14 – Kathu	October 2015
SB16 – Sesheng	October 2015
SB31 - Tannic Kale Farm	October and December 2015
<b>SB36 – Frum Sub Station</b>	<b>September, October and November 2015<sup>1</sup></b>
SB39 – Voëltjiekklub	October 2015
SB41 – Dingleton	October and December 2015
SB71 – New Dingleton PPK Church	February 2016
<b>Non-residential Areas (limit = 1 200 mg/m<sup>2</sup>/day)</b>	<b>Months of Non-Compliance</b>
SB15 – Wincanton	October 2015 and January 2016
<b>SB27 – Demaneng</b>	<b>October 2015, January and March 2016<sup>1</sup></b>
SB28 – Lylyveld North	October 2015 and January 2016
SB29 – Tamaga	October 2015
SB30 – Fritz	October 2015
SB34 – Vliegveld	October 2015
SB44 – Pipeline manhole	October 2015
<b>SB45 – Pipeline T-joints</b>	<b>September and October 2015<sup>1</sup></b>

<sup>1</sup>Non-compliance with the NDCR permitted frequency of 2 exceedances per year, not in sequential months

Source: Air Quality Impact Assessment (Airshed, January 2018)

Of importance to the Lylyveld Expansion Project is the fact that the dust levels at Demaneng (SB27) have already been found to exceed the requirements of the dust regulations.

## Noise

A noise survey was conducted by dBAcoustics during the winter (14 & 15 August) and summer (22 & 23 November) of 2017. The Environmental Health and Safety Guidelines for Noise are given in Table 9-4.

**TABLE 9-4: ENVIRONMENTAL HEALTH AND SAFETY GUIDELINES FOR NOISE**

Receptor	Either		Or
	Period		Where baseline exceeds IFC guideline
	Daytime (07h00 - 22h00)	Night time (22h00 – 7h00)	
Residential, institutional and educational	55.0dBA	45.0dBA	3dB increase over baseline
Industrial and commercial	70.0dBA	70.0dBA	

Source: Noise Impact Assessment (dBAcoustics, February 2018)

Noise sources in the area include: heavy vehicle hauling noise, traffic noise, industrial noise including mining activities and conveyors. Insects, birds and wind also contribute to ambient noise levels. Reverse signals, hooting of trains and blasting are clearly audible in the area surrounding the mine.

The noise levels at the different locations recorded by dBAcoustics are given for the winter and summer periods in Table 9-5 and Table 9-6, respectively.

**TABLE 9-5: ARITHMETIC PREVAILING NOISE LEVELS DURING THE WINTER**

Location	Prevailing ambient noise levels in dBA	
	Prevailing ambient noise level - day	Prevailing ambient noise level - night
Sheseng	41.9	32.6
Western side of Kathu	47.1	37.7
Eastern side of Sishen mine	39.5	34.4
Kathu Agricultural Holdings	38.2	28.3
Dingleton	44.1	43.9
Farms to the west of Sishen mine	31.7	30.3

Source: Noise Impact Assessment (dBAcoustics, 2018)

**TABLE 9-6: ARITHMETIC PREVAILING NOISE LEVELS DURING THE SUMMER**

Location	Prevailing ambient noise levels in dBA	
	Prevailing ambient noise level - day	Prevailing ambient noise level - night
Sheseng	44.0	37.8
Western side of Kathu	47.3	39.6
Eastern side of Sishen Mine	40.4	37.8
Kathu Agricultural Holdings	37.0	35.1
Dingleton	47.3	47.3
Farms to the west of Sishen Mine	36.9	31.1

Source: Noise Impact Assessment (dBAcoustics, 2018)

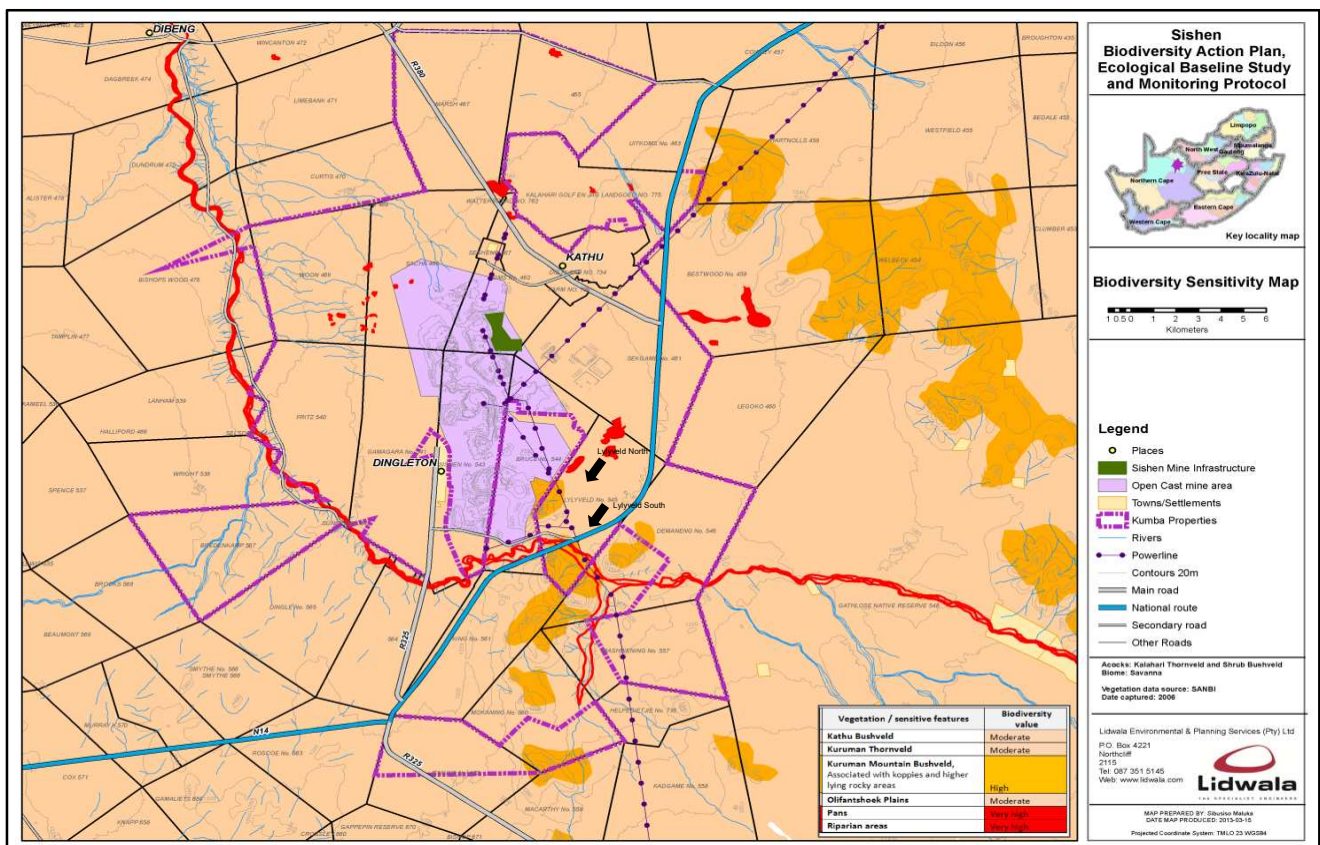
The noise levels at Sishen Mine are considered to be normal and in line with the recommended noise levels as prescribed in SANS 10103 of 2008, as well as international best practice (described

by the IFC).

## Biodiversity

The dominant vegetation types in the Lylyveld Expansion Project are Kuruman Mountain Bushveld and Kuruman Thornveld (Mucina & Rutherford, 2012). Kuruman Mountain Bushveld is prevalent on the hills at Lylyveld South, while Kuruman Thornveld occurs along the Gamagara River and also at Lylyveld North (see Figure 9-7).

According to Lidwala (2013) the Kuruman Mountain Bushveld has high conservation value, but at Lylyveld it is largely degraded due to previous land use and mining activities (STS, November 2017). The Kuruman Bushveld is regarded as being of moderate value, although the Gamagara River which is located between the Lylyveld North and Lylyveld South mining areas has very high sensitivity (Lidwala, 2013) as the system supports large numbers of the species including the protected tree *Vachellia erioloba* (Camelthorn) and also provide corridors for animal movement (Anderson, May 2010). The protected tree, *V. erioloba* is prevalent at both Lylyveld North and South.



Source: Biodiversity Action Plan (Lidwala, 2013)

**FIGURE 9-7: SISHEN MINE BIODIVERSITY SENSITIVITY MAP (2013)**

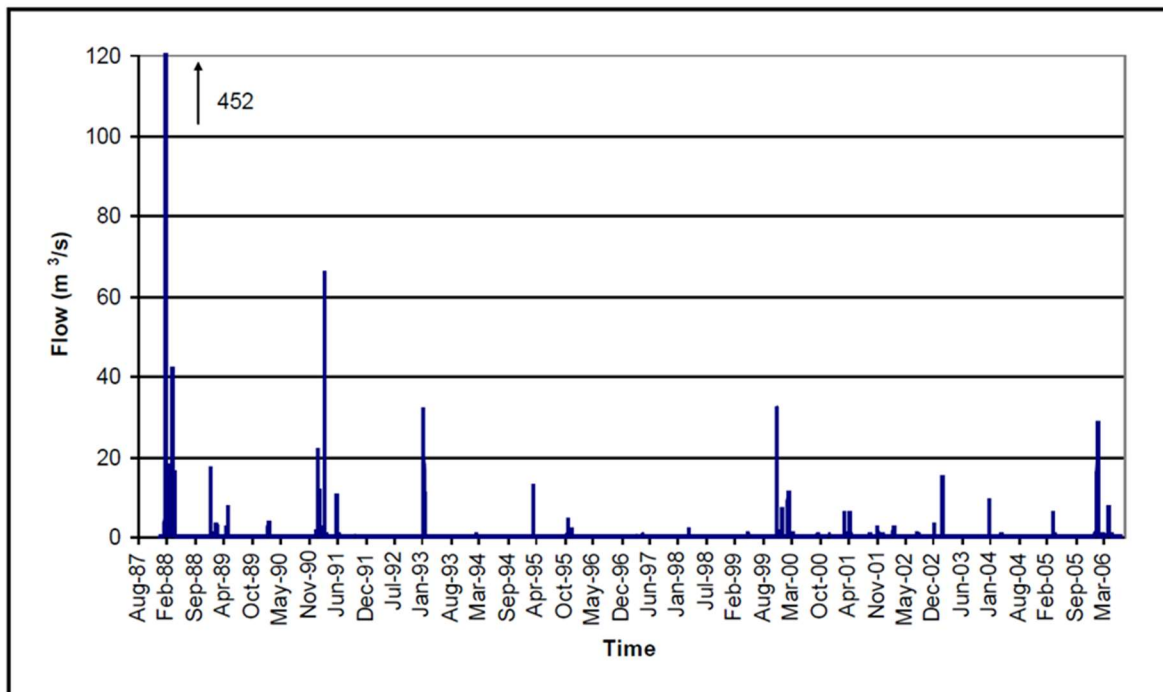
## Surface Water Resources

Sishen Mine is located within the Lower Vaal Water Management Area (WMA), in the D41J Quaternary Catchment drained by the endorheic Gamagara River. The regional drainage



pattern of the area is primarily in the direction of the endorheic Gamagara River (see Figure 9-9). The Gamagara River flows between Lylyveld South and Lylyveld North with the haul road linking the 2 sections crosses the river below the N14 and the Transnet Iron Export line. Lylyveld North and South lie approximately 900 m north and 300 m south of the river flood plain, respectively. There are no known wetlands or pans within the current or proposed footprint areas at Lylyveld North and Lylyveld South. There is an existing haul road to Sishen Mine which passes a large wetland area to the east. The wetland areas are shown in Figure 9-9.

The Gamagara River is dry for approximately 97% of the time, but strong flows do occur during heavy downpours and after successive storm events. These flows last at most a few days before the water disappears into the river bed along the length of the river. The Gamagara River channel is capable of carrying both the 100-year and 50-year floods, without significant flooding. The 1:100-year flood line is indicated in Figure 9-8 (Shangoni, 2017)

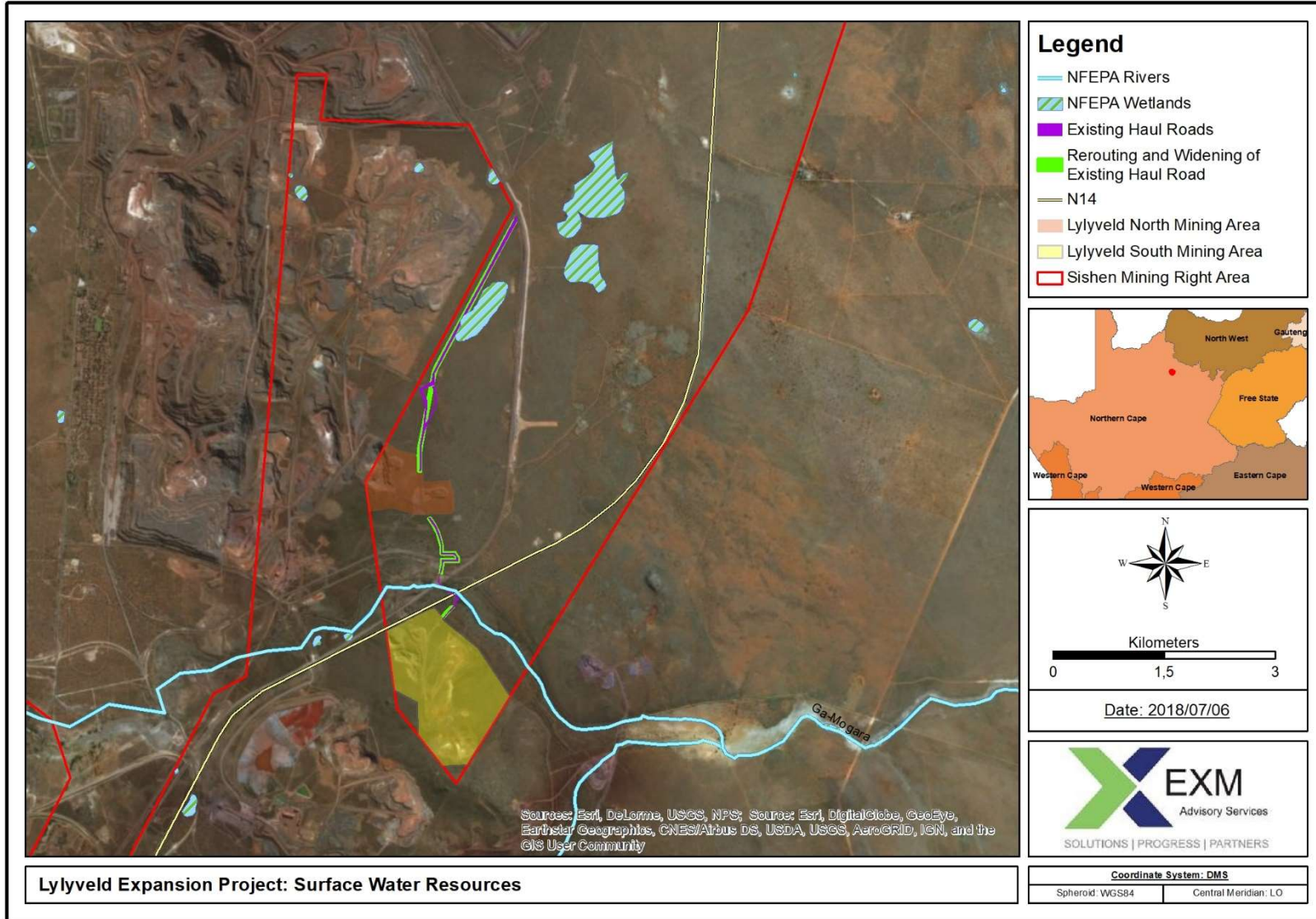


**FIGURE 9-8: GAMAGARA RIVER FLOW MODELLED: 1988 -2006 (SHANGONI, 2017)**

The current activities at Lylyveld South are located outside the 100-year and 50-year flood lines. Sishen Mine currently monitors surface water qualities at ten locations within the Gamagara River. The water profile of the Gamagara is difficult to determine as surface water only occurs after heavy rainfall events.

**Surface Water Quality**

There is limited information available on the surface water quality of the Gamagara River. The majority of the year the Gamagara River has no surface water, however after heavy rainfall events the water qualities have indicated neutral, non-saline and moderately soft to slightly hard. (Shangoni, 2017).

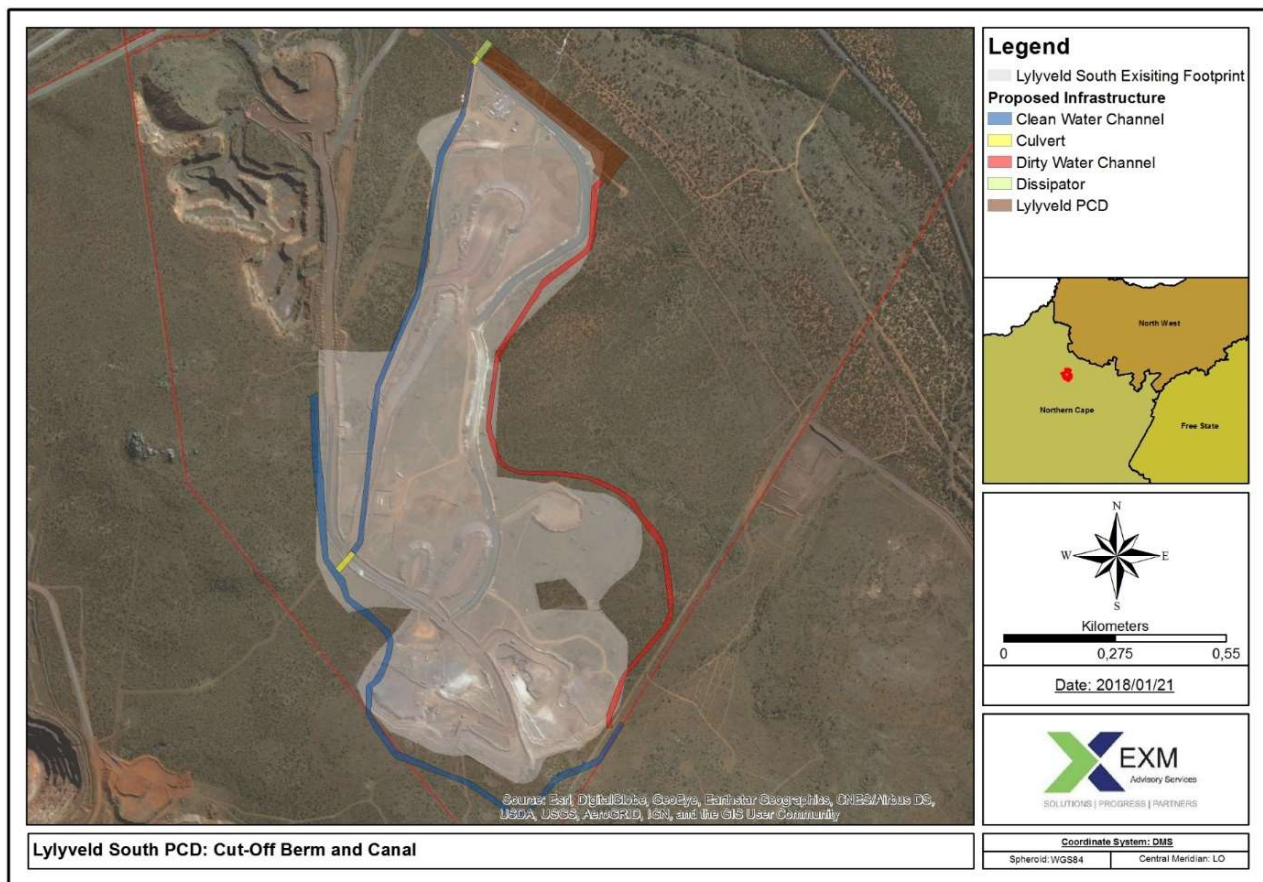


**FIGURE 9-9: SURFACE WATER RESOURCES IN THE VICINITY OF SISHEN MINE**

## Stormwater Management

In accordance with GNR. 704 (June 1999), clean and dirty water areas are to be defined. Clean water is to be prevented from entering any dirty water area and dirty water run-off or seepage is to be contained and prevented from entering into the natural environment.

Sishen is in the process of applying for environmental authorisation and water use licensing of stormwater infrastructure at Lylyveld South. This includes a clean stormwater cut-off system and pollution control (see Figure 9-10). The proposed expansions have not been provided for in the planned infrastructure.



**FIGURE 9-10: PROPOSED CUT-OFF BERM AND CANAL AT LYLYVELD SOUTH MINING AREA (AUTHORISATION PENDING)**

There are currently no formal diversion berms, stormwater canals or pollution control dams at Lylyveld North.

## Groundwater

The information on the groundwater environment has been sourced from the Sishen Integrated Water and Waste Management Plan (IWWMP, Shangoni 2017). The structural geology of the region has an important influence on groundwater flow. The fault zones form preferential flow zones and the dykes form impermeable or semi-permeable boundaries. The area surrounding Sishen Mine has been divided into several compartments separated by dykes (see Figure 9-11).

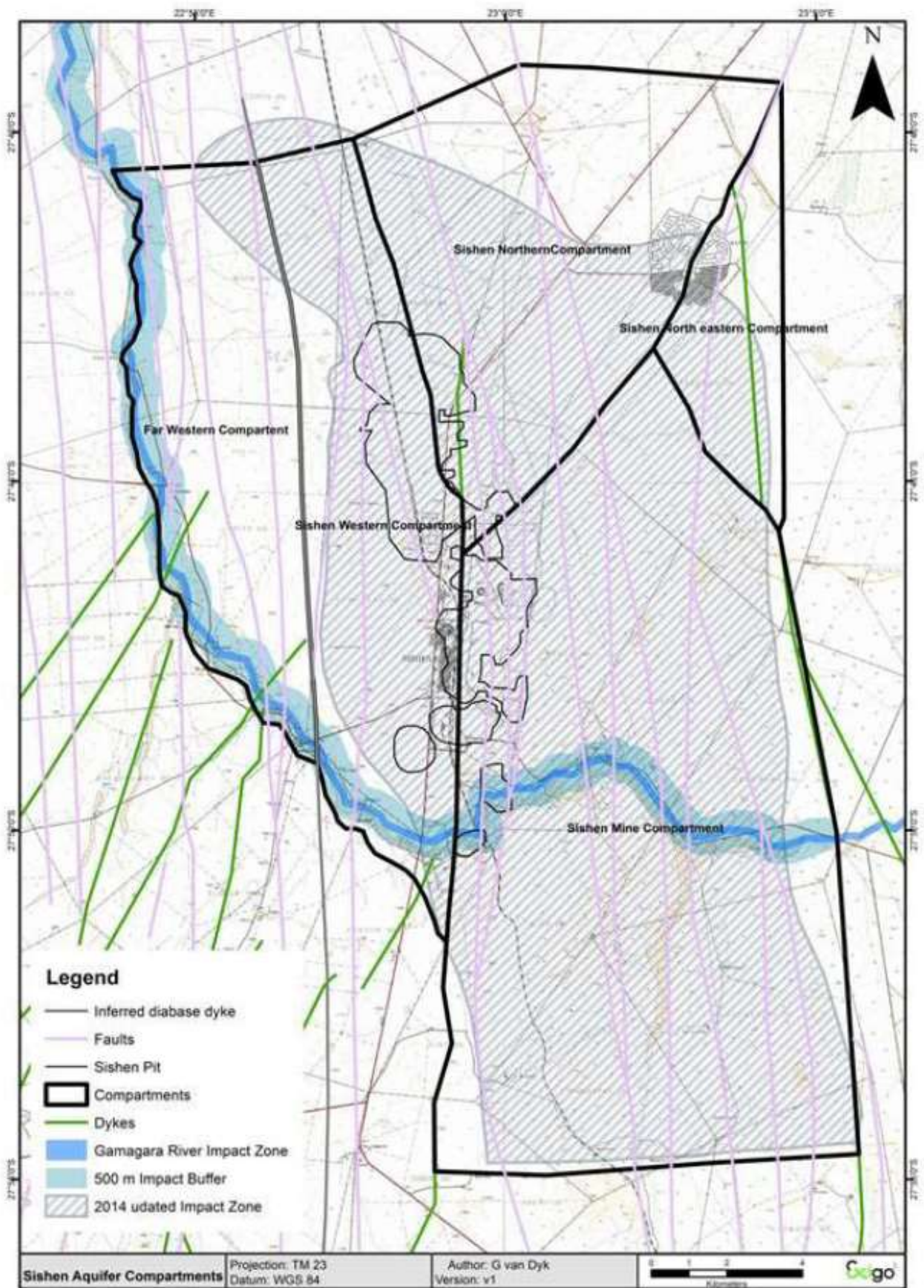
Lylyveld lies within the Sishen Mine Compartment.

The boundaries of this compartment are formed by an east-west dolerite dyke, two north-south diabase dykes, a northwest-southeast diabase dyke and a northeast-southwest diabase dyke. The latter dyke has been mined through and breached. This compartment is in constrained hydraulic connection with some of the neighbouring compartments. Constrained hydraulic connection means that there is no direct link across which groundwater can flow freely. The constrained flow is called leakage. The constrained hydraulic connection is because some dykes are younger than others, notably the dolerite dyke is much younger than the diabase dykes. The younger dykes cut through the older dykes. There are also faults that are inferred to cut through some of the dykes. The Sishen Compartment has been dewatered by mining activities.

The Gamagara River Alluvial Aquifer forms a groundwater zone along the Gamagara River. This aquifer has mainly hypoeiric flow below the alluvium. The vertical thickness of this aquifer varies between 10 m to 75 m. It has three sub zones. The first is the zone upstream of the Sishen Mine Compartment where the weathered/fractured aquifers (mainly BIF and dolomite) feed hypoeiric flow into the Gamagara Alluvial Aquifer. The upstream zone is inferred to have a minor impact due to leakage across and above the eastern diabase dyke boundary to the Sishen Compartment. The Gamagara Alluvial Aquifer overlies the diabase dykes as it is younger. The zone of the Gamagara Alluvial Aquifer in the Sishen Compartment is dewatered and does not exist in this area anymore, except during and after flood events when it can have a temporary existence. The downstream zone receives hypoeiric flow from the shallow calcrete aquifer and is not impacted directly by the dewatered Sishen Compartment.

The impact of dewatering at the main Sishen Mine pit is mainly on the deep BIF-Dolomite-Chert aquifer. Since the compartment is dewatered, no additional dewatering activities take place at Lylyveld.





**FIGURE 9-11: SISHEN COMPARTMENTS WITH GEOLOGICAL STRUCTURES AND CURRENT IMPACT ZONE (MEYER, 2009).**

## **Groundwater Quality**

There is an extensive groundwater monitoring network at Sishen Mine, but no monitoring is currently taking place within the vicinity of the Lylyveld mining activities (see Figure 9-12). The quality of primary and shallow groundwater at Sishen Mine has been impacted on by historic pollution, with hydrocarbons being the most important contaminants resulting in pollution at the mine. The areas where pollution has occurred are the Aldag Service Station, the existing Diesel Workshop, the Total Depot, the Load-out Station workshop area, the current hazardous waste storage yard and the Primary Crusher Tunnel. Remediation of these contaminated areas is underway. Other contaminants detected in groundwater within the main Sishen Mine area include nitrate, ammonia, lead and manganese.

The Sishen Mine residue including the waste rock material has been classified as inert. Current and long-term contamination of groundwater and surface water from the material is shown to be unlikely (Exigo, November 2014). The risk of groundwater pollution as a result of waste rock dumps is thus considered to be low.

## **Water Supply**

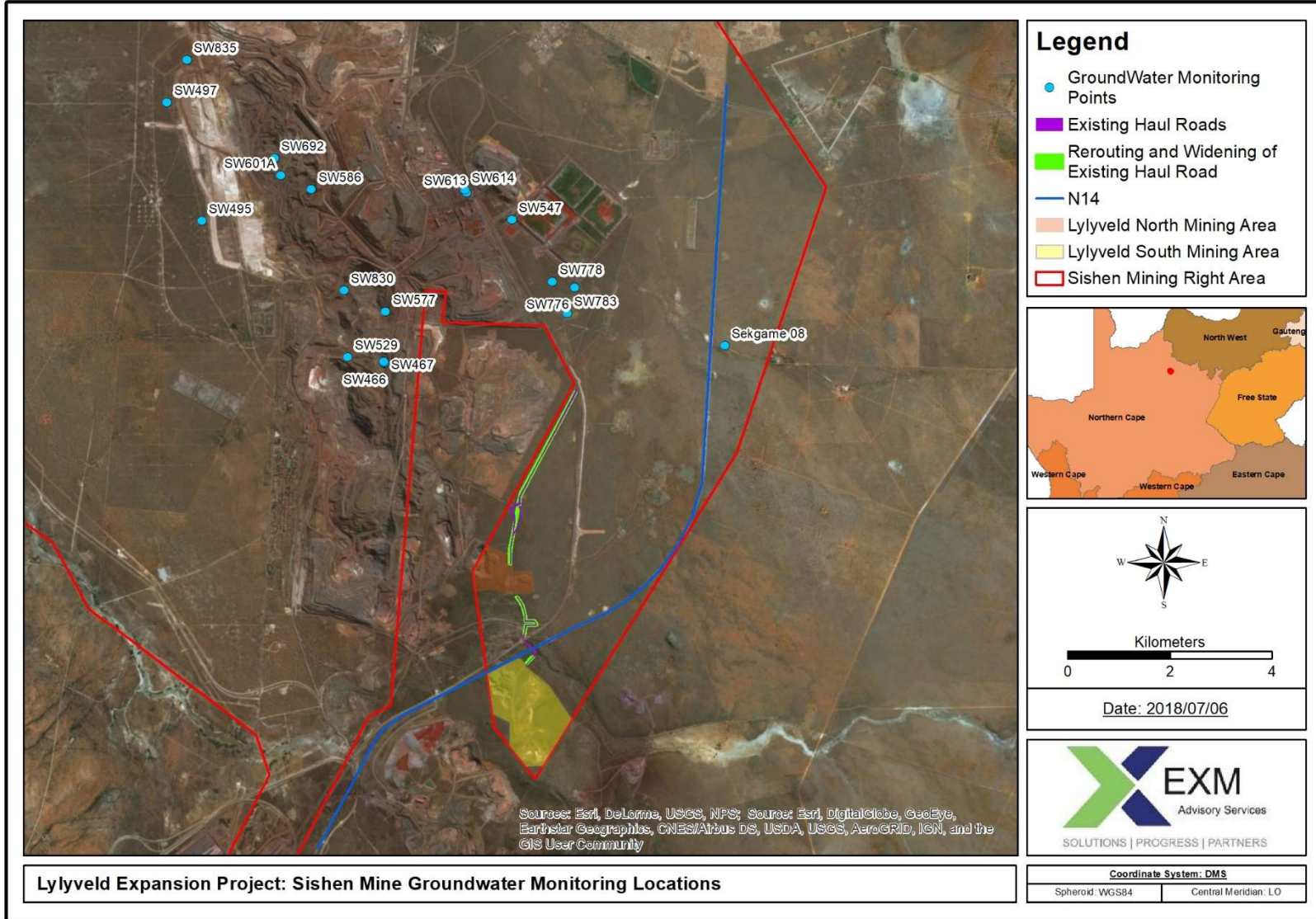
There is an existing borehole at Lylyveld licenced under Section 21 (a) of the National Water Act to supply 36 500 m<sup>3</sup>/annum of water for dust suppression and domestic water use at Lylyveld.

## **Land Tenure**

The Lylyveld Expansion Project will take place on the Farm Lylyveld 545, which is owned by Sishen Iron Ore Company (Pty) Ltd and forms part of the Sishen Mine mining right area (see Figure 9-13). The haul road, which is proposed to be realigned and widened does cross servitudes including that for the N14 (SANRAL), the Sishen Saldanha Iron Ore Rail Line (Transnet Freight Rail) and power lines to Sishen Mine (Eskom).

Land tenure of affected and neighbouring properties is given in Figure 9-13.





**FIGURE 9-12: EXISTING GROUNDWATER MONITORING POINTS AT SISHEN MINE**



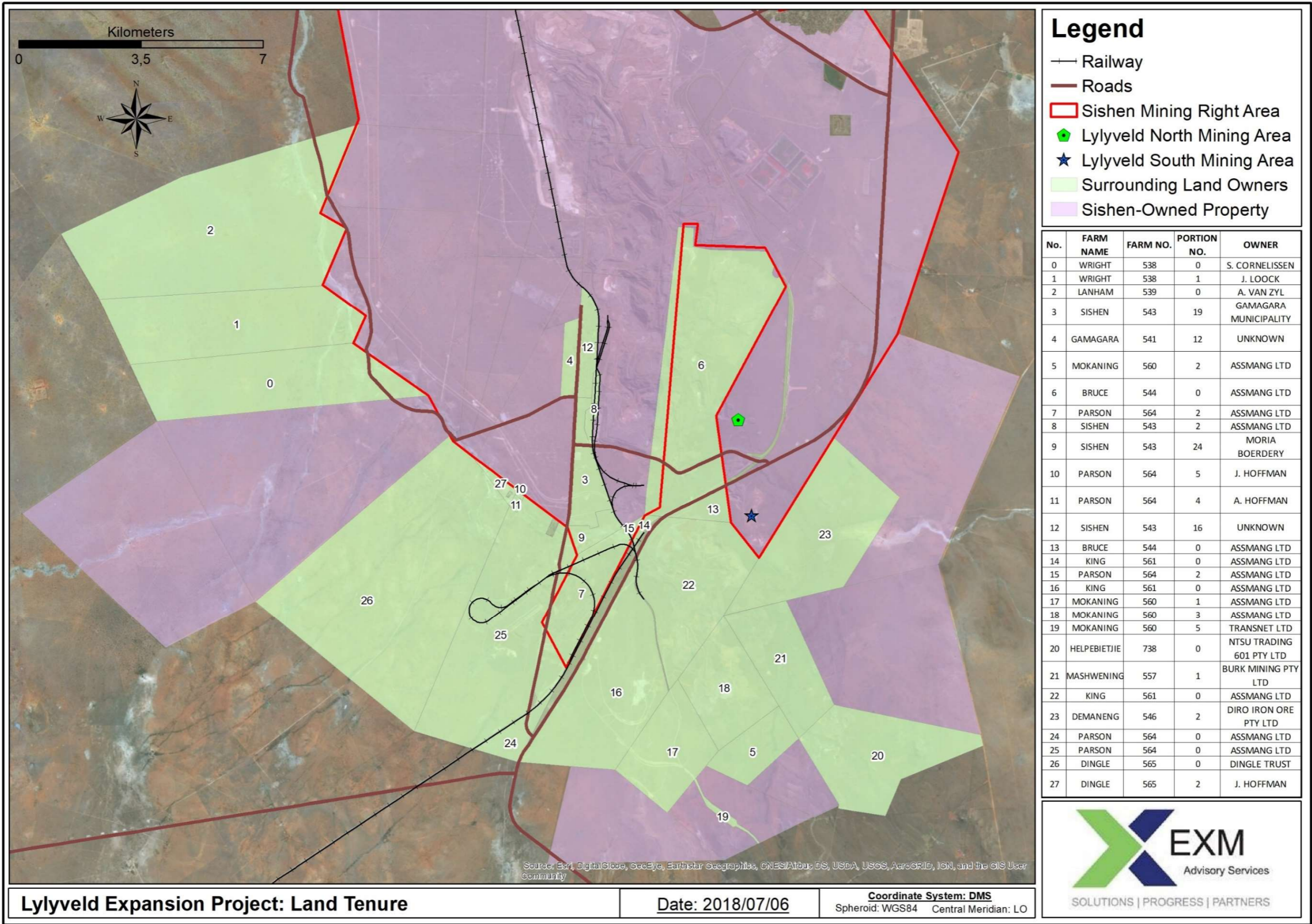


FIGURE 9-13: SISHEN IRON ORE COMPANY LAND OWNERSHIP



## **Cultural Heritage**

The landscape of the Lylyveld mining area has a rich and diverse heritage. Information on heritage findings in the area have been sourced from Beaumont of the McGregor Museum (November 2009) and PGS Heritage (December 2017). According to these reports historical findings in the region include an Earlier Stone Age sample from the Gamagara River and Earlier Stone Age plus Iron Age material from around pits on the hillside. The latter sites were destroyed by subsequent Iscor prospecting, as was another small Iron Age specularite working on a hill flanking the Gamagara River, on Demaneng 546, that they found in the same year. And also from southern Lylyveld 545 is a small Later Stone Age collection made in 1987 from the slopes around a shallow overhang near a beacon, now mined away, at the north end of the ridge, directly south of the N14. Still intact is a low rise with many specularite pits on Mashwening 557, some 6 km to the south-east, where a test trench in 1989 yielded Ceramic Later Stone Age overlying sparse Acheulean, which included a cleaver.

About 6 km to the north-west, on the farms Sishen 543 and Bruce 544, there were many pecked engravings on off – white Gamagara Shale, of which some were saved and donated to the McGregor Museum in 1971. Further away, about 30 km to the north, on the eastern edge of Kathu, there is the Townlands site, an Acheulean quarry of 12 ha extent with about 0.7 billion artefacts, that was latterly declared a Provincial Heritage Site. About 3 km to the north-east of it, on the crest of Kathu Hill, is another Acheulean quarry of similar extent and richness that still remains to be mapped. And between those two localities, just east of the N14 and downslope of the cemetery, is the recently-found Cobus Dreyer site, where hand axes are common and cleavers rare, with some bifaces being based on quartzite derived from the Langberg Mountains, 40 km and more to the west.

Beaumont (November 2009) discovered 11 jasper artefacts ascribed to the Fauresmith – Acheulean timespan. However, no archaeological sites, palaeontological bones, or structures / graves were discovered by Beaumont (November 2009) or PGS Heritage (December 2017). A paleontological desktop assessment (PGS Heritage, December 2017) of the area also indicated that activities at Lylyveld are unlikely to pose a substantial threat to local fossil heritage.

## **Socio-Economic Environment**

Sishen Mine is located in the Gamagara Local Municipality within the John Taolo Gaetsewe District Municipality and which includes the towns of Kathu, Dibeng, Sesheng and Olifantshoek. Sending municipalities include Joe Morolong Local Municipality and Ga-Estonians Local Municipality.

Sishen Mine has played a significant role in the establishment and development of the town

of Kathu and surrounds since 1953. The district is largely reliant on mining with mining contributing 55.5% to the district and 77.5% to the local municipal economy (Demacon, 2016). The mining sector is also the largest employer in the local economy. According to Demacon (2016) there are approximately 50 000 people living in the Gamagara municipal area of which 65% are economically active and 82.3% are formally employed. The sending municipalities show lower economically active segments with approximately 51% and 26% of persons being economically active in Gamagara Local Municipality and Joe Morolong Local Municipality, respectively. Unemployment in these municipalities is also high at 33% and 39%. Similarly, the living standards in the sending municipalities are far lower than in Gamagara. Sishen Mine plays a crucial role in both the local and provincial economy. For every employee working at the mine, approximately five other people are affected (Demacon, 2016). Lylyveld activities currently contribute 1 Mtpa to the current production of approximately 32 Mtpa.

The operations at Lylyveld South are undertaken by two load and haul contractors on behalf of SIOC and form part of the overall mining activities at Sishen Mine. Current employment opportunities directly associated with the Lylyveld operations involve 132 persons working in two shifts.

Adjacent activities include mining and farming (see Figure 9-14). The closest farming activities take place on the farm Demaneng (now owned by SIOC), with the farm house located approximately 3.4 km to the east of Lylyveld South. The house is currently leased to security contractors. The settlements closest to Lylyveld are Dingleton (4 km west), Sesheng (12 km north) and Kathu (12 km north east). The persons residing at Dingleton have largely been relocated to facilitate future mining activities at Sishen to the west.

### **9.5.2 Description of current land uses**

Activities at Lylyveld North and Lylyveld South take place within fenced off mining areas which form part of Sishen Mine. The proposed amendments and expansions at Lylyveld North and South, as well as the haul road will require the disturbance of wilderness areas. The new pit at Lylyveld South was however historically mined, although vegetation has established over the historically disturbed areas.

Neighbouring activities include stock farming (cattle farming) and mining activities. Land use activities are shown in Figure 9-14.

### **9.5.3 Description of specific environmental features and infrastructure on the site**

Infrastructure to be affected by the project include (see Figure 9-14):

- Public Road to Dingleton

Haul trucks from Lylyveld South to Lylyveld North will continue to cross the public road

to Dingleton. This road is used by remaining residents at Dingleton, traffic to Assmang's Khumani Mine and farmers located to the west. Note that the Dingleton has recently been included in the Sishen Mine mining right area and SIOC is in the process of purchasing the land. Sishen is in the process of relocating persons residing in Dingleton to facilitate future expansion of mining activities in that area.

- Sishen Siding

The Sishen Siding has largely been demolished. The haul road passes around and to the east of this infrastructure.

- Sishen Saldanha Iron Ore Export Rail

The haul road passes underneath the rail line. No changes will be made to the road in this section.

The new pit at Lylyveld South will be located within close proximity (~150 m) from the rail line.

- National Road N14

The haul road passes underneath the N14. No changes will be made to the road in this section.

The new pit at Lylyveld South will be located adjacent to the N14.

- Eskom Powerline

The realignment of the haul road will take place within an Eskom powerline servitude.

9.5.4 Environmental and current land-use map

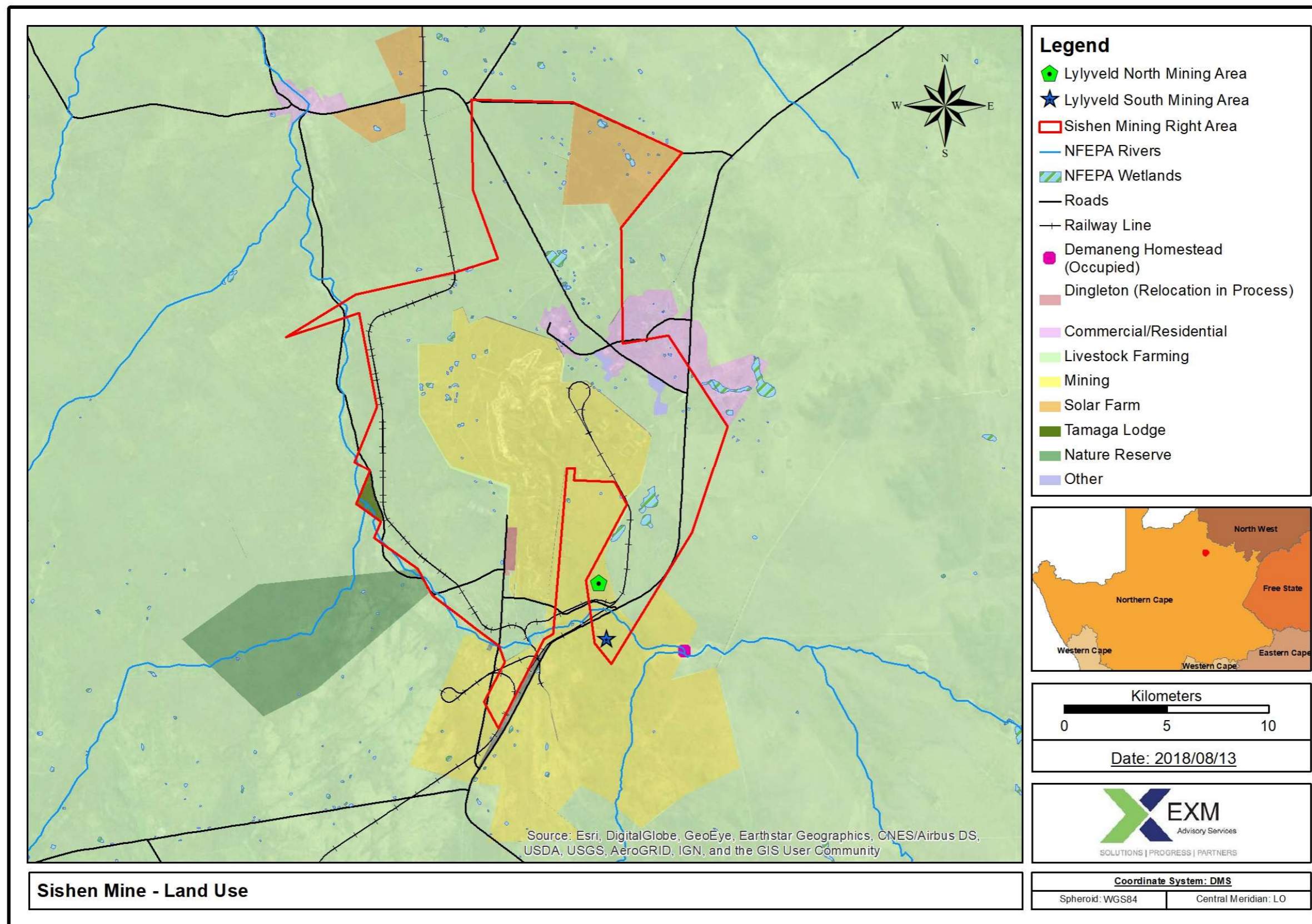


FIGURE 9-14: EXISTING LAND USE AND INFRASTRUCTURE MAP SHOWING LOCATION OF LYLYVELD NORTH AND SOUTH EXPANSION AREAS

## 9.6 Impacts identified

A scoping level identification of potential environmental impacts (physical, biological, social and economic) associated with the proposed Lylyveld Expansion Project are listed in Table 9-7, with a framework for further work during the EIA phase also provided.

**TABLE 9-7: POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS**

IMPACT	IMPACT SOURCE	SIGNIFICANCE/COMMENT	SCOPE OF WORK FOR EIA / FURTHER WORK
<b>AIR QUALITY</b>			
Increase in ambient dust levels.	Increase in dust emission sources (increased pit, dumps and stockpile areas).	The expansion will result in an increased surface area available for the entrainment of dust. Exceedances of air quality standards are already apparent at Lylyveld South.	The change in predicted dust impacts as a result of the expansions is to be determined. An Air Quality Specialist Study is required.
<b>NOISE</b>			
Increase in ambient noise levels	Noise from mining activities including the haulage of ore and waste rock material.	The expansion of activities at Lylyveld will not result in additional mining activities. Current noise monitoring has not shown any significant noise impacts to the east of Sishen Mine.	No additional specialist work is considered necessary. Future noise monitoring programme to be reviewed to ensure that the impacts of noise from activities at Lylyveld are specifically identified.
<b>BIODIVERSITY</b>			
Loss of systems, habitats or species of conservation importance	Clearance of vegetation for the development of new pit, waste rock dump and stockpile areas.  Secondary impacts disturbing ecological habitats such as an increase in noise, fallout dust, or dirty water run-off.	The Lylyveld Expansion Project will result in the clearance of natural areas. Protected species are expected to occur in these areas.  The Gamagara River is regarded as a sensitive habitat unit and needs to be protected. Although the expansion will not result in any direct additional impacts on the Gamagara River, potential secondary impacts due to fallout dust or dirty water run-off could occur.	Sensitive habitats and species to be disturbed due to site clearance are to be identified.  The risk of secondary impacts on the Gamagara River and any other sensitive habitats identified are to be quantified.  Mitigation measures are to be identified Biodiversity Specialist Study is required.
<b>SURFACE WATER</b>			
Disturbance of surface water resources	Disturbance to watercourses, wetland pans or any other surface water resource due to site clearance.	The project will not result in the direct disturbance of any surface water resource.	No further work is required.
Pollution of surface water resources.	Incorrect or insufficient stormwater and/or dirty mine water management.	Dirty water run-off is to be managed and prevented from entering into the surrounding environment.	Stormwater management plan to be reviewed to ensure that dirty water is contained.
	Storage, handling and accidental spillage of hazardous chemicals	No hazardous chemicals such as fuel, lubricants, explosives are stored at Lylyveld. There are no	Spill management procedures to be reviewed to ensure that surface water resources are

IMPACT	IMPACT SOURCE	SIGNIFICANCE/COMMENT	SCOPE OF WORK FOR EIA / FURTHER WORK
		refuelling facilities or workshops at Lylyveld North and Lylyveld South. These materials and services are sourced at the storage and handling facilities at the main operations. Spillages could occur from equipment and vehicles at the site.	protected.
<b>WATER SUPPLY</b>			
Increase in water usage.	Water for domestic supply or dust suppression.	No additional water will be required as a result of the proposed expansion of the activities at Lylyveld North and Lylyveld South.	No further work is required.
<b>GROUNDWATER</b>			
Increase in dewatering requirements.	Increased mining activities including exploitation of additional mining areas and extension of pits.	The mining areas to be affected by the extension of Lylyveld North and South will not require any additional dewatering.	No further work required.
Pollution of groundwater resources	Leaching of contaminants from waste rock material.	It is not expected that the waste rock material produced in the future will differ from current material which has been found to be inert and thus poses negligible risk to groundwater.	Monitoring network to be revised to ensure that future risks of contamination are assessed.
	Storage, handling and accidental spillage of hazardous chemicals.	No hazardous chemicals such as fuel, lubricants, explosives are stored at Lylyveld. There are no refuelling facilities or workshops at Lylyveld North and Lylyveld South. These materials and services are sourced at the storage and handling facilities at the main operations. Spillages could occur from equipment and vehicles at the site.	Spill management procedures to be reviewed to ensure that surface water resources are protected.
<b>CULTURAL HERITAGE</b>			
Disturbance of sites of archaeological, palaeontological, cultural or heritage importance	Site clearance for the development of new pit, waste rock dump and stockpile areas.	It is unlikely that any site of heritage significance will be affected by the Lylyveld Expansion Project.	A Heritage Impact Assessment is to be undertaken in accordance with the requirements of the Natural Heritage Resources Act.
<b>LAND USE AND INFRASTRUCTURE</b>			
Disturbance of current land use activities	Change in land use to mining activities due to expansion of pit, waste rock dump and stockpile areas.	Areas to be used are currently wilderness and not used for any specific purpose.	No further work required.
Damage to infrastructure.	Mining activities within close proximity to N14, rail and power lines.	The new mining pit at Lylyveld South is immediately adjacent to the N14 and in close proximity the Sishen Saldanha Iron Ore Export rail line. The rerouting of the haul road will take place within the Eskom servitude.	Sishen to comply with legal requirements in terms of the Mine Health and Safety Act. This will include a safety risk assessment. Sishen to consult with SANRAL, Transnet and Eskom and obtain permissions as required for proposed developments.

IMPACT	IMPACT SOURCE	SIGNIFICANCE/COMMENT	SCOPE OF WORK FOR EIA / FURTHER WORK
<b>TRAFFIC</b>			
Impact on road users along the road to Dingleton.	Access to Lylyveld North and South from the Dingleton Road Haul trucks crossing the Dingleton roads. Dust generated by mining activities reducing visibility for road users.	Although the Lylyveld Expansion Project will not result in an increase in the amount of traffic accessing the site or the haul truck trips generated, the duration of the impact will increase. This will result in a change in the significance of the impact.	The current traffic management measures implemented to address safety risks to road users are to be reviewed in view of long-term duration of the project. Impact of dust on traffic users to be assessed and mitigation identified as required.
Impact on road users on the N14.	Mining activities (such as blasting) at the new Lylyveld South pit will pose a safety risk to road users on the N14.	Blasting poses a risk to persons including road users within 500 m.	Sishen to comply with legal requirements in terms of the Mine Health and Safety Act. This will include a safety risk assessment.
Improved safety on haul roads	The widening and realignment of the haul road from Lylyveld to Sishen's main area.	The widening of the road will facilitate the safe passing of haul trucks and thus will improve the safety at the Lylyveld operations.	The positive impact on safety is to be considered in relation to the possible negative impacts on the environment or neighbouring infrastructure (Eskom Power Line).
<b>VISUAL ENVIRONMENT</b>			
Disturbance of natural views and sense of place.	Increased visibility of expanded mining activities.	The expanded mining activities will be visible from receptor points including traffic along the N14.	The visual impacts are to be assessed as part of the EIA. Consideration is to be given to the cumulative impact on the visual environment.
<b>SOCIO-ECONOMICS</b>			
Contribution to local economy	Opportunities for procurement and employment.	Although the expansion of the activities does not provide additional procurement and employment opportunities, the current opportunities will be available for an extended period of time.	The implications of the project for the local economic conditions to be investigated and reported on.
Social upheaval	Dissatisfaction of road users due to failure to address concerns regarding safety risks on Dingleton access road.	Surrounding landowners that make use of the Dingleton access road have expressed concerns regarding safety when using the Dingleton Road.	The current traffic management measures implemented to address safety risks to road users are to be reviewed in view of long-term duration of the project.

## **9.7 Methodology used in determining the significance of environmental impacts**

An initial indication of the potential impacts is described in Table 9-7. This is based on an understanding of the baseline environment, existing information and the details currently available for the Lylyveld Expansion Project. The nature and significance of impacts will be confirmed in the EIA phase of the project. Where required, specialist input will be obtained (as identified in this Scoping Report) to assist with determining the significance of the impacts and to identify mitigation measures to address such impacts.

Further information regarding the methodology for assessing the significance of impacts in the EIA Phase is provided in Section 10.3.

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

The proposed Lylyveld Expansion Project will have a definite impact on the environment and surrounding land uses. The magnitude and extent of such impacts will be determined in the EIA studies. The layout planning will be further amended to minimise impacts to sensitive landscapes and also existing land uses.

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

A scoping level description of the impacts, possible mitigation measures and level of residual risk is described in Table 9-8.



**TABLE 9-8: PROJECT IMPACTS, MITIGATION MEASURES AND THE LEVEL OF RESIDUAL RISK**

	ACTIVITY	POTENTIAL IMPACTS	MITIGATION TYPE	POTENTIAL FOR RESIDUAL RISK
<b>LYLYVELD NORTH</b>	<b>Expansion of Mine Pit</b>	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Location of the pits defined by ore bodies thus the potential for avoidance of such sites is limited.  Biodiversity Specialist Study to be undertaken to identify sensitive habitats and species.  The potential for the successful relocation of protected species is limited.	High – the pit location will have an impact on sensitive environments and species.
		Site clearance resulting in the disturbance of heritage resources.	Identify heritage resources and implement recommendation of heritage specialists (including Phase 2 assessment if necessary)	Low – should heritage artefacts be present these will be assessed and documented in accordance with requirements of the specialist and SAHRA
		Loss of soils and land capability.	Soils to be removed and protected for use in rehabilitation of surfaces.	Low – the soils will be used in rehabilitation.
		Dust from blasting and mining activities.	Permanent haul roads will be provided with chemical suppressants. Wet suppression to be used on temporary roads.	Medium – dust is difficult to control.
		Noise due to haulage of ore and waste rock.	Difficult to mitigate. The scale of the operations is however limited and there are no nearby sensitive noise receptors.	Low – the scale of the operations and the absence of nearby sensitive receptors mean that the significance of the impact will be low.
		Landscape disturbance	No back filling is under consideration. The pit will remain as a void.	Low – the landscape will be permanently altered, however given the limited expansion of the pit and in the context of the surrounding environment the risk is considered to be low. Backfilling should however still be investigated.
	<b>Expansion of and new WRDs</b>	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Biodiversity Specialist Study to be undertaken to identify sensitive habitats and species.  Site layout planning to ensure protection areas of high sensitivity where practicable.	Medium – the dump footprint can be changed as required to protective sensitive environments. There will be a loss of some individual species of conservation importance (permits required)
		Site clearance resulting in the disturbance of heritage resources.	Identify heritage resources through Heritage Impact Assessment and indicate on layout planning.  Revise layout to protect heritage resources, as required.	Low – the dump footprint can be changed as required to protect heritage resources.
		Loss of soils and land capability.	Soils to be removed and protected for use in rehabilitation of surfaces of waste rock dumps.  Implement rehabilitation aimed at restoring	Medium – dumps will be sloped and rehabilitated, but it can be expected that there will be some loss in land capability in these areas due to topographical

	ACTIVITY	POTENTIAL IMPACTS	MITIGATION TYPE	POTENTIAL FOR RESIDUAL RISK
			land to in order that it can be used for livestock grazing in the future.	changes resulting from the WRD development.
		Pollution of groundwater due to seepage and surface water due to dirty water run-off.	Stormwater management to ensure containment of dirty water and protection of clean water resources.	Low – It is not expected to have potential for high levels of pollution.
		Dust from haulage of waste rock along haul roads, material handling and entrainment from surface.	Wet suppression to be used on haul roads. Ongoing rehabilitation of waste rock dumps to take place.	Medium – the handling of waste rock is a significant contributor to dust levels in the environment even with mitigation.
		Landscape disturbance and alteration of sense of place.	Ongoing rehabilitation of waste rock dumps.	High – the landscape will be permanently altered.
		Noise due to haulage and dumping of waste rock	Difficult to mitigate. The scale of the operations is however limited and there are no nearby sensitive noise receptors.	Low – the scale of the operations and the absence of nearby sensitive receptors mean that the significance of the impact will be low.
	<b>Expansion of stockpile area</b>	Dust from handling and stockpiling of ore material.	Chemical suppression on permanent roads and wet suppression on temporary road areas.	Medium – it is expected that the handling of ore will contribute to dust levels.
	<b>New Haul Road</b>	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Biodiversity Specialist Study to be undertaken to identify sensitive habitats and species. Site layout planning to ensure protection areas of high sensitivity where practicable.	Medium – the haul road route can be changed as required to protective sensitive environments. It will however not be possible to avoid individual species.
		Site clearance resulting in the disturbance of heritage resources.	Identify heritage resources through Heritage Impact Assessment and indicate on layout planning. Revise layout to protect heritage resources, as required.	Low – – the dump footprint can be changed as required to heritage resources.
		Loss of soils and land capability.	Soils to be removed and protected for use in rehabilitation.	Low – soils can be salvaged and used in rehabilitation.
		Dust from the haulage of ore material.	Chemical suppression to reduce dust levels on haul road.	Low – chemical suppression efficient in maintaining dust levels.
<b>LYLYVELD SOUTH</b>	<b>Expansion and Development of new Pit Areas</b>	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Biodiversity Specialist Study to be undertaken to identify sensitive habitats and species. Location of the pits defined by ore bodies thus the potential for avoidance of sensitive sites is limited. The potential for the successful relocation of protected species is limited.	Low – the pit developments will largely take place within previously disturbed areas. The new pit area was previously mined and thus the habitat is unlikely to be sensitive.
		Site clearance resulting in the disturbance of heritage resources.	Identify heritage resources and implement recommendation of heritage specialists (including Phase 2 assessment if necessary)	Low – the pits developments will largely take place within previously disturbed areas. Significant heritage resources are unlikely to occur.

	ACTIVITY	POTENTIAL IMPACTS	MITIGATION TYPE	POTENTIAL FOR RESIDUAL RISK
		Loss of soils and land capability.	Soils to be removed and protected for use in rehabilitation of surfaces.	Low – the pits developments will largely take place within previously disturbed areas.
		Dust from blasting and mining activities.	Permanent haul roads will be provided with chemical suppressants. Wet suppression to be used on temporary roads.	Medium – dust is difficult to control.
		Noise due to haulage of ore and waste rock.	Difficult to mitigate. The impact on nearby receptors is to be assessed and appropriate mitigation implemented	Low – the limited number of nearby sensitive receptors mean that the significance of the impact will be low.
		Damage to infrastructure due to blasting	Sishen to undertake a risk assessment to determine the risk of blasting a new pit to national road and rail.	Low – should there be an unacceptable risk of damage then mine planning will be revised to ensure that the risks are acceptable to all stakeholders (Transnet, SANRAL and DMR).
		Traffic impacts due to the haulage of ore to Lylyveld North.	The current traffic management measures implemented to address safety risks to road users are to be reviewed in view long-term duration of the project. Additional mitigation to be implemented as identified to address risks.	Uncertain – the haulage of ore across a public road will present a long-term safety risk. The residual risk will depend on the outcome of the review and the proposed mitigation.
		Traffic impacts due to blasting	Sishen to undertake a risk assessment in accordance with legislative requirements to determine the risk of blasting on road users within 500 m.	Low – should there be an unacceptable risk of damage then mine planning will be revised to ensure that the risks are acceptable to all stakeholders (SANRAL and DMR).
		Traffic impacts due to the haulage of ore to Lylyveld South.	The current traffic management measures implemented to address safety risks to road users are to be reviewed in view long-term duration of the project. Impact of dust on traffic users to be assessed and mitigation identified as required.	Medium – the crossing of a public road haul trucks is a risk that will need to be continuously assessed and managed.
		Landscape disturbance	No back filling is under currently under consideration. Pits will remain as a void. The opportunity for backfilling is to be investigated.	High – the landscape will be permanently altered. Given the high visibility of the mining activities, the risk is considered to be high. Backfilling and landscaping of the final void will reduce the risk significantly and provides an opportunity for a positive impact given that the historical pit currently presents a significant landscape disturbance.
Expansion of and new WRDs		Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Biodiversity Specialist Study to be undertaken to identify sensitive habitats and species. Site layout planning to ensure protection areas of high sensitivity where practicable.	Medium – the dump footprint can be changed as required to protective sensitive environments.
		Site clearance resulting in the	Identify heritage resources through Heritage	Low – the dump footprints can be changed as

	ACTIVITY	POTENTIAL IMPACTS	MITIGATION TYPE	POTENTIAL FOR RESIDUAL RISK
		disturbance of heritage resources.	Impact Assessment and indicate on layout planning. Revise layout to protect heritage resources, as required.	required to protect heritage resources.
		Loss of soils and land capability.	Soils to be removed and protected for use in rehabilitation of surfaces of waste rock dumps. Implement rehabilitation aimed at restoring land to in order that it can be used for livestock grazing in the future.	Medium – dumps will be sloped and rehabilitated, but it can be expected that there will be some loss in land capability in these areas due to topographical changes resulting from the WRD development.
		Pollution of groundwater due to seepage and surface water due to dirty water run-off.	Stormwater management to ensure containment of dirty water and protection of clean water resources.	Low – if implemented successfully the risk to the Gamagara River will be acceptable.
		Dust from haulage of waste rock along haul roads, material handling and entrainment from surface.	Wet suppression to be used on haul roads. Ongoing rehabilitation of waste rock dumps to take place.	Medium – the handling of waste rock is a significant contributor to dust levels in the environment even with mitigation.
		Landscape disturbance.	Ongoing rehabilitation of waste rock dumps.	High – the landscape will be permanently altered. Given the high visibility of the mining activities, the risk is considered to be high.
		Noise due to haulage and dumping of waste rock	Difficult to mitigate. The impact on nearby receptors is to be assessed and appropriate mitigation implemented	Low – the limited number of nearby sensitive receptors mean that the significance of the impact will be low.
	<b>Development of new stockpile area</b>	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Biodiversity Specialist Study to be undertaken to identify sensitive habitats and species. Site layout planning to ensure protection areas of high sensitivity, where practicable.	Low – the stockpile footprint can be changed as required to protective sensitive environments.
		Site clearance resulting in the disturbance of heritage resources.	Identify heritage resources through Heritage Impact Assessment and indicate on layout planning. Revise layout to protect heritage resources, as required.	Low – the stockpile footprint can be changed as required to protect heritage resources.
		Loss of soils and land capability.	Soils to be removed and protected for use in rehabilitation. Implement rehabilitation aimed at restoring land to in order that it can be used for livestock grazing in the future.	Low – soils have low land capability, but still need to be salvaged, for use in rehabilitation.
		Pollution of groundwater due to seepage and surface water due to dirty water run-off.	Stormwater management to ensure containment of dirty water and protection of clean water resources.	Low – if implemented successfully the risk to the Gamagara River will be acceptable.
		Dust from handling of ore material.	Chemical suppression on permanent roads and	Medium – it is expected that the handling of ore will

	ACTIVITY	POTENTIAL IMPACTS	MITIGATION TYPE	POTENTIAL FOR RESIDUAL RISK
			wet suppression on temporary road areas.	contribute to dust levels.
		Traffic impacts due to dust	The risk of increased dust levels due to proximity of the stockpiles to the N14 are to be considered. Measures are to be implemented to ensure that the risks.	Low – if the risks are unacceptable, the stockpile can be relocated.
<b>HAUL ROAD WIDENING AND RE-ALIGNMENT</b>	<b>Re-alignment of haul road</b>	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Biodiversity Specialist Study to be undertaken to identify sensitive habitats and species.	Low – should the habitat required for the re-alignment be regarded as sensitive then the no-go option can be implemented.
		Disturbance of existing infrastructure (Eskom Power Line)	Consultation with Eskom with respect to protection of infrastructure. Implementation of measures to prevent disturbance.	Low – it is anticipated that mitigation measures can be implemented to ensure protection of Eskom infrastructure. If not, the no-go option will be implemented (the route will remain as is).
	<b>Widening of haul road</b>	Site clearance resulting in the disturbance of vegetation, habitats and/or sensitive environments/species.	Biodiversity Specialist Study to be undertaken to identify sensitive habitats and species in areas to be widened.	Low – should the habitat required widening of the road be regarded as sensitive, the no-go option will be implemented (the road will not be widened in that section).
		Disturbance of surface water resources (wetland pan)	Confirm the delineation of the wetland pan boundary. Avoid further disturbance to the wetland pan due to widening of the road.	Low – should the widening of the road be found to impact on the wetland pan, then the no-go option will be implemented (road will not be widened in that section).
		Disturbance of existing infrastructure (Eskom Power Lines).	Consultation with Eskom with respect to protection of infrastructure. Implementation of measures to prevent disturbance.	Low – it is anticipated that mitigation measures can be implemented to ensure protection of Eskom infrastructure. If not, the no-go option will be implemented (the road will not be widened in that section)..

### **9.10 The outcome of the site selection - Final site layout plan**

The site layouts as presented in Figure 5-1 to 5-3 will be investigated in the EIA phase of the project. Impacts on sensitive sites, including heritage, biodiversity, surface water resources including wetlands will be identified and the layout revised as required to minimise impacts. The proximity of the proposed activities to the N14, Sishen Saldanha Iron Ore Export Rail Line and Eskom Power Lines will also be considered, and the layout revised to reduce impacts.

An alternative layout plan developed aimed at minimising such impacts will be developed as an outcome to the EIA for implementation by SIOC.

### **9.11 Motivation where no alternative sites were considered**

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

### **9.12 Statement motivating the preferred site**

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



## **10. PLAN OF STUDY FOR THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS**

### **10.1 Description of Alternatives to be Considered including the Option of Not Going Ahead with the Activity.**

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

#### **10.1.1 No-Go alternative**

The no-go alternative (not proceeding with all or part of the proposed activities) will be further considered in the EIA phase of the project. Should the impacts of the entire or parts of the proposed Lylyveld Expansion be considered to be unacceptable, even with mitigation then the no-go alternative will be implemented.

#### **10.1.2 Layout alternatives**

As indicated in Section 9.2 the current proposed layout of the Lylyveld Expansion Project will be revised based on the outcomes of the specialist studies and further investigations. This will be done in consultation with SIOC to ensure that the impacts of the project are kept to a minimum

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

Where the EAP does not have sufficient expertise or information in a particular field to adequately determine the baseline environmental conditions or to assess the impacts, specialists in those fields will be appointed to provide the necessary information required to facilitate the EIA.

The requirements for further work have been identified in the scoping phase (see Table 9-7). This forms the terms of reference for the EIA phase of the project.

Key components to be undertaken in the EIA Phase include:

- Consultation with Eskom, SANRAL and Transnet with respect to potential impacts on infrastructure;
- Review of risks to road users of the Dingleton Road associated with the haul truck crossing (this will be undertaken in consultation with SIOC).

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

Specialist reports will be structured in terms of *GNR 982 Appendix 6, as amended*. The specialist studies identified thus far are discussed below.

### **10.2.1 Biodiversity**

EXM proposes to appoint Scientific Terrestrial Services to undertake a specialist investigation of the biodiversity to be impacted on by the proposed Lylyveld Expansion.

The study will include:

- A desktop study of available databases and previous work done at the site and in the area;
- Update of habitat type mapping for areas to be affected by the project;
- Identification of faunal species of conservation importance that occur in the area;
- Identification of species of conservation importance;
- Mapping of sensitive sites including surface water resource areas and wetlands;
- Recommendations for revised layout planning to mitigate impacts;
- Impact assessment and reporting including mitigation and management requirements.

Note that no provision has been made for a specialist an aquatic ecological assessment or wetland impact assessment. The boundaries of the wetland pan which may be affected by the haul road expansion will however be confirmed.

### **10.2.2 Air Quality**

EXM proposes to appoint Airshed Planning Professionals to assist with the assessment of the air quality impact of the extension. The following tasks are considered necessary for the assessment:

- Identification of existing pollution sources (Airshed has already quantified the emissions at Sishen Mine including Lylyveld South);
- Identification of receptors (Airshed already has this information);
- Collation of updated climatic data (Airshed already has the information);
- Legislative review (already completed by Airshed for Sishen);
- Quantification of all sources of atmospheric emissions associated with the project; and
- A qualitative assessment report including current dust emissions at Sishen and the potential increase in dust levels due to the proposed expansion.

Note: that modelling is not considered necessary for this assessment given the detailed information already available from current modelling. There will be sufficient information to assess the impact.

The study will give particular attention to the impact of the proposed activities on dust levels close to public roads and the possible risk this can place on visibility for road users.

### **10.2.3 Heritage Impact Assessment**

EXM proposes to appoint PGS Heritage to undertake a heritage study of the areas for site clearance. The scope of work includes inductions, review of existing databases and a Phase 1 heritage and paleontological desktop assessment. The study will incorporate:

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

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

### **10.2.4 Closure Costing**

Provision has been made for the costing of the change in the closure liability as a result of the expansions. EXM will work together with Sishen personnel to ensure the methodology used relates to the assessments undertaken for the mine as whole. The shortfall (if any) in the financial provision will be determined.

### **10.2.5 Other Specialist Fields**

Note that there is significant information available from previous studies undertaken and EXM will draw on this information to assess the impacts on the following:

- Social and economic environment;
- Noise;
- Groundwater (pollution);
- Surface water management requirements;

There is sufficient information available and no additional specialist work is considered necessary.

No provision has been made for a hydrological assessment. A conceptual plan of the revised stormwater management requirements will be provided.

No provision has been made for a specialist investigation into the visual or aesthetic impacts, although these will be assessed by EXM as part of the EIA investigations.

### **10.3 Proposed method of assessing the environmental aspects including the proposed method of assessing alternatives**

#### **10.3.1 Impact ranking criteria**

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

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

Where:

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

and

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

Each criterion is given a score from 1 to 5 based on the definitions given in Table 10.1. Although the criteria used for the assessment of impacts attempts to quantify the significance, it is important to note that the assessment is generally a qualitative process and therefore the application of this criteria is open to interpretation. The process adopted will therefore include the application of scientific measurements and professional judgement to determine the significance of environmental impacts associated with the project. The assessment thus largely relies on experience of the environmental assessment practitioner (EAP) and the information provided by the specialists appointed to undertake studies for the EIA.

Where the consequence of an event is not known or cannot be determined, the "precautionary principle" will be adhered to and the worst-case scenario assumed. Where possible, mitigation measures to reduce the significance of negative impacts and enhance positive impacts will be recommended. The detailed actions, which are required to ensure that mitigation is successful, will be provided in the EMPR, which will form part of the EIA report. Consideration will be given to the phase of the project during which the impact occurs. The phase of the development during which the impact will occur will be noted to assist with the scheduling and implementation of management measures.

**TABLE 10-1: CRITERIA FOR ASSESSING THE IMPACT SIGNIFICANCE**  
**SEVERITY CRITERIA**

<b>INTENSITY = MAGNITUDE OF IMPACT</b>	<b>RATING</b>
Insignificant: impact is of a very low magnitude	1

Low: impact is of low magnitude	2
Medium: impact is of medium magnitude	3
High: impact is of high magnitude	4
Very high: impact is of highest order possible	5

<b>DURATION = HOW LONG THE IMPACT LASTS</b>	<b>RATING</b>
Very short-term: impact lasts for a very short time (less than a month)	1
Short-term: impact lasts for a short time (months but less than a year)	2
Medium-term: impact lasts for the for more than a year but less than the life of operation.	3
Long-term: impact occurs over the operational life of the proposed extension.	4
Residual: impact is permanent (remains after mine closure)	5

<b>EXTENT = SPATIAL SCOPE OF IMPACT/ FOOTPRINT AREA / NUMBER OF RECEPTORS</b>	<b>RATING</b>
Limited: impact affects the project site	1
Small: impact extends to the boundaries of the mining area	2
Medium: impact extends to neighboring properties	3
Large: impact affects the surrounding communities	4
Very Large: The impact extends beyond the neighbouring communities	5

## PROBABILITY

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

## IMPACT SIGNIFICANCE

### NEGATIVE IMPACTS

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

### POSITIVE IMPACTS

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

## CUMULATIVE IMPACTS

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

## MITIGATION MEASURES

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

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

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

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

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

## PROJECT PHASES

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



### **10.3.2 The proposed method of assessing duration significance**

The method for assessing duration and significance is included above.

### **10.4 Stages at which the competent authority will be consulted**

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

- Application Consultation - completed 3 July 2018
- Consultation on approval of Scoping Report (follow-up on approval and comments from the DMR on Scoping Report) – September 2018
- Consultation after submission of the EIA (presentation to DMR on content and findings of EIA) – February/March 2019
- Authority Site Visit – February/March 2018

The scoping, EIA and EMP reports will be submitted to the DMR for review

### **10.5 Particulars of the public participation process with regard to the impact assessment process that will be conducted**

#### **10.5.1 Steps to be taken to notify IAPs**

All persons registered as IAPs will be given an opportunity to comment on the EIA Report. Note that the notification and registration of additional IAPs will continue throughout the process. IAPs will be contacted regarding the availability of the report via email, registered mail or bulk SMS.

#### **10.5.2 Details of the engagement process to be followed**

##### **Public Review of the Scoping Report**

This draft Scoping Report will be made available for public review for 30 days. The report will be circulated to the public and commenting authorities. Any new issues raised during review of the Scoping Report will be incorporated in the final scoping report which will be submitted to the DMR.

##### **Feedback Meeting/s during EIA**

On completion of the EIA Report, public or focus group meetings may be arranged to present the results of the specialist studies and the identified environmental and social impacts of the development.

##### **Public Review of the EIA Report**

The EIA report will be made available for public review for a period of 30 calendar days.

## Report Distribution

The scoping and EIA reports will be made available for review using the following means:

- Hard copies are to be placed in the local library in Kathu and provided to the local municipality (Gamagara Local Municipality)
- Hard or electronic copies (CDs or emails) on request from EXM Advisory Services:
  - Tel: 010 007 3617 | 082 871 2959
  - Post: PO Box 1822, Rivonia, 2128
  - email: kerry@exm.co.za
- Summaries will be provided on request from EXM Advisory Services (Afrikaans and English).

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

The scope of work for the EIA phase of the project is detailed in Section 10.2.

The following tasks are to still to be completed:

- Compilation and circulation of draft scoping report (this report) for public and commenting authority review;
- Submit final scoping report (incorporating public and commenting authority comments) to DMR;
- Address public and authority comment and modify scope of work to EIA as required;
- Completion of specialist studies and collation of additional information;
- Identification of additional mitigation and environmental management requirements for incorporation into the project;
- Assess impacts and revise as required;
- Compile Draft EIA Report;
- Compile Draft EMPr
- Public Review of Draft Report
- Address public comment
- Finalise EIA Report and EMP
- Consult with Competent Authority (DMR) and address queries as required.

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

10-2.

**TABLE 10-2: EIA TASKS AND TIMING**

Phase	EAP activity	Opportunities for Consultation and Participation		SCHEDULE
		Competent Authorities	IAPs, State Departments and Organs of State	
Application	Application meetings (if required) & consultation.	Meeting with DMR	-	August 2018
	Submit application form to DMR (SAMRAD & Hard Copy)	DMR acknowledgement of receipt of application	-	July 2018
Scoping	Notification IAPs Inform persons of the project	Register interest, concerns and questions	IAPs to register interest, concerns and questions	June/July 2018
	Submit draft scoping to public and commenting authorities	Draft support submitted	IAPs to provide comments	July/August 2018
	Submit scoping report to DMR and acceptance	Authority to accept scoping report OR refuse (43 days of receipt)	IAPs comments are in the final scoping report	August/Sept 2018
Specialist Assessments and Input	EAP to manage specialist activities and collate information for EIA.	-	-	July – Oct 2018
EIA Phase	Assess environmental impacts. Compile draft EIA and EMP report	-	-	October 2018
	Arrange meetings and consultations	Meetings if required.	Public feedback meeting/. Focused consultation with IAPs or commenting authorities if required.	November 2018
	Submit draft EIA report to IAPs authorities.	Review of draft EIA report (30 days). Comments to EAP	Review of draft EIA report (30 days). Comments to EAP	
	Address public comment and finalise EIA and EMP reports			
	Final EIA report to authority (106 days from acceptance of scoping).	Authority acknowledge receipt of EIA report (10 days).		December 2018
Authority review and Authorisation	Arrange feedback meeting	DMR Request for Additional Information	-	Feb/March 2019
	-	Environmental Authorisation Granted / Refused (107 days).	-	April 2019
	Notifications to I&APs regarding environmental authorisation (granted or refused).		-	April 2019
Appeal Phase	EAP to provide guidance regarding the appeal process as and when required.	Consultation during processing of appeal if relevant.	Submit appeal in terms of National Appeal Regulations	As required

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

Refer to Table 9-8.

**11. OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY**

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

The current socio-economic benefits of the project will be sustained as the project will increase the life of the operations. The negative impacts on communities will however also continue over the long-term. More detail on the positive and negative socio-economic impacts of the project will be addressed in the EIA Report.

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

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

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


None applicable at this stage.

### 13. UNDERTAKINGS BY THE EAP

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

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

The undersigned declares that this report represents an independent and objective assessment of the risks associated with the proposed development.

Name	Affiliation	Designation	Signature	Date
Kerry Fairley	EXM Advisory Services (Pty) Ltd	Pr.Sci.Nat. Director		13 July 2018



## **14. REFERENCES**

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

**Anderson, T.A.** (May 2010). Specialist Vegetation Study on the Potential Impacts of the Proposed Open Pit Mine on Lylyveld South, Sishen Iron Ore Mine, Kathu.

**Beaumont, P.B.** (November 2009). Phase 1 Archaeological Impact Assessment Report on a Portion of the Farm Lylyveld 545, near Kathu, Kalagadi District Municipality. Northern Cape.

**dBAcoustics**, February 2018. Sishen Iron Ore Company (Pty) Ltd Environmental Noise Impact Assessment – DMS Upgrade Project for the Processing of Low Grade Iron Ore Material. Kathu, Northern Cape. Project Number: 016/2018.

**Demacon Market Studies**, July 2016. Sishen Economic Impact Assessment. Findings and Recommendations.

**Lidwala Environmental and Planning Services**, March 2013. Biodiversity Action Plan for Sishen Mine, Kathu, Northern Cape.

**Meyer, 2009.** Conceptual Geohydrological Model for Sishen Iron Ore Mine Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002). Mineral and Petroleum Resources Development Regulations. Government Notice R.527.

**PGS Heritage**, December 2017. Phase 1 Heritage Impact Assessment. Proposed Development of a New Pollution Control Dam at Aldag, on the Remainder of the Farm Sishen 543, and the expansion of a currently planned Pollution Control Dam on the Remainder of the Farm Lylyveld 545, Northern Cape.

**Shangoni Management Services**, July 2017. Sishen Iron Ore Company. Integrated Water and Waste Management Plan. Sishen Mine.