



global environmental solutions

**ENVIRONMENTAL IMPACT ASSESSMENT REPORT
AND
ENVIRONMENTAL MANAGEMENT PROGRAMME
REPORT**

**KOLOMELA MINE AMENDMENT:
EXPANSION OF ACTIVITIES AT KOLOMELA MINE
PART A**

SUBMITTED FOR ENVIRONMENTAL AUTHORISATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002.

NAME OF APPLICANT: SISHEN IRON ORE COMPANY (PTY) LTD - KOLOMELA MINE

TEL NO: 053 313 9136

FAX NO: 078 560 5600

POSTAL ADDRESS: Private Bag X3003, Postmasburg, 8420

PHYSICAL ADDRESS: Kolomela Mine, Farm Strydfontein 614, Postmasburg, Northern Cape

FILE REFERENCE NUMBER SAMRAD NC-00039-MR/102



Synergistics is a SLR group company

DOCUMENT INFORMATION

Title	ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT
Author	Kerry Fairley
Client	Sishen Iron Ore Company (Pty) Ltd – Kolomela Mine
Keywords	amendment, expansion, environmental authorisation, waste licence
Project Number	755.19038.00006
Report Number	A
Status	Draft for PUBLIC review
Issue Date	2 September 2016

Synergistics Environmental Services (Pty) Ltd - part of the SLR Group

Johannesburg, South Africa

Physical Address:

SLR House
Fourways Manor Office Park
Corner Roos and Macbeth Streets
Fourways
Johannesburg
South Africa

Postal Address:

P O Box 1596
Cramerview
2060

Tel: +27 (011) 467-0945

Fax: +27 (011) 467-0978

1. IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (act 28 of 2002 as amended), the minister must grant a prospecting or mining right if among others the mining “will not result in unacceptable pollution, ecological degradation or damage to the environment”.

Unless an environmental authorisation can be granted following the evaluation of an environmental impact assessment and an environmental management programme report in terms of the National Environmental Management Act (act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3)(b) of the EIA regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the competent authority and in terms of section 17 (1) (c) the competent authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or a permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the regulation and will lead to the environmental authorisation being refused.

It is furthermore an instruction that the environmental assessment practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

2. OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The objective of the environmental impact assessment process is to, through a consultative process—

- (a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- (b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- (c) identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

(d) determine the—

(i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

(ii) degree to which these impacts—

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources, and

(cc) can be avoided, managed or mitigated;

(e) identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;

(f) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;

(g) identify suitable measures to manage, avoid or mitigate identified impacts; and

(h) identify residual risks that need to be managed and monitored.

KOLOMELA MINE EXPANSION

ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT PART A

CONTENTS

1	CONTACT PERSON AND CORRESPONDENCE ADDRESS	1
1.1	DETAILS OF THE EAP WHO PREPARED THE REPORT	1
1.2	EXPERTISE OF THE EAP	1
2	DESCRIPTION OF THE PROPERTY	1
3	DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY	4
3.1	DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN	8
4	POLICY AND LEGISLATIVE CONTEXT	32
5	NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES	40
6	MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE INCLUDING A FULL DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE	42
6.1	DETAILS OF THE DEVELOPMENT FOOTPRINT ALTERNATIVES CONSIDERED	42
6.2	DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED	47
6.3	SUMMARY OF ISSUES RAISED BY IAPS	51
7	THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE DEVELOPMENT FOOTPRINT ALTERNATIVES	83
7.1	TYPE OF BASELINE ENVIRONMENT AFFECTED BY THE PROPOSED ACTIVITY	83
7.2	DESCRIPTION OF THE CURRENT LAND USES	136
7.3	DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURES AND INFRASTRUCTURE ON THE SITE	139
7.4	ENVIRONMENT AND CURRENT LAND USE MAP	140
8	IMPACTS AND RISKS IDENTIFIED INCLUDING THE NATURE, SIGNIFICANCE, CONSEQUENCE, EXTENT, DURATION IN AND PROBABILITY OF THE IMPACTS, INCLUDING THE DEGREE TO WHICH THESE IMPACTS CAN BE REVERSED, AVOIDED, MANAGED, MITIGATED AND EXTENT TO WHICH THEY MAY CAUSE IRREPLACEABLE LOSS OF RESOURCES	143
8.1	LIST OF IMPACTS OF ACTIVITIES IN INITIAL SITE LAYOUT	143
8.2	METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS	143
8.3	THE POSITIVE AND NEGATIVE IMPACTS THAT THE PROPOSED ACTIVITY (IN TERMS OF THE INITIAL SITE LAYOUT) AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND THE COMMUNITY THAT MAY BE AFFECTED	145
8.4	THE POSSIBLE MITIGATION MEASURES THAT COULD BE APPLIED AND THE LEVEL OF RISK	175
8.5	MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED	175
8.6	STATEMENT MOTIVATING THE ALTERNATIVE DEVELOPMENT LOCATION WITHIN THE OVERALL SITE	176
8.7	FULL DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY, ASSESS AND RANK THE IMPACTS AND RISKS THE ACTIVITY WILL IMPOSE ON THE PREFERRED SITE (IN RESPECT OF THE FINAL SITE LAYOUT PLAN) THROUGH THE LIFE OF THE ACTIVITY	176
8.8	ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT RISK	176
9	SUMMARY OF SPECIALIST REPORTS	209
10	ENVIRONMENTAL IMPACT STATEMENT	223
10.1	SUMMARY OF KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT	223
10.2	FINAL SITE MAP	225
10.3	SUMMARY OF THE POSITIVE AND NEGATIVE IMPLICATIONS AND RISKS OF THE PROPOSED ACTIVITY AND IDENTIFIED ALTERNATIVES	10-227

10.4	PROPOSED MANAGEMENT OBJECTIVES AND THE IMPACT MANAGEMENT OUTCOMES FOR INCLUSION IN THE EMPR.....	231
10.5	FINAL PROPOSED ALTERNATIVES.....	232
10.6	ASPECTS FOR INCLUSION AS CONDITIONS IN THE AUTHORISATION	232
10.7	DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE	232
10.8	REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD OR SHOULD NOT BE AUTHORISED.....	232
10.9	PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED	234
11	FINANCIAL PROVISION	234
11.1	DERIVATION OF QUANTUM.....	234
11.2	AMOUNT TO BE PROVIDED FOR FROM OPERATING EXPENDITURE	234
12	DEVIATIONS FROM THE APPROVED SCOPING REPORT AND PLAN OF STUDY	234
12.1	DEVIATIONS FROM THE METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF THE POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS	234
12.2	MOTIVATION FOR DEVIATION	234
13	OTHER INFORMATION REQUIRED BY COMPETENT AUTHORITY	234
14	OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF NEMA	234
15	REFERENCES	235

LIST OF FIGURES

FIGURE 2.1:	KOLOMELA MINE LOCALITY	3
FIGURE 3.1:	MAP OF KOLOMELA MINE SHOWING PROPOSED LISTED ACTIVITIES AND INFRASTRUCTURE (REVISED LAYOUT AFTER MITIGATION)	7
FIGURE 3.2:	CHANGE IN NUMBER OF EMPLOYEES BOTH PERMANENT AND CONTRACTOR DURING THE LIFE OF MINE	9
FIGURE 3.3:	LAYOUT OF PROPOSED KAPSTEVEL SOUTH PIT, KAPSTEVEL SOUTH EVAPORATION POND AND THE EXTENDED KAPSTEVEL WRD (REVISED LAYOUT AFTER MITIGATION)	11
FIGURE 3.4:	LAYOUT OF PROPOSED PLOEGFONTEIN AND TIERBULT PITS AND ASSOCIATED INFRASTRUCTURE (REVISED LAYOUT AFTER MITIGATION)	14
FIGURE 3.5:	LAYOUT OF THE EXTENDED LEEUWFONTEIN NORTH AND SOUTH WRDS (REVISED LAYOUT AFTER MITIGATION)	16
FIGURE 3.6:	LAYOUT SHOWING 3 LOCATIONS OF THE MODULAR DMS PROCESSING PLANTS ON THE FARMS: TIERBULT (2), KLIPBANKFONTEIN (7) AND KAPSTEVEL (15).	20
FIGURE 3.7:	PROPOSED LAYOUT OF KAPSTEVEL AT PIT FACILITY (REVISED LAYOUT AFTER MITIGATION).....	23
FIGURE 3.8:	PROPOSED LAYOUT OF KLIPBANKFONTEIN AT PIT FACILITY (REVISED LAYOUT AFTER MITIGATION).....	24
FIGURE 3.9:	HAUL ROADS TO KLIPBANKFONTEIN PIT AND LEEUWFONTEIN SOUTH WRD.....	26
FIGURE 3.10:	PROVISIONAL INJECTION BOREHOLE DESIGN (REVISED LAYOUT AFTER MITIGATION)	30
FIGURE 6.1:	ORIGINAL PROPOSED SITE LAYOUT 1 BEFORE CONSIDERATION OF ALTERNATIVES AND PUBLIC CONSULTATION.....	43
FIGURE 6.2:	PROPOSED SITE LAYOUT 2 DURING THE SCOPING PHASE WHICH THE SPECIALIST STUDIES WERE UNDERTAKEN.....	44
FIGURE 6.3:	FINAL LAYOUT PLAN 3 (MITIGATED LAYOUT) TAKING INTO CONSIDERATION THE AVOIDANCE OF SENSITIVITIES HIGHLIGHTED BY THE EIA AND SPECIALIST STUDIES	45
FIGURE 7.1:	PERIOD, DAY AND NIGHT-TIME WIND ROSES (2011 – 2014).....	84
FIGURE 7.2:	SEASONAL WIND ROSES (NOVEMBER 2011 TO OCTOBER 2014)	85
FIGURE 7.3:	RAINFALL STATISTICS (POSTMASBURG WEATHER STATION – 1917 TO 1991).....	86
FIGURE 7.4:	TRANSMISSIVITY DISTRIBUTION AND MAIN STRUCTURAL TRENDS (SOURCE: GROUNDWATER COMPLETE, 2014)	90
FIGURE 7.5:	SIMULATED DRAWDOWN AT END OF 2014 (SOURCE: GROUNDWATER COMPLETE, 2014)	91
FIGURE 7.6:	WATERCOURSES AT AND WITHIN THE PROXIMITY OF KOLOMELA MINE (SOURCE: SAS, 2015)	103
FIGURE 7.7:	PAN CLUSTERS AT KOLOMELA MINE	104
FIGURE 7.8:	LOCATIONS OF WETLANDS, TERRESTRIAL PANS AND DRAINAGE LINES	106
FIGURE 7.9:	VEGETATION TYPES WITHIN THE REGION	109
FIGURE 7.10:	BIODIVERSITY MANAGEMENT UNITS	110
FIGURE 7.11:	PM ₁₀ HOURLY AVERAGE POLAR PLOTS FOR THE KAPPIESKAREEBOOM STATION	112

FIGURE 7.12: PM _{2.5} HOURLY AVERAGE POLAR PLOTS FOR THE KAPPIESKAREEBOOM STATION	112
FIGURE 7.13: LOCATION OF DUST MONITORING SITES	113
FIGURE 7.14: RESULTS OF THE SGS DUSTFALL MONITORING CAMPAIGN – ON-SITE DUST BUCKETS	114
FIGURE 7.15: RESULTS OF THE SGS DUSTFALL MONITORING CAMPAIGN – OFF-SITE DUST BUCKETS	115
FIGURE 7.16: NOISE SAMPLING LOCATIONS	117
FIGURE 7.17: LOCATION OF HERITAGE SITES.....	122
FIGURE 7.18: POPULATION GROWTH IN TSANTSABANE MUNICIPAL AREA	130
FIGURE 7.19: GROWTH IN THE NUMBER OF HOUSEHOLDS IN THE TSANTSABANE MUNICIPAL AREA	131
FIGURE 7.20: EDUCATION LEVELS OF ADULTS IN TSANTSABANE MUNICIPAL AREA	132
FIGURE 7.21: CHANGE IN EDUCATION LEVELS IN TSANTSABANE MUNICIPAL AREA WITH TIME.....	132
FIGURE 7.22: CHANGE IN UNEMPLOYMENT RATE PER AREA WITHIN THE TSANTSABANE MUNICIPAL AREA.....	134
FIGURE 7.23: AVERAGE ANNUAL HOUSEHOLD INCOME	134
FIGURE 7.24: NUMBER OF CRIMES (BY TYPE) REPORTED	136
FIGURE 7.25: KOLOMELA NEIGHBOURING HOUSEHOLDS	138
FIGURE 7.26: ENVIRONMENTAL SENSITIVITIES WITHIN THE KOLOMELA AMENDMENT AREA	140
FIGURE 7.27: CURRENT LAND USES WITHIN THE KOLOMELA AMENDMENT AREA (SHOWING EXISTING DISTURBANCE AND APPROVED LAYOUT).....	141
FIGURE 7.28: CURRENT LAND USES SURROUNDING KOLOMELA AMENDMENT AREA.....	142
FIGURE 8.1: SIMULATED DEWATERING CONES FOR YEAR 2020 DEWATERING AT 3990 M ³ /HR	146
FIGURE 8.2: SIMULATED DEWATERING CONES FOR YEAR 2030 DEWATERING AT 3990 M ³ /HR	146
FIGURE 8.3: SIMULATED DEWATERING CONES FOR YEAR 2040 DEWATERING AT 3990 M ³ /HR	147
FIGURE 8.4: SIMULATED DEWATERING CONES FOR YEAR 2050 DEWATERING AT 3990 M ³ /HR	147
FIGURE 8.5: SIMULATED DEWATERING CONES FOR YEAR 2060 DEWATERING AT 3990 M ³ /HR	148
FIGURE 8.6: SIMULATED DEWATERING CONES FOR YEAR 2070 DEWATERING AT 3990 M ³ /HR	148
FIGURE 8.7: DRAINAGE AT KAPSTEVEL AT PIT FACILITY AND DMS PLANT	150
FIGURE 8.8: DRAINAGE AT KLIPBANKFONTEIN AT PIT FACILITY.....	151
FIGURE 8.9: LAYOUT OF PLOEGFONTEIN & TIERBULT PITS AREA SHOWING AVOIDANCE OF WETLAND PAN CATCHMENT AREAS.....	154
FIGURE 8.10: LAYOUT OF LEEUWFONTEIN SOUTH WRD SHOWING AVOIDANCE OF WETLAND PAN CATCHMENT AREAS.....	155
FIGURE 8.11: PREDICTED ANNUAL AVERAGE PM ₁₀ GROUND LEVEL CONCENTRATIONS FOR SCENARIO 2..	158
FIGURE 8.12: PREDICTED AREAS EXCEEDING THE NUMBER OF DAYS AS REQUIRED BY THE 24-HOUR NAAQS LIMITS FOR PM ₁₀ FOR SCENARIO 2.....	159
FIGURE 8.13: PREDICTED ANNUAL AVERAGE PM ₁₀ GROUND LEVEL CONCENTRATIONS FOR SCENARIO 3..	160
FIGURE 8.14: PREDICTED AREAS EXCEEDING THE NUMBER OF DAYS AS REQUIRED BY THE 24-HOUR NAAQS LIMITS FOR PM ₁₀ FOR SCENARIO 3.....	161
FIGURE 8.15: PREDICTED ANNUAL AVERAGE PM _{2.5} GROUND LEVEL CONCENTRATIONS FOR SCENARIO 2..	162
FIGURE 8.16: PREDICTED AREAS EXCEEDING THE NUMBER OF DAYS AS REQUIRED BY THE 24-HOUR NAAQS LIMITS FOR PM _{2.5} FOR SCENARIO 2.....	163
FIGURE 8.17: PREDICTED ANNUAL AVERAGE PM _{2.5} GROUNDLEVEL CONCENTRATIONS FOR SCENARIO 3..	164
FIGURE 8.18: PREDICTED AREAS EXCEEDING THE NUMBER OF DAYS AS REQUIRED BY THE 24-HOUR NAAQS LIMITS FOR PM _{2.5} FOR SCENARIO 3.....	165
FIGURE 8.19: PREDICTED DAILY DUST FALLOUT RATES FOR SCENARIO 2.....	166
FIGURE 8.20: PREDICTED DAILY DUST FALLOUT RATES FOR SCENARIO 3.....	167
FIGURE 8.21: PREDICTED CUMULATIVE DAY-TIME NOISE LEVELS (YEAR 2024)	169
FIGURE 8.22: PREDICTED CUMULATIVE NIGHT-TIME NOISE LEVELS (YEAR 2024).....	170
FIGURE 8.23: LAYOUT OF KAPSTEVEL PIT, WRD AND AQUIFER RECHARGE PIPELINE.....	173
FIGURE 10.1: FINAL LAYOUT PLAN 3 (MITIGATED LAYOUT) TAKING INTO CONSIDERATION THE AVOIDANCE OF SENSITIVITIES HIGHLIGHTED BY THE EIA AND SPECIALIST STUDIES	10-226

LIST OF TABLES

TABLE 1.1: DETAILS OF THE EAP.....	1
TABLE 2.1: DESCRIPTION OF THE PROPERTY.....	2
TABLE 3.1: DESCRIPTION OF LISTED AND SPECIFIED ACTIVITIES	4
TABLE 3.2: LISTED ACTIVITIES FOR THE KAPSTEVEL SOUTH PIT AND WRD	12
TABLE 3.3: LISTED ACTIVITIES FOR PLOEGFONTEIN AND TIERBULT PITS.....	15
TABLE 3.4: LISTED ACTIVITIES FOR LEEUWFONTEIN WRD	17
TABLE 3.5: LISTED ACTIVITIES FOR KLIPBANKFONTEIN WRD.....	18

TABLE 3.6: LISTED ACTIVITIES FOR MODULAR DMS PROCESSING PLANT	21
TABLE 3.7: LISTED ACTIVITIES FOR AT PIT FACILITIES	25
TABLE 3.8: LISTED ACTIVITIES FOR HAUL ROADS TO KLIPBANKFONTEIN PIT AND LEEUWFONTEIN SOUTH WRD.....	26
TABLE 3.9: LISTED ACTIVITIES FOR THE EXPLOSIVES MAGAZINE	27
TABLE 3.10: LISTED ACTIVITIES FOR THE SEWAGE TREATMENT WORKS	28
TABLE 3.11: LISTED ACTIVITIES FOR PRODUCT STOCKPILE AREA	29
TABLE 3.12: LISTED ACTIVITIES FOR AQUIFER RECHARGE FACILITY.....	31
TABLE 4.1: LEGAL FRAMEWORK	32
TABLE 6.1: SUMMARY OF ISSUES RAISED BY IAPS AND REGULATORY AUTHORITIES	51
TABLE 7.1: MONTHLY TEMPERATURE SUMMARY	86
TABLE 7.2: AGRICULTURAL POTENTIAL OF DOMINANT SOILS ON THE KOLOMELA MINE.....	87
TABLE 7.3: GROUNDWATER LEVELS RECORDED IN FARMS SURROUNDING KOLOMELA FROM 2008 TO 2015	93
TABLE 7.4: WATER QUALITY RECORDED ON FARMS SURROUNDING KOLOMELA MINE IN 2015	100
TABLE 7.5: SUMMARY OF THE ECOLOGICAL STATUS OF QUATERNARY CATCHMENT D73A BASED ON KLEYNHANS (1999).....	102
TABLE 7.6: SUMMARY OF PM ₁₀ CONCENTRATIONS FOR THE KAPPIESKAREEBOOM STATION.....	111
TABLE 7.7: SUMMARY OF PM _{2.5} CONCENTRATIONS FOR THE KAPPIESKAREEBOOM STATION.....	111
TABLE 7.8: SUMMARY OF ATTENDED 20 MINUTE SURVEY CONDUCTED BETWEEN 10 AND 12 JUNE 2014.....	118
TABLE 7.9: SUMMARY OF UNATTENDED 24 HOUR SURVEY CONDUCTED BETWEEN 9 AND 12 JUNE 2014.....	119
TABLE 7.10: SUMMARY OF SAMPLING CAMPAIGN RESULTS FROM 2003 TO 2014	119
TABLE 7.11: HERITAGE SITES	123
TABLE 7.12: DESCRIPTION OF CURRENT & AUTHORISED LAND USES ON THE APPLICATION AREA	136
TABLE 7.13: DESCRIPTION OF LAND USES ON NEIGHBOURING PROPERTIES.....	137
TABLE 8.1: IMPACT RISK ASSESSMENT.....	177
TABLE 10.1: SUMMARY OF KEY POSITIVE AND NEGATIVE IMPACTS IDENTIFIED FOR THE MITIGATED AND UNMITIGATED SCENARIOS	10-227
TABLE 11.1: UPDATED PREMATURE AND FINAL (LOM) CLOSURE COSTS FOR PROPOSED KOLOMELA AMENDMENT (ALL VALUES EXCLUDE SALVAGE VALUES).....	234

ACRONYMS AND ABBREVIATIONS	
	Definition
AEL	Atmospheric Emissions Licence
CBA	Critical Biodiversity Areas
dBA	Decibel (A-weighted)
DEMC	Default Ecological Management Class
DMR	Department of Mineral Resources
DMS	Dense Medium/Media Separation
DSO	Direct Shipping Ore
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECD	Early Childhood Development
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMP	Environmental Management Programme
ESA	Ecological Support Areas
GN(R)	Government Notice (Regulation)
HDPE	High Density Polyethylene
IAP	Interested and Affected Party
L_{A90}	A-weighted noise level exceeded for 90% of the measurement period
L_{Aeq}	A-weighted equivalent sound pressure level
L_{A1eq}	A-weighted impulse sound pressure level
LED	Local Economic Development
LOM	Life of mine
LSA	Late Stone Age
Mamsl	Metres above mean sea level
MAP	Mean annual precipitation
MAR	Mean annual runoff
MCCF	Mining Crime Combating Forum
MSA	Middle Stone Age
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
NEMAQA	National Environmental Management: Air Quality Act 39 of 2004
NEMBA	National Environmental Management Biodiversity Act 10 of 2004
NFEPA	National Freshwater Ecosystem Priority Areas
PCD	Pollution Control Dam
PES(C)	Present Ecological Status (Class)
PM10	Particulate matter less than ten microns
PM2.5	Particulate matter less than 2.5 microns
ROM	Run of mine
SAHRA	South African Heritage Resource Agency
SAMRAD	South African Mineral Resources Administration (System)
SANS	South African National Standards
SAPS	South African Police Service
SAS	Scientific Aquatic Services CC

SIOC	Sishen Iron Ore Company
SLP	Social Labour Plan
TDS	Total Dissolved Solids
WRD	Waste Rock Dumps

PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL ASSESSMENT REPORT

1 CONTACT PERSON AND CORRESPONDENCE ADDRESS

1.1 DETAILS OF THE EAP WHO PREPARED THE REPORT

TABLE 1.1: DETAILS OF THE EAP

DETAILS	PROJECT MANAGER AND AUTHOR
Name of the practitioner	Kerry Fairley
Tel No.:	082 871 2959
Fax No.:	086 616 0443
E-mail address	kerry@exm.co.za

1.2 EXPERTISE OF THE EAP

1.2.1 QUALIFICATIONS OF THE EAPS

Kerry Fairley

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

1.2.2 SUMMARY OF THE EAPS' PAST EXPERIENCE

Kerry Fairley has over 16 years of experience in environmental impact assessment and management in the mining industry. Kerry has been involved in the compilation 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).

See Part A: Appendix A for proof of registration.

2 DESCRIPTION OF THE PROPERTY

The proposed amendments to Kolomela Mine will take place within the area covered by the existing Mining Right {Ref: (NC) 069 MR} with the exception of the aquifer recharge component of the amendment that will take place on the farm Floradale 230 & 484, located immediately adjacent to the mining right area.

A description of the property on which the proposed project is located is provided in Table 2.1.

TABLE 2.1: DESCRIPTION OF THE PROPERTY

Farm Name:	Mining Right Area <ul style="list-style-type: none"> - Ploegfontein 487 - Rem Leeuwfontein 488 - Strydfontein 614 - Rem Klipbankfontein 489 - Portion 1,2 & 3 Kapstevél 541 - Rem Kapstevél 541 - Wolhaarkop 485 - Welgevonden 476 - Welgevonden 486 Aquifer Recharge <ul style="list-style-type: none"> - Floradale 230 - Floradale 484
Application area (Ha)	Approximately 2 400 ha new development area: <ul style="list-style-type: none"> - of which 1 890 ha is within the mining right area - of which 520 ha is for the aquifer recharge area
Magisterial district:	Tsantsabane Local Municipality, Z.F. Mgcawu District Municipality
Distance and direction from nearest town	Postmasburg is located 10 km, north east of Kolomela Mine
21 digit Surveyor General Code for each farm portion	Ploegfontein 487: C03100000000048700000 Leeuwfontein 488: C03100000000048800000 Strydfontein 614: C03100000000061400000 Klipbankfontein 489: C03100000000048900000 Kapstevél 541: C03100000000054100000 Wolhaarkop 476: C03100000000047600000 Welgevonden 486: C03100000000048600000 Welgevonden 476: C03100000000047600000 Floradale 230: C03100000000023000000 Floradale 484: C03100000000048400000

The local and regional settings of the project area are included as Figure 2.1.

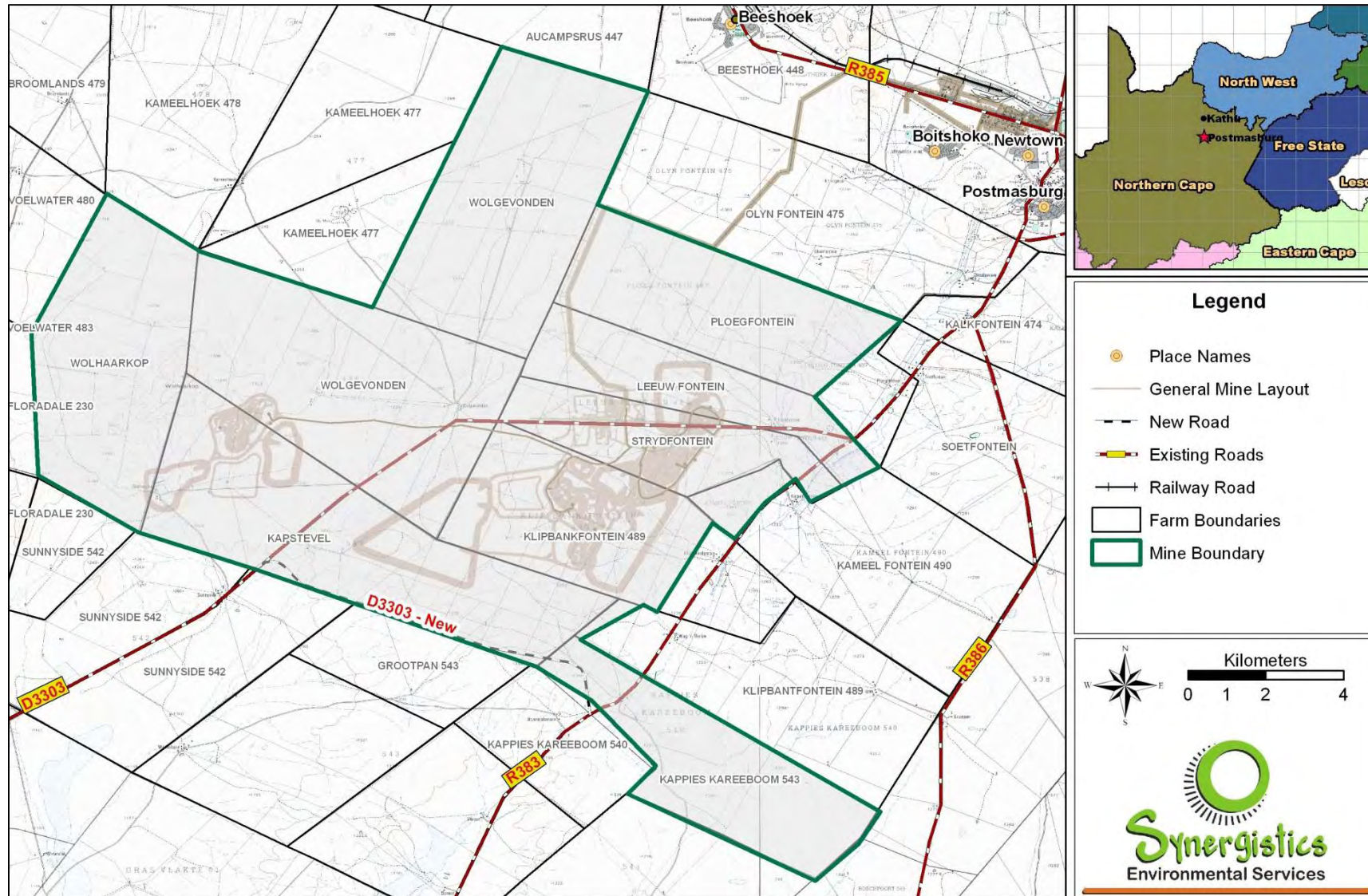


FIGURE 2.1: KOLOMELA MINE LOCALITY

3 DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY

The proposed new activities and infrastructure at Kolomela Mine are described in Table 3.1.

TABLE 3.1: DESCRIPTION OF LISTED AND SPECIFIED ACTIVITIES

NAME OF ACTIVITY	AERIAL EXTENT OF THE ACTIVITY Ha or m ²	LISTED ACTIVITY (Mark with an X where applicable or affected).	APPLICABLE LISTING NOTICE (GNR 983, GNR 984 or GNR 985)	WASTE MANAGEMENT AUTHORISATION (Indicate whether an authorisation is required in terms of the Waste Management Act). (Mark with an X)	APPLICABLE LISTING NOTICE (GNR 921)
New Kapstevl South Pit	147 ha	X	GN 983 12 (watercourse) 24 (new haul roads) 56 (lengthening of existing haul roads) GN 984 15 (vegetation clearance) 17 (mining right) GN 985 14 (Soutloop river listed under NFEPA)		
Kapstevl South Evaporation Pond	22 ha	X	GN 983 13 (storage of water) GN 984 6 (water use licence) 15 (vegetation clearance)		
Extension of approved Kapstevl Waste Rock Dump	546 ha (extension area)	X	GN 983 12 (watercourse) 24 (new haul roads) 56 (lengthening of existing haul roads) GN 984 15 (vegetation clearance) 17 (mining right)	X	Category A(13) (waste rock dump extension)
New Ploegfontein and Tierbult Pits	165 ha	X	GN 983 12 (watercourse) 24 (new haul roads) 56 (lengthening of existing haul roads) GN 984 15 (vegetation clearance) 17 (mining right)		
New Haul Road to Ploegfontein Pits	15 ha	X	GN 983 24 (new haul roads)		
New Ploegfontein Evaporation Pond	10 ha	X	GN 983 13 (storage of water) GN 984 6 (water use licence)		
Extension of the approved Leeuwfontein North Waste Rock Dump	408 ha (extension area)	X	GN 983 12 (watercourse) 24 (new haul roads) 56 (lengthening of existing haul roads) GN 984 15 (vegetation clearance) 17 (mining right)	X	Category A (13) (waste rock dump extension)

NAME OF ACTIVITY	AERIAL EXTENT OF THE ACTIVITY Ha or m ²	LISTED ACTIVITY (Mark with an X where applicable or affected).	APPLICABLE LISTING NOTICE (GNR 983, GNR 984 or GNR 985)	WASTE MANAGEMENT AUTHORISATION (Indicate whether an authorisation is required in terms of the Waste Management Act). (Mark with an X)	APPLICABLE LISTING NOTICE (GNR 921)
Extension of the approved Leeuwfontein South Waste Rock Dump	200 ha (extension area)	X	GN 983 12 (watercourse) 24 (new haul roads) 56 (lengthening of existing haul roads) GN 984 15 (vegetation clearance) 17 (mining right)	X	Category A (13) (waste rock dump extension)
Amendment of the approved Klipbankfontein Waste Rock Dump	486 ha	X	GN 983 12 (watercourse) 24 (new haul roads) 56 (lengthening of existing haul roads) GN 984 15 (vegetation clearance) 17 (mining right)	X	Category A (13) (waste rock dump extension)
New Kapstevl DMS Processing Plant and Product Stockpile Area	24 ha	X	GN 983 12 (watercourse) 13 (storage of water) 24 (new haul roads) 27 (clearance of vegetation) GN 984 6 (21 g water use licence) 21 (processing) GN 985 14 (Soutloop listed under NFEPA)		
New Conveyor from Kapstevl at Pit Facility to Load out Station	3 ha	X	GN 983 12 (watercourse)		
New Tierbult DMS Processing Plant	12 ha (included in footprint of Leeuwfontein North Waste Rock Dump)	X	GN 983 24 (new haul roads) GN 984 6 (21 g water use licence) 21 (processing)		
New Klipbankfontein DMS Processing Plant	12 ha	X	GN 983 24 (new haul roads) GN 984 6 (21 g water use licence) 21 (processing)		
New Kapstevl at Pit Facility (parking, fatigue centre, workshops and refuelling area)	112 ha	X	GN 983 12 (watercourse) 13 (storage of water) 24 (new haul roads) GN 984 4 (storage of dangerous goods) 6 (AEL and water use licence) 15 (vegetation clearance) 28 (AEL) GN 985		

NAME OF ACTIVITY	AERIAL EXTENT OF THE ACTIVITY Ha or m ²	LISTED ACTIVITY (Mark with an X where applicable or affected).	APPLICABLE LISTING NOTICE (GNR 983, GNR 984 or GNR 985)	WASTE MANAGEMENT AUTHORISATION (Indicate whether an authorisation is required in terms of the Waste Management Act). (Mark with an X)	APPLICABLE LISTING NOTICE (GNR 921)
			14 (Soutloop listed under NFEPA)		
New Klipbankfontein at Pit Facility (parking, fatigue centre, workshops and refuelling area)	48 ha	X	GN 983 12 (watercourse) 13 (storage of water) 24 (new haul roads) GN 984 4 (storage of dangerous goods) 6 (AEL and water use licence) 15 (vegetation clearance) 28 (AEL) GN 985 14 (Soutloop listed under NFEPA)		
New Haul Roads to Klipbankfontein At Pit Facility	0.1 ha	X	GN 983 12 (watercourse) 24 (new haul roads) GN 985 14 (Soutloop listed under NFEPA)		
New Haul Roads to the Klipbankfontein Pit and Leeuwfontein South WRD	11 ha	X	GN 983 24 (new haul roads)		
New Explosives Magazine	5 ha	X	GN 983 12 (watercourse) 14 (dangerous goods) 27 (vegetation clearance) GN 985 14 (Soutloop listed under NFEPA)		
New Product Stockpile Area at existing DSO Processing Plant	44 ha	X	GN 984 15 (vegetation clearance)		
New Sewage Treatment Works	5 ha (already cleared)	X	GN 983 12 (watercourse) GN 985 14 (Soutloop listed under NFEPA)		
New Aquifer Recharge Facility	100 ha (pipelines and boreholes)	X	GN 983 12 (watercourse) GN 985 14 (Soutloop listed under NFEPA)		
Dewatering	14 boreholes and surface pipelines	-	No listed activities		

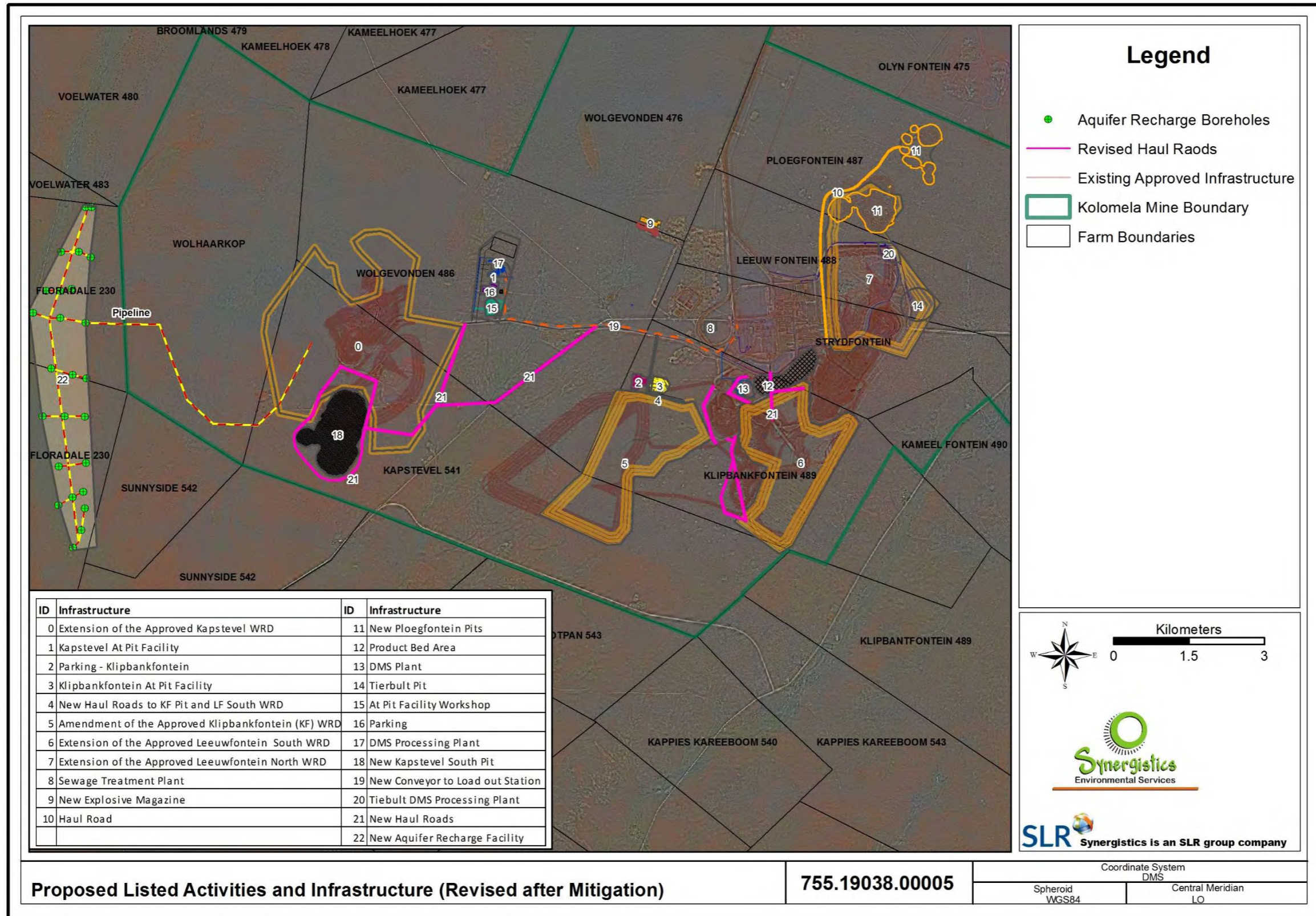


FIGURE 3.1: MAP OF KOLOMELA MINE SHOWING PROPOSED LISTED ACTIVITIES AND INFRASTRUCTURE (REVISED LAYOUT AFTER MITIGATION)

3.1 DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

3.1.1 OVERVIEW

Environmental authorisation is being sought for the expansion and amendment of activities at the existing Kolomela Mine, located 10 km south west of the town Postmasburg in the Northern Cape.

The Minister of Mineral Resources granted a mining right on 5 May 2008, authorising the exploitation of iron ore at Kolomela Mine {Ref: (NC) 069 MR}. The mining right is valid until 17 September 2038, unless cancelled or suspended.

Kolomela Mine operates under an existing Environmental Management Programme Amendment authorised in terms of Section 39(4) (*now repealed*) of the Mineral & Petroleum Resources Development Act (Ref: NC 30/5//3/2/1/069EM).

The Kolomela Mine is an open pit iron ore mine which produces approximately 9 million tonnes of iron ore per annum (Mtpa). The current life of mine (LOM) plan is until 2038 and involves mining from the existing three pits, namely the Leeuwfontein Pit, the Klipbankfontein Pit and the Kapstevél Pit. Existing processing facilities involve a 9 Mtpa direct shipping ore (DSO) operation, including crushing and screening of recovered ore material into stockpiles of 'lump' and 'fines' for transportation by rail to Saldanha Bay.

Kolomela Mine intends increasing production at the mine from the current 9 Mtpa per annum to 13 Mtpa in 2016 and then to 16 Mtpa in 2018. This increased production will be supported by mining from additional pits: Kapstevél South Pit, Tierbult Pit and the Ploegfontein Pits¹. The incorporation of the additional pits will allow for the LOM to be extended by an additional 2 years until 2040.

Waste Rock Dumps (WRDs) will need to be expanded to accommodate the additional production. Three sites have also been identified for the incorporation of Dense Media Separation (DMS) into processing. It is anticipated that only one DMS plant will be in operation at any time at which ever position is closest to the ore to be processed and adding an additional 1-2 Mtpa processing capability. If conditions require it, more than one of the Modular DMS Processing Plants may be in operation at any one time. Minor changes to the existing DSO Processing Plant are also planned to increase the capacity to 14 Mtpa by 2018.

Additional infrastructure required to support the accelerated mining includes new haul roads, workshops, refuelling area and a fatigue centre near the Kapstevél Pits (Kapstevél At Pit Facility) and also near the Klipbankfontein Pit (Klipbankfontein At Pit Facility). A new sewage treatment works and explosives magazine as well as product bed stockpile area are also considered necessary to support the amendment.

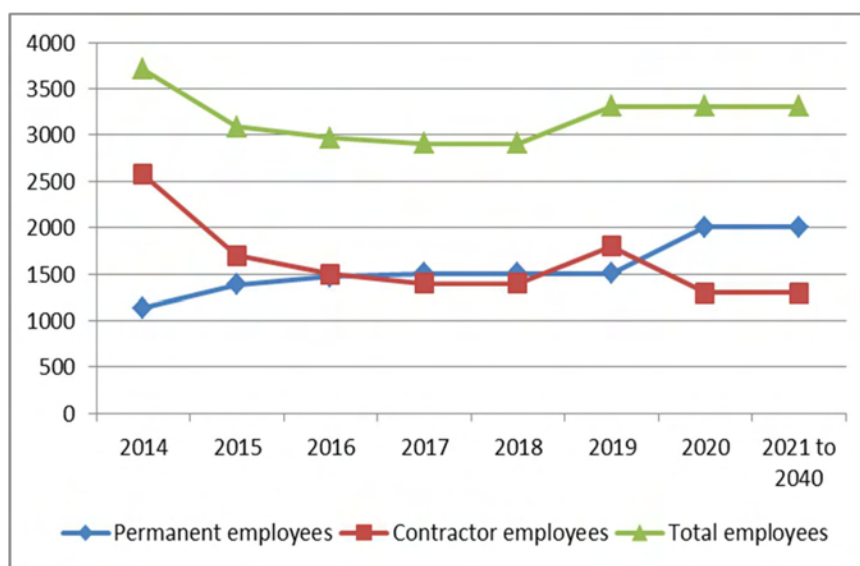
Water extracted from pits and which cannot be used by the mine is exported via pipeline to the Vaal-Gamagara Water Supply Scheme, in agreement with Sedibeng Water and in accordance with the Water Use Licence conditions (Ref: 10/D73A/ABCGIJ/2774). However, Sedibeng Water is unable to manage all such water in accordance with the agreement. Kolomela Mine thus has undertaken to look at alternative options for the management of the water. Environmental authorisation (Permit 16/2014 Ref: NC/BA/12/SIY/TSA/KOL/2013)

¹ Note that the Ploegfontein Pits were included in the original mine works programme and environmental impact assessment and are thus covered by the original environmental authorisation. However, mining at these pits has not yet commenced.

has been given for Aquifer Recharge activities into the Groenwaterspruit to the east of the Kolomela Mining area. The water uses were included in the integrated water use licence for the mine on 18 March 2016. This application for amendment of activities at Kolomela Mine includes the provision for additional Aquifer Recharge into a tributary of the Soutloop River located to the west of the Kolomela mining right area on the privately owned farms Floradale 230 and 484.

3.1.2 EMPLOYMENT

Despite the proposed expansions and increased production, there is not expected to be a major change in employment opportunities at Kolomela Mine. Because the appointment of additional permanent employees will coincide with decreasing numbers of contractor employees, the net effect on overall employee numbers will be fairly limited. The only exception is in 2020, when the mine plans to incorporate 500 contractor workers into its permanent work force. The remaining fluctuations in employee numbers have to be studied on a year-to-year basis, to determine associated social impacts. Contractor employee numbers will decrease until 2019, when 400 new employees are planned to be employed for pre stripping activities of the proposed new pit areas.



Source: G3 Business Solutions (2015)

FIGURE 3.2: CHANGE IN NUMBER OF EMPLOYEES BOTH PERMANENT AND CONTRACTOR DURING THE LIFE OF MINE

3.1.3 DEWATERING

Currently groundwater is abstracted at 1 950 m³/hr to allow for safe operation of the pits. It is proposed that the abstraction rates be increased by 2040 m³/hr to an average rate of 3990 m³/hr in order to accommodate the increased production from existing pits and the future development of the new pits at Kapstevél South and Ploegfontein. The increased dewatering will be achieved by increasing pumping rates at the existing boreholes as well as the drilling of 14 new boreholes around the Leeuwfontein and Klipbankfontein Pits. Additional pipelines (250-300mm in diameter) will be laid from the boreholes. The Integrated Water Use Licence is to be amended to accommodate the additional dewatering requirements.

3.1.4 LISTED ACTIVITIES

3.1.4.1 Kapsteval South Pit and Waste Rock Dumps

A new open pit, referred to as the **Kapsteval South Pit** is to be developed to the south of the existing Kapsteval Pit. The proposed pit will cover an area of approximately 147 ha. The position of the pit necessitates the amendment of the currently approved **Kapsteval Waste Rock Dump** (WRD) as the proposed pit partly includes the area currently authorised for waste rock deposition.

The existing authorised Kapsteval WRD will need to be expanded by an additional 670 ha to a total area 803 ha to accommodate additional production from the Kapsteval Pits. Partial backfilling of the Kapsteval Pit has also been incorporated into the planning. The final height of the Kapsteval WRD will be approximately 78 m above ground level at its highest point in the northern sections and approximately 50 m above ground level in the western section.

The waste rock dump material at Kolomela Mine has been classified as non-Hazardous (Golder, January 2016, Part C - Report A) in terms of the SANS 10234 as per the Waste Classification and Management Regulations (GN. 634 of 23 August 2013). The waste rock dump material falls into the definition of a Type 3 waste in terms of the National Norms and Standards for the Assessment of Waste for Landfill Disposal (GN. 635 of 23 August 2013), but given the low geochemical, toxicological and waste risk profile, a Class C barrier system would not add value in terms of environmental protection (Golder, January 2016, Part C – Report A). No provision has thus been made for a barrier system under the waste rock dump extension area.

Clean water is diverted around the pits and dumps by means of soil berms and drains. Run-off collected in the pit is to be pumped to an evaporation pond with a footprint area of 22 ha located to the south east of the Kapsteval South Pit. The evaporation dam will have a capacity of 166 320 m³. Stormwater management infrastructure shall be designed to accommodate a 1 in 50 year flood event.

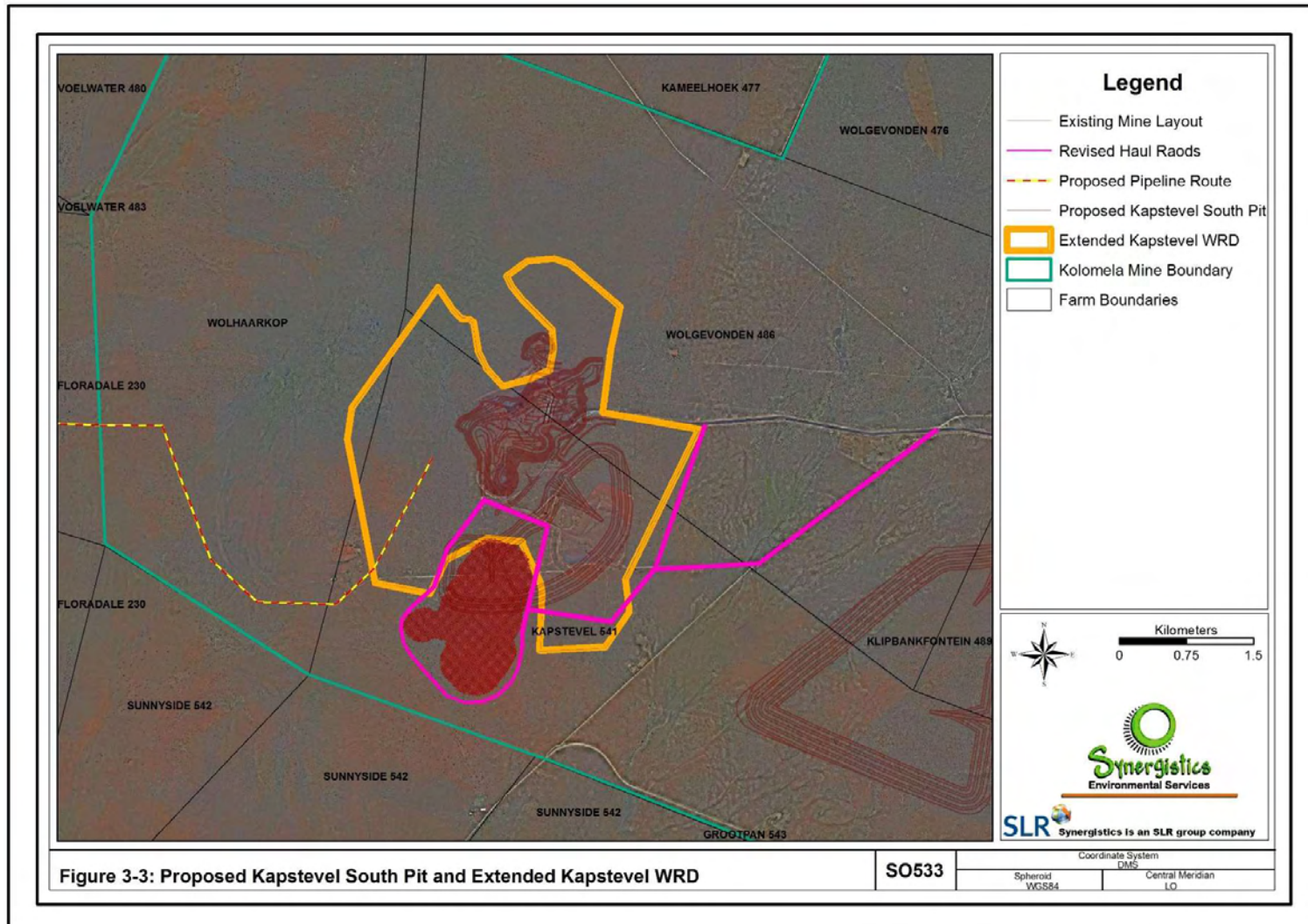


FIGURE 3.3: LAYOUT OF PROPOSED KAPSTEVL SOUTH PIT, KAPSTEVL SOUTH EVAPORATION POND AND THE EXTENDED KAPSTEVL WRD (REVISED LAYOUT AFTER MITIGATION)

TABLE 3.2: LISTED ACTIVITIES FOR THE KAPSTEVEL SOUTH PIT AND WRD

Listing Notice	Activity Number	Description
GN 983	12 – The development of -: (xii) infrastructure or structures with a physical footprint of 100 square metres or more; Where such a development occurs: (a) within a watercourse	There are several drainage lines that occur within the footprint area of the Kapstevél WRD and the Kapstevél Pit area.
	13 – The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more....	The development of an evaporation pond for the management of water collecting in the pit with a storage volume of 166 320 m ³ .
	24 – The development of – (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.	Haul roads are required within the pit and WRD areas to allow for the transport of ore and waste rock. These are generally temporary in nature, with the position changing to accommodate the development of the pits and WRD. Haul roads are approximately 30 m in width.
	56 – The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre – (ii) where no reserve exists, where the road is wider than 8 metres.	The existing main haul road from the Kapstevél Pit area to the DSO Processing Plant would need to be lengthened by up to 2 kilometres to allow access to the Kapstevél South Pit area.
GN 984	6 – The development of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent ...	The evaporation pond requires licensing in terms of Section 21g of the National Water Act.
	15 – The clearance of an area of 20 hectares or more of indigenous vegetation.	Vegetation clearance is required during the stripping of the footprint area required for the mining of the Kapstevél South Pit. An additional 78 ha (additional to that already approved in previous layouts) would require clearance for the of the pit area. Vegetation is also cleared and available topsoil stripped ahead of waste rock deposition. An additional 546 ha is required to be cleared as a result of the proposed expansion. The site required for the development of the evaporation pond will also require the clearance of 22 ha of indigenous vegetation.
	17- Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Minerals and Petroleum Resources Development At, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource....	The extraction of the mineral resource from the Kapstevél South Pit and the expansion of the WRD will take place under the existing Kolomela mining right.
GN 985	14 – The development of: (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such a development occurs – (a) within a watercourse	The tributaries of the Soutloop River are located within a sub-quaternary catchment classified as a River National Freshwater Ecosystem Priority Area (NFEPA). River NFEPA's were defined in order to achieve biodiversity targets for river ecosystems and were identified in rivers that are currently in a good condition (A or B ecological category). Their NFEPA status indicates that they should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources. As such the tributaries of the Soutloop are considered as: (ff) Critical biodiversity areas or ecosystem service areas

Listing Notice	Activity Number	Description
		as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.
GN 921	Category A	
	13 – The expansion of a waste management activity listed in Category A or B of this schedule which does not trigger an additional waste management activity in terms of this schedule.	The existing Kapsteveld WRD will be expanded by 680 ha to accommodate the expanded mining activities. The waste rock is not hazardous as classified according to SANS 10234 as per the Waste Classification and Management Regulations (GN. 634 of 23 August 2013). The waste rock is a Type 3 Waste according to the National Norms and Standards for the Assessment of Waste for Landfill Disposal (GN. 635 of 23 August 2013).

3.1.4.2 Ploegfontein and Tierbult Pits

A series of pits are proposed for the farm Ploegfontein 487 comprising an area of approximately 128 ha. The largest pit lies on the southern portion of Ploegfontein covering 70 ha. The Tierbult section (35 ha) lies on the farm Welgevonden 486 and will be incorporated into the Leeuwfontein WRD. Alternatives for the actual layout of this mining area forms one of the considerations of this EIA.

Clean water will be diverted around the pit and dump areas by means of soil berms and drains to be constructed upstream of the dirty areas. Run-off collected in the Ploegfontein Pits area will be pumped to an **evaporation pond** covering an area of approximately 10 ha, with a storage capacity of 79 000 m³. Water management systems will be designed to accommodate a 1 in 50 year flood event.

Although the mining of Ploegfontein pits were included in the existing environmental authorisation for Kolomela Mine, this further amendment provides more detailed studies and planning for the mining of this area.

Waste Rock from the Ploegfontein and Tierbult Pits will be disposed at the Leeuwfontein North WRD, thus necessitating the expansion of this dump.

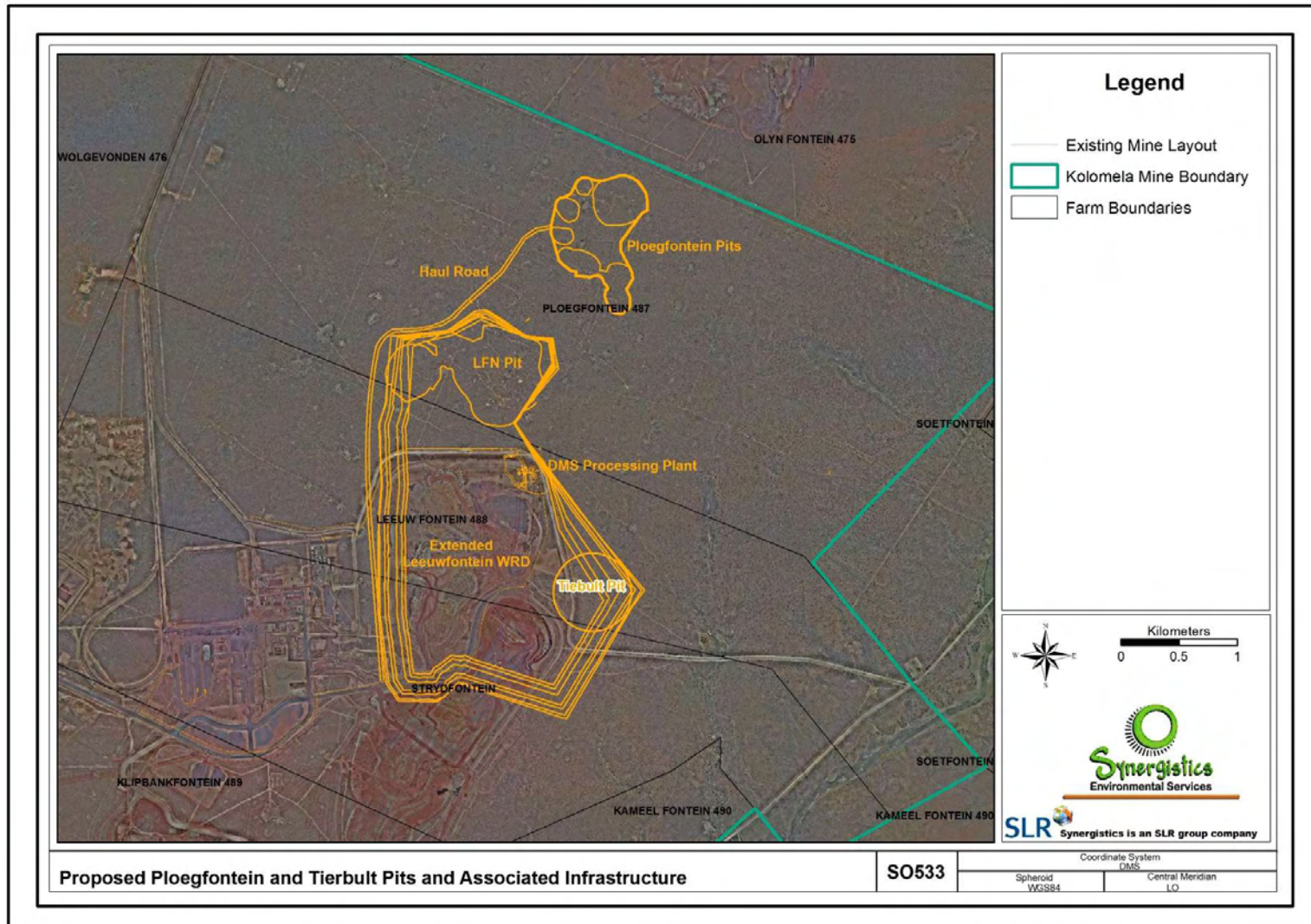


FIGURE 3.4: LAYOUT OF PROPOSED PLOEGFONTEIN AND TIERBULT PITS AND ASSOCIATED INFRASTRUCTURE (REVISED LAYOUT AFTER MITIGATION)

TABLE 3.3: LISTED ACTIVITIES FOR PLOEGFONTEIN AND TIERBULT PITS

Listing Notice	Activity Number	Description
GN 983	12 – The development of -: (xii) infrastructure or structures with a physical footprint of 100 square metres or more; Where such a development occurs: (a) within a watercourse	The footprint area of the pits will result in the destruction of wetland pans. Wetland pans fall under the definition of a watercourse in terms of the National Water Act.
	13 – The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more....	The development of an evaporation pond for the management of water collecting in the Ploegfontein Pit with a storage volume of 79 000 m ³ .
	24 – The development of – (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.	Haul roads are required within the pit and WRD areas to allow for the transport of ore and waste rock. A new permanent haul road of 5 kilometres will be developed to access the Ploegfontein Pit area. Temporary haul roads will also be developed within the pits areas to accommodate the expansion of the pits and WRD. Haul roads are approximately 30 m in width.
	56 – The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre – (ii) where no reserve exists, where the road is wider than 8 metres.	The existing haul roads at the Leeufontein Pit and WRDs may need to be lengthened to access the Tierbult area
GN 984	6 – The development of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent ...	The evaporation pond to be developed at the Ploegfontein Pit area requires licensing under Section 21g of the National Water Act.
	15 – The clearance of an area of 20 hectares or more of indigenous vegetation.	Vegetation clearance is required during the stripping of the footprint area required for the mining of the Ploegfontein and Teirbult Pits. Approximately 35 ha (additional to that already approved in previous layouts) would require clearance for the of the pit areas.\
	17- Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Minerals and Petroleum Resources Development At, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource....	The extraction of the mineral resource from the Ploegfontein and Tierbult Pits will take place under the existing Kolomela mining right.

3.1.4.3 Leeuwnfontein Waste Rock Dumps

The **Leeuwnfontein North WRD** footprint will be expanded to accommodate waste rock originating from mining operations at the Ploegfontein and Tierbult Pits. An expansion to the north and east of the existing approved layout is proposed covering an additional 408 ha with the overall final footprint of the WRD being 608 ha. The expanded footprint area to the north will result in the complete backfilling of the Tierbult Pit and Ploegfontein South pit area. The proposed final height of WRDs will be approximately 70 m above ground level.

The existing approved layout of the **Leeuwnfontein South WRD** will also need to be expanded in the north western section by 200 ha with the final footprint covering 469 ha. This expansion will result in the partial backfilling of the Klipbankfontein Pit.

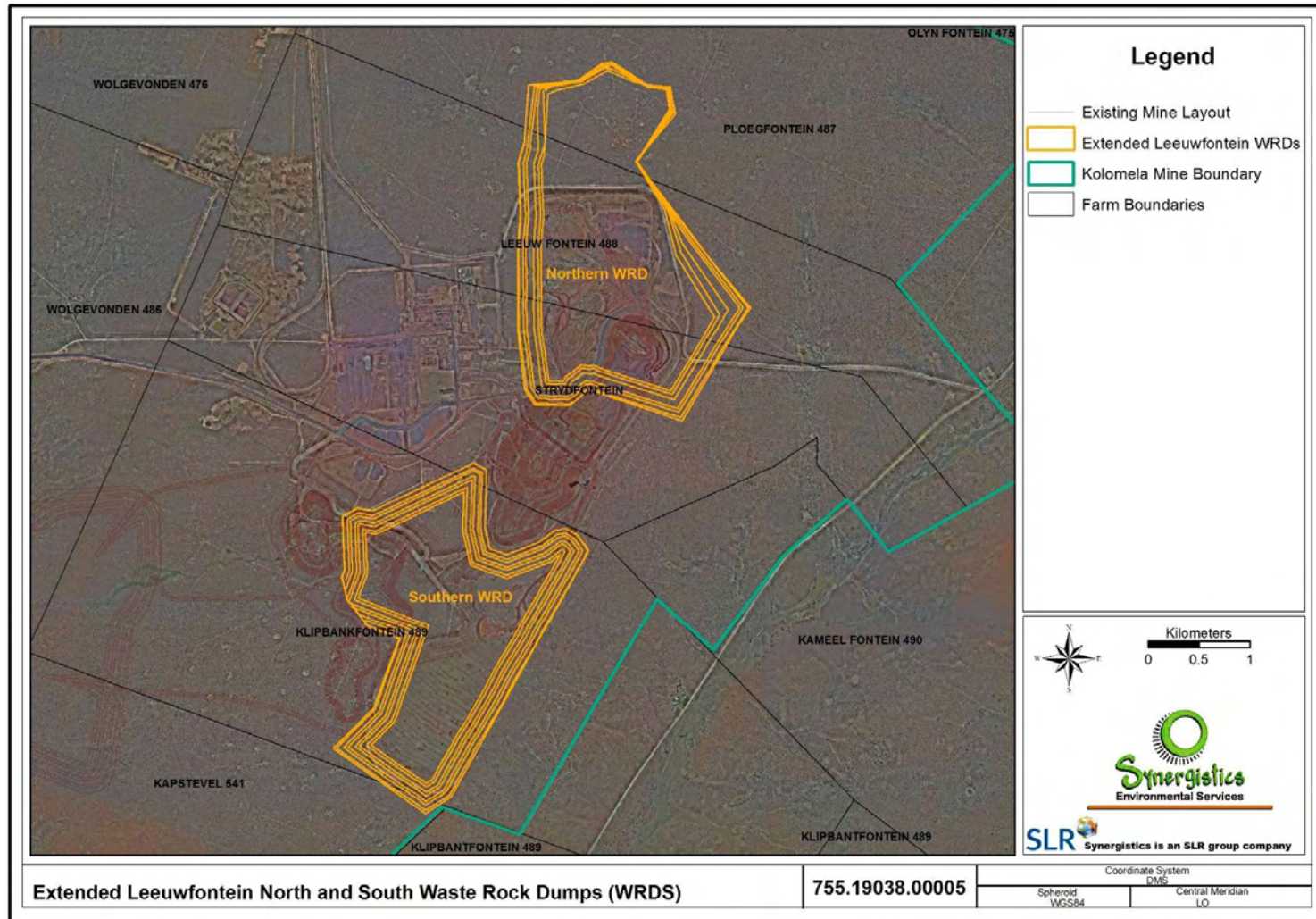


FIGURE 3.5: LAYOUT OF THE EXTENDED LEEUWFontein North and South WRDs (REVISED LAYOUT AFTER MITIGATION)

The waste rock dump material at Kolomela Mine has been classified as non-Hazardous (Golder, January 2016, Part C – Report A) in terms of the SANS 10234 as per the Waste Classification and Management Regulations (GN. 634 of 23 August 2013). The waste rock dump material falls into the definition of a Type 3 waste in terms of the National Norms and Standards for the Assessment of Waste for Landfill Disposal (GN. 635 of 23 August 2013), but given the low geochemical, toxicological and waste risk profile, a Class C barrier system would not add value in terms of environmental protection (Golder, January 2016, Part C – Report A). No provision has been made for a barrier system under the waste rock dump extension area.

TABLE 3.4: LISTED ACTIVITIES FOR LEEUWFORTEIN WRD

Listing Notice	Activity Number	Description
GN 983	12 – The development of -: (xii) infrastructure or structures with a physical footprint of 100 square metres or more; Where such a development occurs: (a) within a watercourse....	The expansion of the Leeuwfontein WRD will result in the destruction of wetland pans. Wetland pans fall under the definition of a watercourse in terms of the National Water Act.
	24 – The development of – (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.	Haul roads are required within the pit and WRD areas to allow for the transport of ore and waste rock. These are generally temporary in nature, with the position changing to accommodate the development of the pits and WRD. Haul roads are approximately 30 m in width.
	56 – The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre – (ii) where no reserve exists, where the road is wider than 8 metres.	The existing main haul roads may need to be lengthened to allow access to the expansion areas of the WRDs.
GN 984	15 – The clearance of an area of 20 hectares or more of indigenous vegetation.	Vegetation is also cleared and available topsoil stripped ahead of waste rock deposition. An additional 320 ha footprint is required as a result of the proposed expansion of the Leeuwfontein North WRD and 420 ha is required for the expansion of the Leeuwfontein South WRD. However, much of this area will have already been cleared as the dumps are backfilled into the pits.
	17- Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource....	The expansion of the WRDs will take place under the existing Kolomela mining right.
GN 921	Category A	
	13 – The expansion of a waste management activity listed in Category A or B of this schedule which does not trigger an additional waste management activity in terms of this schedule.	The existing Leeuwfontein North WRD will be expanded by 320 ha and the Leeuwfontein South WRD will be expanded by 420 ha. The waste rock is not hazardous as classified according to SANS 10234 as per the Waste Classification and Management Regulations (GN. 634 of 23 August 2013). The waste rock is a Type 3 Waste according to the National Norms and Standards for the Assessment of Waste for Landfill Disposal (GN. 635 of 23 August 2013).

3.1.4.4 Klipbankfontein Waste Rock Dump

The **Klipbankfontein WRD** is to be relocated to the east from its originally approved position. This amendment to the existing authorised footprint is motivated for the need for the WRD to be located closer to the mining pit area, thus reducing the haul distance. The original layout was based on the possibility of ore reserves being located to the west of the existing approved Klipbankfontein footprint area. Sterilisation drilling has confirmed that there are no ore reserves in the proposed revised footprint area.

The waste rock dump material at Kolomela Mine has been classified as non-Hazardous (Golder, January 2016, Part C – Report A) in terms of the SANS 10234 as per the Waste Classification and Management Regulations (GN. 634 of 23 August 2013). The waste rock dump material falls into the definition of a Type 3 waste in terms of the National Norms and Standards for the Assessment of Waste for Landfill Disposal (GN. 635 of 23 August 2013), but given the low geochemical, toxicological and waste risk profile, a Class C barrier system would not add value in terms of environmental protection (Golder, January 2016, Part C – Report A). No provision has thus been made for a barrier system under the waste rock dump extension area.

TABLE 3.5: LISTED ACTIVITIES FOR KLIPBANKFONTEIN WRD

Listing Notice	Activity Number	Description
GN 983	12 – The development of -: (xii) infrastructure or structures with a physical footprint of 100 square metres or more; Where such a development occurs: (a) within a watercourse	The revised layout of the Klipbankfontein WRD will result in the destruction of wetland pans which lie in the footprint area. Wetland pans fall under the definition of a watercourse in terms of the National Water Act.
	24 – The development of – (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.	New haul roads will need to be developed within the revised layout area. Haul roads are generally temporary in nature and are moved to accommodate the development of the WRDs. Haul roads have a width of 30 m.
	56 – The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre – (ii) where no reserve exists, where the road is wider than 8 metres.	The existing haul roads may need to be lengthened to access the new layout area.
GN 984	15 – The clearance of an area of 20 hectares or more of indigenous vegetation.	Vegetation is also cleared and available topsoil stripped ahead of waste rock deposition. An area of 190 ha, not included in any previous layout will be cleared as part of the WRD development. However, it should be noted that the total footprint of the Klipbankfontein WRD is being reduced from an area of 602 ha to 486 ha.
	17- Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource....	The expansion of the WRDs will take place under the existing Kolomela mining right.
GN 921	Category A	
	13 – The expansion of a waste management activity listed in Category A or B of this schedule which does not trigger an additional waste management activity in terms of this schedule.	The existing authorised footprint area of the Leeuwfontein WRD is to be changed with approximately 190 ha lying outside of the existing authorised area. The waste rock is not hazardous as classified according to SANS 10234 as per the Waste Classification and Management Regulations (GN. 634 of 23 August 2013).

Listing Notice	Activity Number	Description
		The waste rock is a Type 3 Waste according to the National Norms and Standards for the Assessment of Waste for Landfill Disposal (GN. 635 of 23 August 2013).

3.1.4.5 DMS Processing Plants

Kolomela Mine currently make use of a **Modular Dense Media Separation (DMS) Processing Plant** (referred to as the Tierbult Plant) for the processing of 1 Mtpa of low grade ore from the Leeuwfontein Pit. The DMS plant is used for the processing of low grade ore not suitable for handling through the DSO plant.

The current **Tierbult DMS Plant** infrastructure will be relocated during the LOM to two additional areas, depending where there is the greatest need for the processing of low grade ore. Two sites are proposed: one at the new Kapstevl at Pit Facility and close to the Klipbankfontein Pit. The DMS plants will be used to process up to 2 Mtpa.

The modular DMS facility produces a small amount of tailings and plant discard. This material is temporarily stockpiled on site and then blended and disposed together with waste rock.

Clean water will be diverted around the DMS plants by means of soil berms and drains. Dirty water run-off from the Kapstevl DMS plant area will be collected in a **pollution control dam (PCD)**. This system will comprise a sediment trap and oil separator as appropriate. The water from the PCD will be recycled back into the process. Dirty water run-off from the **Klipbankfontein and Tierbult DMS Plant** areas will be contained in evaporation dams (i.e. water will not be recycled for re-use). These dams will have a capacity approximately 14 200 m³ and 15 267 m³, respectively. Water management systems will be designed so as to accommodate a 1 in 50 year storm event.

Given the distance from the Kapstevl DMS Plant location to the current load-out-facility at the Kolomela Rail Loop, provision has been made for the development of an **overland conveyor**, over a length of approximately 6.5 km to carry processed ore to the facility. The conveyor will run along the existing haul road route, immediately adjacent to the road and will not result in any additional surface disturbance.

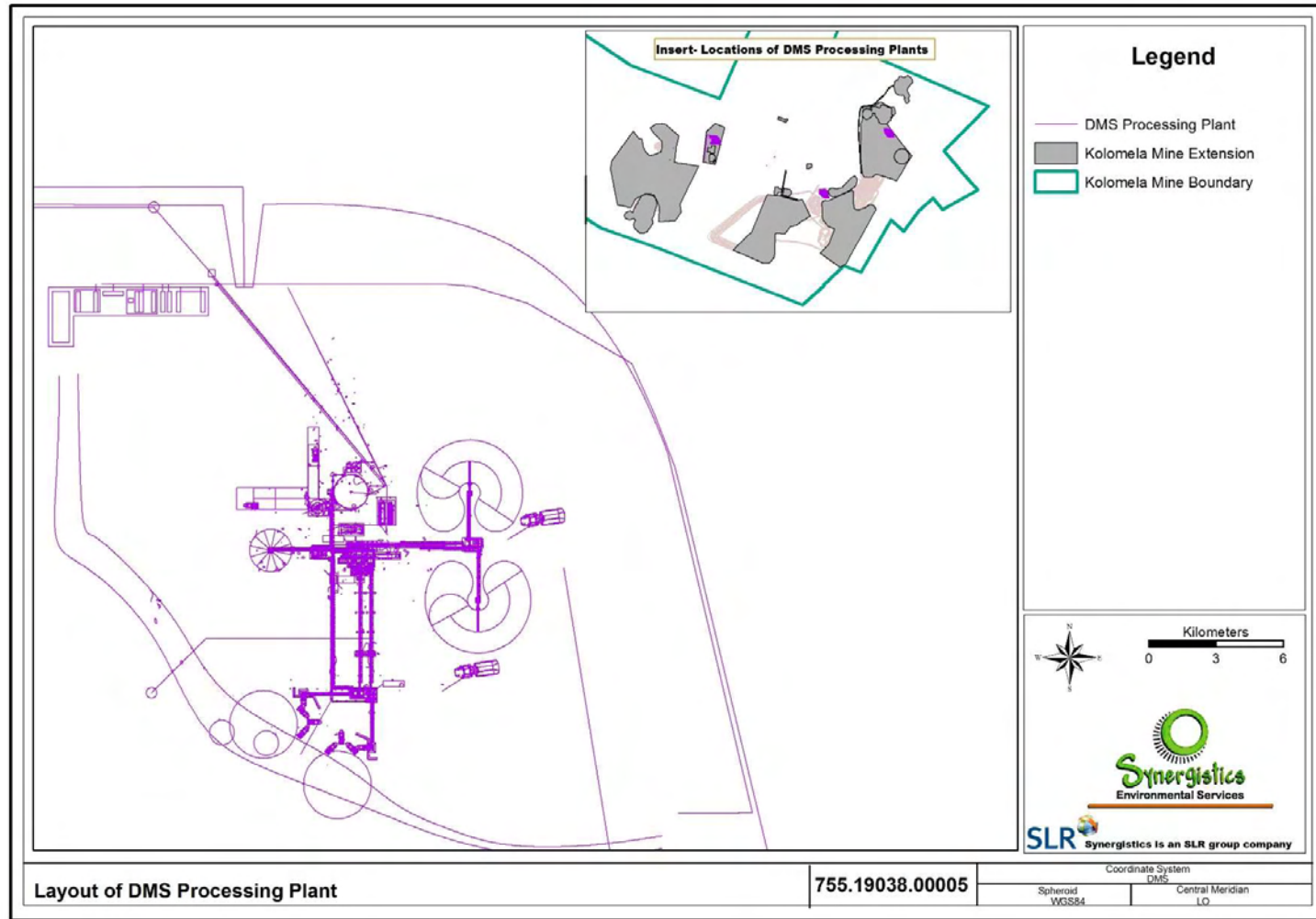


FIGURE 3.6: LAYOUT SHOWING 3 LOCATIONS OF THE MODULAR DMS PROCESSING PLANTS ON THE FARMS: TIERBULT (2), KLIPBANKFONTEIN (7) AND KAPSTEVEL (15).

TABLE 3.6: LISTED ACTIVITIES FOR MODULAR DMS PROCESSING PLANT

Listing Notice	Activity Number	Description
GN 983	12 – The development of :- (xii) infrastructure or structures with a physical footprint of 100 square metres or more; Where such a development occurs: (a) within a watercourse	The footprint of the proposed Kapstevél DMS plant will result in the disturbance of drainage lines in the upper reaches of the Welgevonden Spruit. The conveyor will also cross several drainage lines.
	13 – The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more....	A PCD with a capacity of 444 116 m ³ will be developed to contain dirty water run-off from the Kapstevél DMS plant and stockpile area.
	24 – The development of – (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.	A new haul road will need to be developed to allow for the delivery of ore to the processing plants. Only access to the Kapstevél DMS plant will be within a previously undisturbed area.
	27 – The clearance of an area of an area of 1 hectare ore more, but less than 20 hectares of indigenous vegetation.	An area of 24 ha is required for the development of the Kapstevél DMS Processing Plant and associated activities. The Tierbult DMS Processing Plant has been developed within an already disturbed area, so no clearance is required. The Klipbankfontein DMS Processing Plant will also be developed within an already disturbed footprint area.
GN 984	6 – The development of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent ...	Slimes and plant discard is temporarily stored on site prior to blending with waste rock and final disposal at WRDs. The storage facilities require authorisation under section 21 g of the National Waste Act. The PCD and evaporation ponds to be developed for dirty water management also require licensing under Section 21 g of the National Water Act.
	21 – An activity including the operation of that activity associated with the primary processing of a mineral resource including winning, reduction, extraction, classifying, concentration, crushing, screening and washing but excluding the smelting, beneficiation, refining, calcining or gasification of the mineral resource	Dense Media Separation involves the primary processing of the iron ore.
GN 985	14 – The development of: (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such a development occurs – (b) within a watercourse	The tributaries of the Soutloop River are located within a sub-quaternary catchment classified as a River National Freshwater Ecosystem Priority Areas (NFEPA). River NFEPA's were defined in order to achieve biodiversity targets for river ecosystems and were identified in rivers that are currently in a good condition (A or B ecological category). Their NFEPA status indicates that they should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources. As such the tributaries of the Soutloop are considered as: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.

3.1.4.6 At Pit Facilities

The **Kapstevél At Pit Facility** (see Figure 3.7) is motivated by the need for support infrastructure closer to the Kapstevél Pit area. The At Pit Facility includes a haul truck parking and fatigue area for accommodating off-shift workforce. Provision is also made for workshops for the maintenance of haul trucks, a washbay, a small

sewage treatment plant (which will also service the DMS plant) and a refuelling area, including facilities for the storage of **1 million litres of diesel** (1 000 cubic metres) in addition to smaller quantities of petrol and lubricants.

Clean water will be diverted around the dirty area by means of soil berms and drains. Dirty water run-off will be collected in a **PCD**. This PCD will comprise a sediment trap and oil separator as appropriate. The water will be recycled for re-use at the plant or workshop areas as required. Water may also be used for dust suppression on roads. Clean water will be diverted around the facility using drains. Culverts will be established where the haul roads to these areas cross drainage lines. Water management systems will be designed to accommodate a 1 in 50 year storm event.

An **At Pit Facility** is also proposed for close to the Klipbankfontein operations (see Figure 3-8). The layout is similar to the Kapstevél Facility, including haul road, haul truck parking, a fatigue centre, workshops, wash bay and refuelling area. Use will be made of a conservancy tank at this facility. There will be two **PCDs** established to collect run-off, one from the haul truck parking area with a capacity of 105 885 m³ and one from the workshop area with a capacity of 101 783 m³.



FIGURE 3.7: PROPOSED LAYOUT OF KAPSTEVEL AT PIT FACILITY (REVISED LAYOUT AFTER MITIGATION)

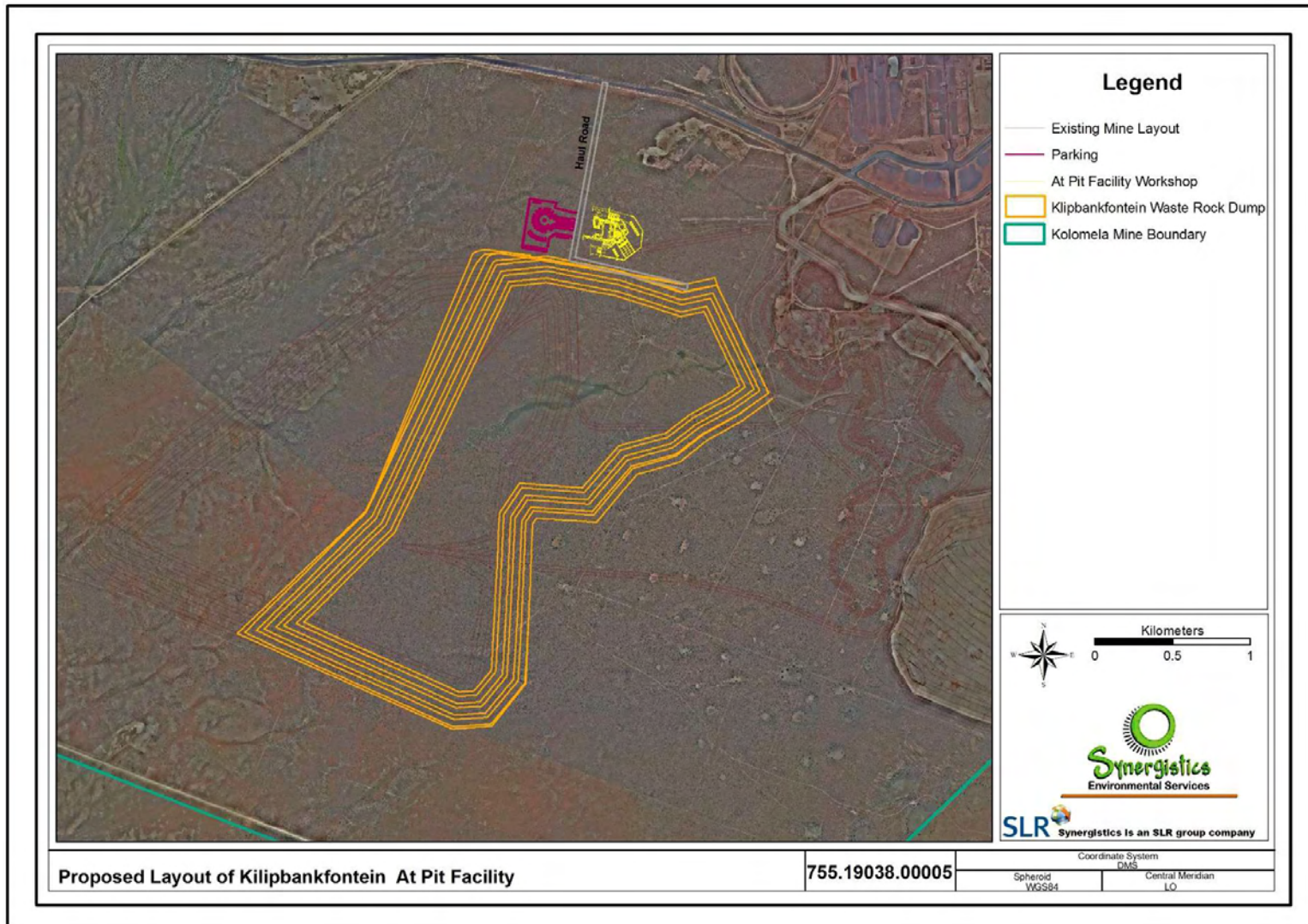


FIGURE 3.8: PROPOSED LAYOUT OF KLIPBANKFONTEIN AT PIT FACILITY (REVISED LAYOUT AFTER MITIGATION)

TABLE 3.7: LISTED ACTIVITIES FOR AT PIT FACILITIES

Listing Notice	Activity Number	Description
GN 983	12 – The development of -: (xii) infrastructure or structures with a physical footprint of 100 square metres or more; Where such a development occurs: (a) within a watercourse (b) in front of a development setback; or (c) if no development setback exists, within 32 m of a watercourse, measured from the edge of the watercourse.	Infrastructure at the Kapsteveld At Pit Facility may result in the disturbance of drainage lines or be within 32 m of such drainage lines in the upper catchment of the Welgevonden Spruit. The infrastructure at the Klipbankfontein At Pit Facility (particularly the workshop area and the haul road) will result in the disturbance of drainage lines which also form tributaries of the Welgevonden Spruit.
	13 – The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more....	A PCD with a capacity of 254 209 m ³ will be developed to contain dirty water run-off from the Kapsteveld At Pit Facility. Two PCDs will be established at the Klipbankfontein At Pit Facility with capacities of 105 885 m ³ and 101 783 m ³ .
	24 – The development of – (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.	The haul road to the Kapsteveld DMS Processing Plant will also lead to the workshops and the fatigue centre. A new haul road will also be developed to allow for access to the Klipbankfontein At Pit Facility.
GN 984	4 – The development of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.	A 1 000 cubic metres diesel storage facility will be established at both the Kapsteveld and the Klipbankfontein At Pit Facilities. In addition approximately 40 cubic meters of lubricants and 20 cubic metres of used oils will also be stored at each of the Kapsteveld and Klipbankfontein facilities.
	6 – The development of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent ...	An Atmospheric Emissions Licence is required in terms of Subcategory 2.4: Storage and Handling of Petroleum Products (GN. 893) for the refuelling facilities and workshops at the Kapsteveld and Klipbankfontein At Pit Facilities. The PCDs to be developed for the management of dirty water run-off require licensing in terms of Section 21 g of the National Water Act.
	15 – The clearance of an area of 20 hectares or more of indigenous vegetation.	Approximately 30 ha will be cleared at each of the At Pit Facilities to allow for the development of haul truck parking areas, fatigue centre, workshops, light vehicle parking areas, wash bays, fuels storage, refuelling areas and other associated infrastructure.
	28 – Commencing of an activity, which requires an atmospheric emissions licence in terms of section 21 of the National Environmental Management: Air Quality Act, 2004(Act No. 39 of 2004)....	The commencement of storage of diesel which requires an Atmospheric Emissions Licence at each of the At Pit Facilities.
GN 985	14 – The development of: (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such a development occurs – (c) within a watercourse (d) in front of a development setback; or (e) if no development setback exists, within 32 m of a watercourse, measured from the edge of the watercourse.	The tributaries of the Soutloop River are located within a sub-quaternary catchment classified as a River National Freshwater Ecosystem Priority Areas (NFEPA). River NFEPA were defined in order to achieve biodiversity targets for river ecosystems and were identified in rivers that are currently in a good condition (A or B ecological category). Their NFEPA status indicates that they should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources. As such the tributaries of the Soutloop

Listing Notice	Activity Number	Description
		are considered as: Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.

3.1.4.7 Haul Roads

In addition to the new roads to the At Pit Facilities, four new Haul Roads are to be constructed to facilitate movement of haul trucks between the ROM stockpile area, the Klipbankfontein Pit and the Leeuwfontein South WRD. The haul roads have a width of 30 m and will cover a distance of approximately 3.3 km.

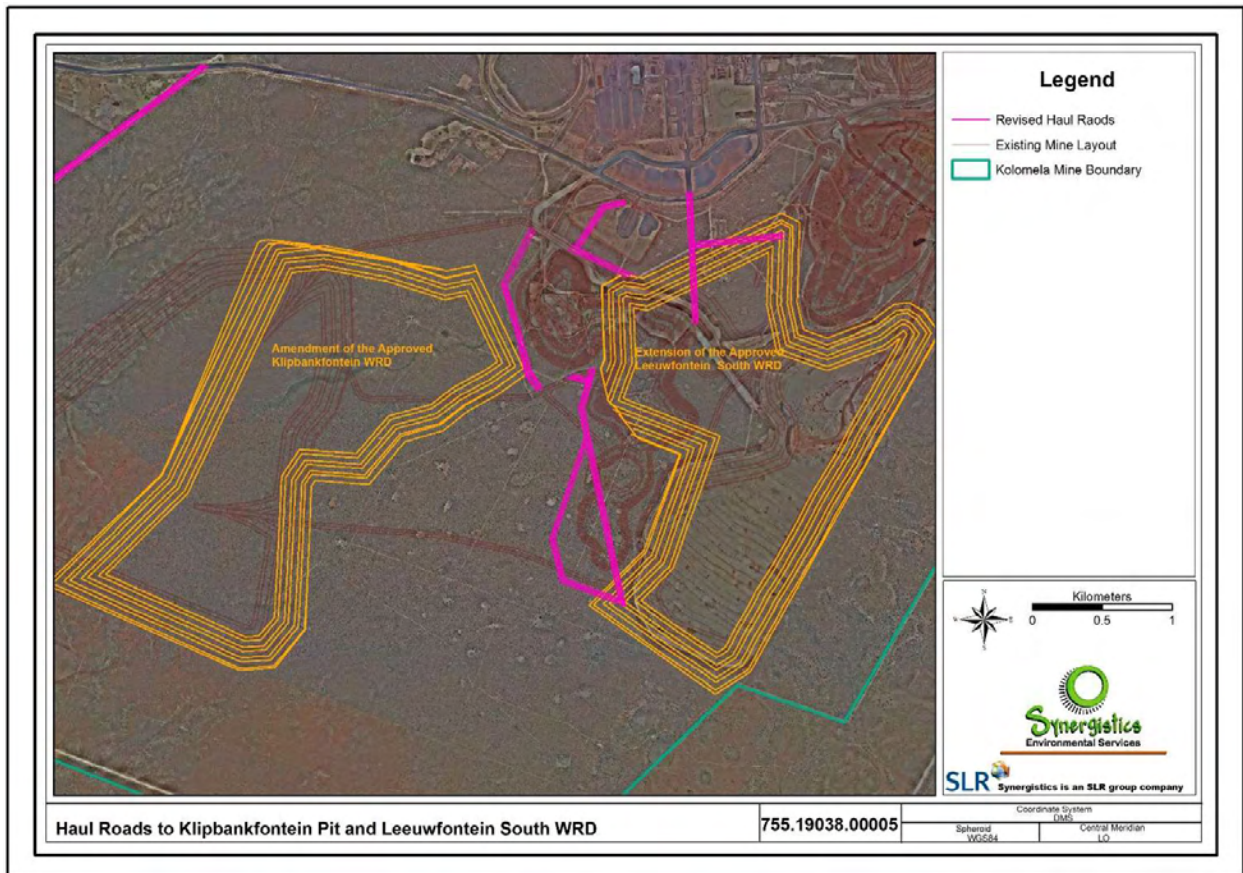


FIGURE 3.9: HAUL ROADS TO KLIPBANKFONTEIN PIT AND LEEUWFONTEIN SOUTH WRD

TABLE 3.8: LISTED ACTIVITIES FOR HAUL ROADS TO KLIPBANKFONTEIN PIT AND LEEUWFONTEIN SOUTH WRD

Listing Notice	Activity Number	Description
GN 984	24 – The development of – (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.	The haul road to the Kapsteveld DMS Processing Plant will also lead to the workshops and the fatigue centre. A new haul road will also be developed to allow for access to the Klipbankfontein At Pit Facility.

3.1.4.8 Explosives Magazine

The increase in production at Kolomela necessitates additional capacity for the storage of explosives at the mine. It is proposed to build an additional similar **explosives magazine**, adjacent to the current facility and will cover an area of approximately 5 ha (refer to Figure 3.1). The explosives magazine includes the following infrastructure:

- Two explosives magazines case buildings designed for the storage (each with a capacity of 7 500 kg) of explosives material and accessories such as Expanfo and Explogel (packaged explosives that will be used for secondary blasting), primacord, trojan categories, Detacord, Y3 Boosters, zapcord, detonators and surface delay products (each with a capacity of 7 500 kg);
- A bunded diesel tank (with a capacity to store approximately 11 000 litres);
- Two bunded Prill silos (each with a capacity to store approximately 41 tonnes of Porous Prill Ammonium Nitrate);
- Two bunded Matrix silos (each with a capacity to store approximately 85 tonnes of Ammonium Nitrate and Calcium Nitrate solution);
- A chemical storage area used to store chemicals used in the process, such as Sodium Nitrate and Thiourea;
- An office block with parking area and a septic tank;
- An access road;
- A truck parking area; and
- A trench around the entire perimeter of the Explosives Magazine Facility

The magazine buildings will be encased within an earthen berm wall leaving only the area for the access door clear.

All storage units are contained within bunded areas. Any additional contaminated run-off and spillages generated from storage units, explosive truck calibrations and decontamination of explosive trucks will be collected and disposed of by destroying in drill holes charged with explosives. The small quantities of packaging generated from the Expanfo and Explogel explosives are required by law to be burnt as a means of disposal. This will be carried out on site.

TABLE 3.9: LISTED ACTIVITIES FOR THE EXPLOSIVES MAGAZINE

Listing Notice	Activity Number	Description
GN 983	12 – The development of -: (xii) infrastructure or structures with a physical footprint of 100 square metres or more; Where such a development occurs: (c) if no setback exists within 32 metres of a watercourse, measured from the edge of the watercourse.	The layout of the proposed explosive magazine results in the disturbance of a watercourse. As part of the outcomes of this EIA the layout will be altered so as not to disturb the watercourse but the fenced area may still be within 32 m of a watercourse.
	14 – The development of facilities or infrastructure, for the storage, or for the storage	The explosive magazine will provide for the storage of the following dangerous good:

Listing Notice	Activity Number	Description
	and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	<ul style="list-style-type: none"> • 11 cubic metres of diesel; • 82 tonnes of Porous Prill Ammonium Nitrate • 170 tonnes of Ammonium Nitrate and Calcium Nitrate solution
	27 – The clearance of an area of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation.	The new explosive magazine will cover a footprint area of approximately 5.2 ha. The vegetation within this area will be cleared to allow for the development of infrastructure.
GN 985	14 – The development of: (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such a development occurs – (c) if no setback exists within 32 metres of a watercourse, measured from the edge of the watercourse.	The tributaries of the Soutloop River are located within a sub-quaternary catchment classified as a River National Freshwater Ecosystem Priority Areas (NFEPA). River NFEPA's were defined in order to achieve biodiversity targets for river ecosystems and were identified in rivers that are currently in a good condition (A or B ecological category). Their NFEPA status indicates that they should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources. As such the tributaries of the Soutloop are considered as: Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.

3.1.4.9 Sewage Treatment Works

An additional **sewage treatment works** is to be constructed within the footprint area of the existing Kolomela Mine railway balloon (refer to Figure 3.1). The works will be similar to the existing authorised Sewage Treatment Works at the mine. The need for the additional works is motivated by the proposed expansion in the labour at the mine.

The new sewage treatment works will be a Becon Watertech Bio-Filter Plant or equivalent. The purification process will comprise of a primary combined settlement tank and anaerobic digester, secondary aerobic process, humus tank and a disinfection process. The plant will have a capacity to handle hydraulic loading of 200 kl/day. The quantity of treated water that will be released to the outflow pond depends on the actual usage of the sewage system but the maximum discharge that the system can handle is 200 kl/day.

All treated water will first be stored in the outflow pond (that is also a sump for the pollution control dam and part of the site storm water management system) with a capacity to store 269 m³. The treated effluent will be pumped to the mine's process water tank where it will be reused as part of the operational water supply. No effluent is released into the environment.

TABLE 3.10: LISTED ACTIVITIES FOR THE SEWAGE TREATMENT WORKS

Listing Notice	Activity Number	Description
GN 983	12 – The development of -: (xii) infrastructure or structures with a physical footprint of 100 square metres or more; Where such a development occurs: (c) if no setback exists within 32 metres of a watercourse, measured from the edge of the watercourse.	The layout of the proposed sewage treatment works results in the disturbance of a watercourse. As part of the outcomes of this EIA the layout will be altered so as not to disturb the watercourse but the disturbance area may still be within 32 m of a watercourse.
GN 985	14 – The development of:	The tributaries of the Soutloop River are located within a

Listing Notice	Activity Number	Description
	(xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such a development occurs – (c) if no setback exists within 32 metres of a watercourse, measured from the edge of the watercourse.	sub-quadernary catchment classified as a River National Freshwater Ecosystem Priority Areas (NFEPA). River NFEPA's were defined in order to achieve biodiversity targets for river ecosystems and were identified in rivers that are currently in a good condition (A or B ecological category). Their NFEPA status indicates that they should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources. As such the tributaries of the Soutloop are considered as: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.

3.1.4.10 Product Stockpile Area

Currently screened material reports directly from the DSO to the blending beds where the ore is stacked and reclaimed before being conveyed to the load out station for deposition onto the wagon trains. With the increase in production as well as the incorporation of the DMS Processing Plant, there is a need for additional product storage capacity. A new **product stockpile area** of approximately 44 ha is proposed to the south of the DSO Processing Plant (refer to Figure 3.1).

TABLE 3.11: LISTED ACTIVITIES FOR PRODUCT STOCKPILE AREA

Listing Notice	Activity Number	Description
GN 984	15 – The clearance of an area of 20 hectares or more of indigenous vegetation.	Approximately 48 ha will be cleared for the development of the product stockpile area.

3.1.4.11 Aquifer Recharge Facility

It is proposed to develop an **aquifer recharge facility** comprising 25 injection boreholes within the tributary of the Soutloop River located on privately owned land on the farms Floradale located adjacent to the western boundary of the Kolomela mining right area. An additional 30 monitoring boreholes are also required. Excess water which cannot be discharged to the Vaal-Gamagara pipeline and originating from the Kapstevél and Kapstevél South pits will be recharged into the groundwater aquifer using this system. An aboveground pipeline with an internal diameter of 0.3 m (300 mm) will be constructed to the aquifer recharge area.

Injection boreholes will be drilled to a depth of between 30 – 60 m. The construction of the injection boreholes is illustrated in Figure 3.10. All boreholes will be cased and fitted with a concrete slab to support the borehole. The boreholes will also be fitted with air release valves, flow meters, piezometer tubes (two 32 mm diameter, HDPE, will be installed at 12 mbgl; one for a water level data logger and one for hand readings on each borehole) as well as a source water quality sampling tap. Once the pipeline and boreholes have been installed, water will gravitate or be pumped to the areas for water disposal.

Water is injected into the gravel layers which serve as the storage area. Once this area is filled, water will naturally leave the area through evapo-transpiration and through-flow. Borehole injection tests will determine the recharge rates applicable to the recharge site. Based on tests undertaken for the Groenwaterspruit recharge area it can be expected that recharge could be at a rate of approximately 50 litres/second.

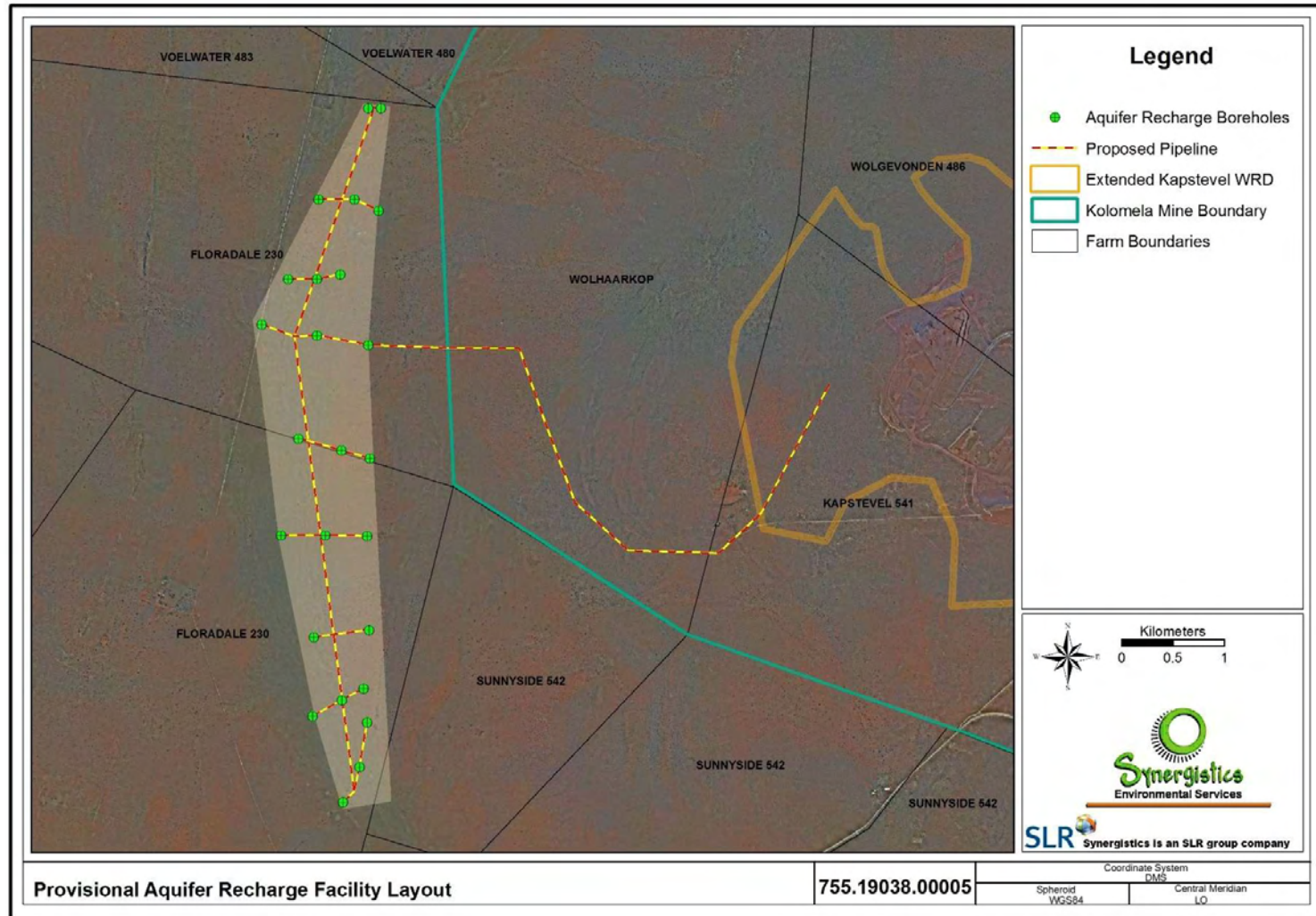


FIGURE 3.10: PROVISIONAL INJECTION BOREHOLE DESIGN (REVISED LAYOUT AFTER MITIGATION)

TABLE 3.12: LISTED ACTIVITIES FOR AQUIFER RECHARGE FACILITY

Listing Notice	Activity Number	Description
GN 983	12 – The development of -: (xii) infrastructure or structures with a physical footprint of 100 square metres or more; Where such a development occurs: (a) within a watercourse.	The aquifer recharge area will comprise 55 boreholes and associated pipelines within the tributary of the Soutloop River.
GN 985	14 – The development of: (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such a development occurs – (a) within a watercourse	The tributaries of the Soutloop River are located within a sub-quatarnary catchment classified as a River National Freshwater Ecosystem Priority Areas (NFEPA). River NFEPA's were defined in order to achieve biodiversity targets for river ecosystems and were identified in rivers that are currently in a good condition (A or B ecological category). Their NFEPA status indicates that they should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources. As such the tributaries of the Soutloop are considered as: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.

4 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 proposed project. Table 4.1 provides a summary of the applicable legislative context and policy.

TABLE 4.1: LEGAL FRAMEWORK

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)				REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATIVE POLICY OR CONTEXT
	Legislation	Regulations / Guidelines	Description		
EIA Process and Listed Activities	National Environmental Management Act 107 of 1998 (NEMA) as amended	Section 2 of NEMA	Sets out the principles of environmental management	-	Section 2 principles considered during the planning of the proposed amendment.
		Chapter 5 of NEMA	Integrated environmental management, provides information on environmental management tools that promote the implementation of principles set out in Section 2 of NEMA	-	Environmental management tools have been considered during planning of the proposed amendment.
		Regulation 982	General Requirements of EAPs and Specialists - Section 13 Public Participation Process - Section 41 Register of Interested and Affected Parties - Section 42 Register of Interested and Affected Parties entitled to comment on reports and plans - Section 43 Comments of interested and affected parties to be recorded in	Entire EIA Process	Environmental impact assessment process and reporting undertaken in accordance with the requirements of the regulations.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)				REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATIVE POLICY OR CONTEXT
	Legislation	Regulations / Guidelines	Description		
			reports and plans - Section 44 Appendix 3: Content of EIA Report		
		Regulation GN 983, GN 984 or GN 985, Listing Notice 1, 2, 3.	Lists activities requiring a basic environmental assessment and an environmental impact assessment.	Part A: Section 3	Environmental authorisation must be obtained prior to commencement with listed activities. This project triggers BAR and EIA activities but because of EIA activities a full scoping and EIA process is needed.
		Guideline Series 7	Public Participation in the Environmental Impact Assessment Process (GN 807 of 10 October 2012)	Part A: Section 6.2 & 6.3	PPP undertaken in accordance with regulatory requirements and adhere to the guidelines.
		Guideline Series 9.	Need and Desirability Guideline in terms of the Environmental Impact Assessment Regulations, 2010 (GN 891 of 20 October 2014).	Part A: Section 5.	In the absence of guidelines for the EIA Regulation of 2014, reference has been referred to for the purposes of this amendment.
	National Environmental Management Laws Third Amendment Act (Act 25 of 2014)	Section 69 - Minister may make regulations for management and control of residue stockpiles and deposits. (no regulations made to date).	Section 24C-Procedure for Identifying Competent Authority - (2A) - Minister of Mineral Resources identified as competent authority where a listed or specified activity is directly related to prospecting, exploration mineral or petroleum, extraction, primary processing of mineral or petroleum. Section 24S-Residue Deposits - Any residue stockpiles and residue deposits must be deposited and managed in accordance with NEM:WA, on a site demarcated in EMP.	Part A: Section 3	Application for environmental authorisation in terms of the NEMA made to the DMR. Application made to the DMR for authorisation in terms of NEMWA for the extension of waste rock dumps. Combined application submitted to the DMR on 30 October 2015. Scoping Report submitted to the DMR on 3 November 2015 and acknowledgement of receipt of Scoping Report given on 10 November 2015.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)				REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATIVE POLICY OR CONTEXT
	Legislation	Regulations / Guidelines	Description		
			Section 43 – Licensing Authority - Minister of mineral resources is the licensing authority where waste relates directly to prospecting, extraction, primary processing, residue deposits, stockpiles.		
Standard Template for: ENVIRONMENTAL IMPACT ASSESSMENT REPORT and ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).				This report	Report compiled in accordance with standard template.
Amendment to Mining Activities	Minerals and Petroleum Resources Development Act 28 of 2002 (MPRDA)	Section 102	As the Kolomela Expansion Project will be located within the boundaries of Kolomela Mine, the site is on mining land and is classified as being a mining activity. Thus the MPRDA and its regulations must be complied with. The environmental management programme cannot be amended without written consent from the minister.	This report Submitted in support of Section 102 amendment.	Application for Section 102 authorisation made on 30 October 2015 and acknowledges by the DMR on 19 January 2016.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)				REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATIVE POLICY OR CONTEXT
	Legislation	Regulations / Guidelines	Description		
Financial Provision	Minerals and Petroleum Resources Development Act 28 of 2002 (MPRDA)	Mineral and Petroleum Resources Development Regulations (GN. 527 of 23 April 2004). Section 53&54	Methods for Financial Provision and Quantum for Financial Provision	Part A: Section 11 Part B: Section 5.5&5.6	The calculation of the quantum of the financial provision is in accordance with requirements as given in Section 53 of the regulations.
	National Environmental Management Act 107 of 1998 (NEMA) as amended	Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations (GN. 1147 of 20 November 2015)	Transitional Arrangements provided in Section 17.	Not applicable	Review was undertaken prior to the publishing of the regulations and thus does not fall into the period indicated in Section 17(5). The financial provision is to be reviewed in accordance with Regulations 53&54 of the MPRD Regulations.
Waste Management & Disposal	National Environmental Management: Waste Act 59 of 2008. (NEM: WA)	List of Waste Management Activities (GN. 921 of 29 November 2013)	Lists waste management activities requiring environmental authorisation.	Part A: Section 3	Existing waste rock dumps and other waste management facilities are already authorised in terms of existing environmental authorisations for Kolomela Mine. Application made for the expansion of waste rock dumps in terms of Category A(17) and supported by the EIA process.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)				REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATIVE POLICY OR CONTEXT
	Legislation	Regulations / Guidelines	Description		
Waste Management & Disposal	National Environmental Management Waste Act 59 of 2008. (NEM: WA)	Waste Classification and Management Regulations (GN. 634 of 23 August 2013)	Wastes are to be classified in terms of SANS 10234.	Part A: Section 3 Part C: Report A	Reference is made to the Kolomela Mineral Waste Stream Assessment and Mine Residue Facilities Impact Report (Golder, 13 January 2016) – Part C: Report A. Technical Memorandum: Overall Outcomes of Kolomela Mineral Waste Streams Assessment and Mining Residue Facilities Impact Study (Golder, 8 January 2016) – Part C: Report A.
		National Norms and Standards for the Assessment of Waste for Landfill Disposal (GN. 635 of 23 August 2013).	Waste Assessment to be completed for wastes in terms of the regulations.	Part A: Section 3 Part C: Report A	Reference is made to the Kolomela Mineral Waste Stream Assessment and Mine Residue Facilities Impact Report (Golder, 13 January 2016) –Part C: Report A. Technical Memorandum: Overall Outcomes of Kolomela Mineral Waste Streams Assessment and Mining Residue Facilities Impact Study (Golder, 8 January 2016) – part C: Report A.
		Regulations regarding the Planning of Residue Stockpiles and Deposits (GN. 632 of 24 July 2015).	Regulations planning and management of residue stockpiles and residue deposits.	Part A: Section 3	Reference is made to the Kolomela Mineral Waste Stream Assessment and Mine Residue Facilities Impact Report (Golder, 13 January 2016) – Part C: Report A Technical Memorandum: Overall Outcomes of Kolomela Mineral Waste Streams Assessment and Mining Residue Facilities Impact Study (Golder, 8 January 2016) – Part C: Report A.
Biodiversity	National Environmental Management Biodiversity Act 10 of 2004 (NEMBA)	National List of Ecosystems that are Threatened and in Need of Protection, GN 1002 of 9 December 2011	Lists ecosystems to be protected in terms of NEMBA.	Not applicable	No threatened ecosystems will be affected by the proposed development.
		Threatened or Protected Species Regulations,	No person may carry out a restricted activity involving a	Part A: Section 7.1.8 Part B: Section 4	A permit will be required prior to removal of endangered, vulnerable and protected species, if such species are found

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)				REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATIVE POLICY OR CONTEXT
	Legislation	Regulations / Guidelines	Description		
		GNR.152 of 23 February 2007	specimen of a listed threatened or protected species without a permit.	Part C: Report L	on the site.
		Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector 2013	This Guideline provides a tool to facilitate the sustainable development of South Africa's mineral resources in a way that enables regulators, industry and practitioners to minimise the impact of mining on the country's biodiversity and ecosystem services.	-	This guideline has been taken into account when assessing the biodiversity impacts of the project and the required mitigation measures.
		National Freshwater Ecosystem Priority Assessment (NFEPA) of 2012	Lists systems of ecosystem importance.	Part A: Section 3 Part A: Section 7.1.7 Part C: Report K	The Soutloop River is listed under NFEBA. Application has been made for activities under GN985, as required.
		SANBI Wetland Inventory	Database of wetlands.	Part A: Section 7.1.7 Part C: Report K	No wetlands listed in wetland inventory. Wetlands however listed under NFEPA.
	Northern Cape Nature Conservation Act 9 of 2009	Chapter 6 Schedule 1 and 2	Lists specially protected and protected species that cannot be disturbed without a permit.	Part A: Section 7.1.8 Part C: Report K	Application will be made DENC for plant species listed under Act should authorisation be given by the DMR.
	National Forests Act 84 of 1998	List of Protected Trees (GN1161 of 20 November 2015.	No person may carry out a restricted activity on any protected tree except if there is a licence granted by the minister.	Part A: Section 7.1.8 Part C: Report K	A licence must be obtained prior to removing any protected trees on site, if such species are found on the site. Application will be made to DAFF for such a licence should environmental authorisation for the project be granted.
	Conservation of Agricultural Resources Act 43 of 1983	Declared Weeds and Invader Plants (GN. 280 of 2001)	Requires the landowner to manage agricultural resources i.e. the removal of invasive species, protection of soils against water and wind erosion and the management of water resources.	Part B: Section 4	An alien invasive management plan is in place at Kolomela Mine.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)				REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATIVE POLICY OR CONTEXT
	Legislation	Regulations / Guidelines	Description		
Water Use	National Water Act 36 of 1998 (NWA)	Section 21	Lists water uses that require a licence prior to commencement	Part B: Section 3.5	Application for amendment to water use licence is to be made under Section 21
		Regulations for the Use of Water for Mining and Related Activities aimed at the Protection of Water Resources. (GN. 704 of 4 June 1999)	Restrictions on development and activities within or close to watercourses		Application to be made for exemption from the provisions of the regulations, where applicable. To be included as part of the water use licence amendment application.
Heritage Resources	National Heritage Resources Act 29 of 1999	Section 38	Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as: (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length; (c) any development or other activity which will change the character of a site- (i) exceeding 5000 m ² in extent.	Part A: Section 7.1.11 Part C: Report E	South African Heritage Resources Agency (SAHRA) has been notified of the proposed development and a Phase 1 Heritage Impact Assessment is required for the project. Heritage Impact Assessment has been completed.
		Section 38(2)	The responsible heritage resources authority must within 14 days of receipt of a notification in terms of subsection (1) – (a) if there is reason to believe that heritage resources will be affected by such development, notify the person who intends to undertake the development to submit an impact assessment report.		Heritage Impact Assessment has been completed. Heritage permits will be required. Phase 2 assessment recommended.
Air Quality	National Environmental Management:	GN 248	Lists activities that require an atmospheric emissions licence prior to construction.	Section 3.	An atmospheric emissions licence is required for the refuelling area as it is a listed activity. In accordance with the NEM: AQA regulations, the AEL application will be submitted should

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)				REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATIVE POLICY OR CONTEXT
	Legislation	Regulations / Guidelines	Description		
	Air Quality Act 39 of 2004 (NEM: AQA)	Section 34	Minister may prescribe national standards to: -control noise in general, by specific machinery, activities or in specified places or areas; -for determining definition for noise and maximum levels of noise.	Part B: Section 4	environmental authorisation be granted. Applicant is to adhere to any legislated national standards for noise. These standards will be taken into account in the assessment and built into the EMP.
Health and Safety	Mine Health And Safety Act 29 of 1996		To provide for protection of the health and safety of employees and other persons at mines.	Part B: Section 4 Part B: Section 8	The Mine Health and Safety Act must be complied with.

5 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES

According to the Guideline on Need and Desirability in term of the Environmental Impact Assessment (EIA) Regulations, 2010 (GN. 891 of 2014), the consideration of “need and desirability” in EIA decision-making requires the consideration of the strategic context of the proposed amendment along with the broad societal needs and the public interest.

The proposed development must not exceed ecological limits in order to secure ecological integrity, and must serve the public interest in terms of social and economic development. Consideration needs to be given to the constitutional right (Section 24 of the Constitution) for:

- “securing ecological sustainable development and use of natural resources”; and
- “promoting justifiable economic and social development”.

The Minister of Mineral Resources granted a mining right on 5 May 2008 authorising the exploitation of iron ore at Kolomela Mine {Ref: (NC) 069 MR} which is valid until 17 September 2038, unless cancelled or suspended. Current mining operations involve mining from three pits on the farms Leeuwfontein 488, Strydfontein 614, Remainder of Klipbankfontein 489, and portions 1, 2, 3, and the Remainder of Kapstevl 541. Existing processing facilities involve a 9 million tonnes per annum (Mtpa) direct shipping ore (DSO) operation, including crushing and screening of recovered ore material into stockpiles of ‘lump’ and ‘fines’ for transportation by rail to Saldanha Bay.

Kolomela intends to increase production to 16 Mtpa by 2018 in order to meet market demand and to satisfy short and medium term requirements essential to ongoing business continuity. Although included in the mining right, pits at Ploegfontein, Tierbult and Kapstevl South are not provided for in the current layout in the approved Environmental Management Programme and thus are being added to the plan. The mining of these pits is necessary to maintain the current life of mine (2040), while accelerating production. These pits will be located in order to extract the available ore. Associated with this is the expansion of the existing waste rock dump footprints. Consideration has been given to environmental sensitivities when designing the footprints of the waste rock dumps, and these have been further revised based on the outcomes of the specialist studies undertaken as part of this EIA process.

In addition, the increased production will need to be facilitated by the processing of lower grade ore. Provision has thus been made for DMS processing at the mine at a maximum rate of 1-2 Mtpa using modular processing plants. These plants will be located close to primary source of the lower grade ore. Three locations have thus been included for the location of such plants, close to the Leeuwfontein Pit, adjacent to the he Kapstevl At Pit Facility and close to the Klipbankfontein Pit. Note that there will be only one DMS processing plant active at any particular time. The incorporation of these plants meets the iron ore resource can be mined optimally as low grade material can be included in the production.

In order to facilitate future increased production from the Kapstevl and Klipbankfontein areas, provision is also been made for more facilities closer to the pit areas, including workshops and haul truck parking areas. These facilities have been located with due consideration to known environmental sensitivities, and the positions have been finalised based on the outcomes of specialist studies.

The associated projects will have some positive outcomes for local communities and society in general. The construction and operations associated with the projects are expected to result in increased employment opportunities with time.

Overall revenue increase at the mine will facilitate increased fund allocation to local economic development through the implementation of projects identified in the Social and Labour Plan. SIOC is fully committed to implementing development plans and projects that will facilitate local community and rural development in the area surrounding in line with the provisions of the Broad-Based Socio-Economic Empowerment Charter for the South African Mining Industry.

Thus, in summary, the expansion of Kolomela Mine is needed and is desirable for the following reasons:

- Enable SIOC to stay in operation and earn a profit;
- Enable SIOC to produce a sufficient quantity of iron ore, to satisfy the various requirements of its clients;
- Safeguard the employment of the existing employees;
- Increase future employment opportunities;
- Safeguard and increase local economic development opportunities created by the existing Kolomela Mine.

6 MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE INCLUDING A FULL DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE

6.1 DETAILS OF THE DEVELOPMENT FOOTPRINT ALTERNATIVES CONSIDERED

During the course of the scoping and EIA phases of the Kolomela Expansion Project, several potential development layouts were proposed. As a result of the public consultation, specialist studies, impact assessment and mitigation, the proposed layout was refined and amended. Therefore, the original layout was amended during the scoping process and the scoping layout was further amended during the EIA Phase.

The three layouts are included as Figures 6.1, 6.2 and 6.3 below.

6.1.1 DETAILS OF ALL ALTERNATIVES CONSIDERED

6.1.1.1 Location Alternatives

Although the location of the pits are largely fixed as a result of accessing the mineral reserves, alternatives have been considered with respect to the layout of infrastructure and waste rock dumps.

Layout Plan 1 – Original Amendment Proposal (refer to Figure 6.1): This layout was presented an initial investigation area to be considered for layout of the expanded operations at Kolomela Mine. Initial specialist studies were undertaken in these areas in order to facilitate layout planning. This was the original layout presented to interested and affected parties in the beginning of the scoping process.

Layout Plan 2 (refer to Figure 6.2) – Revised Amendment Proposal: This layout was presented by Kolomela Mine as per the requirements of meeting the 16 Mtpa objective. Specialist studies were updated to consider changes from Layout Plan1 to Layout Plan 2 to ensure proposed disturbance areas not included in the baseline previous studies were covered. This is the preferred layout used in the scoping report.

Layout Plan 3 (refer to Figure 6.3): – Mitigated Layout for Authorisation

This layout presents a modified version of Layout Plan 2, taking into cognisance sensitivities identified in specialist studies and recommendations made by specialists and the EAP to minimise impacts. The layout plan has been revised to reduce impacts where practicable. This is the final layout plan used in this EIA report and represents the mitigated scenario after assessing impacts. This is the layout that is to be authorised by this application.

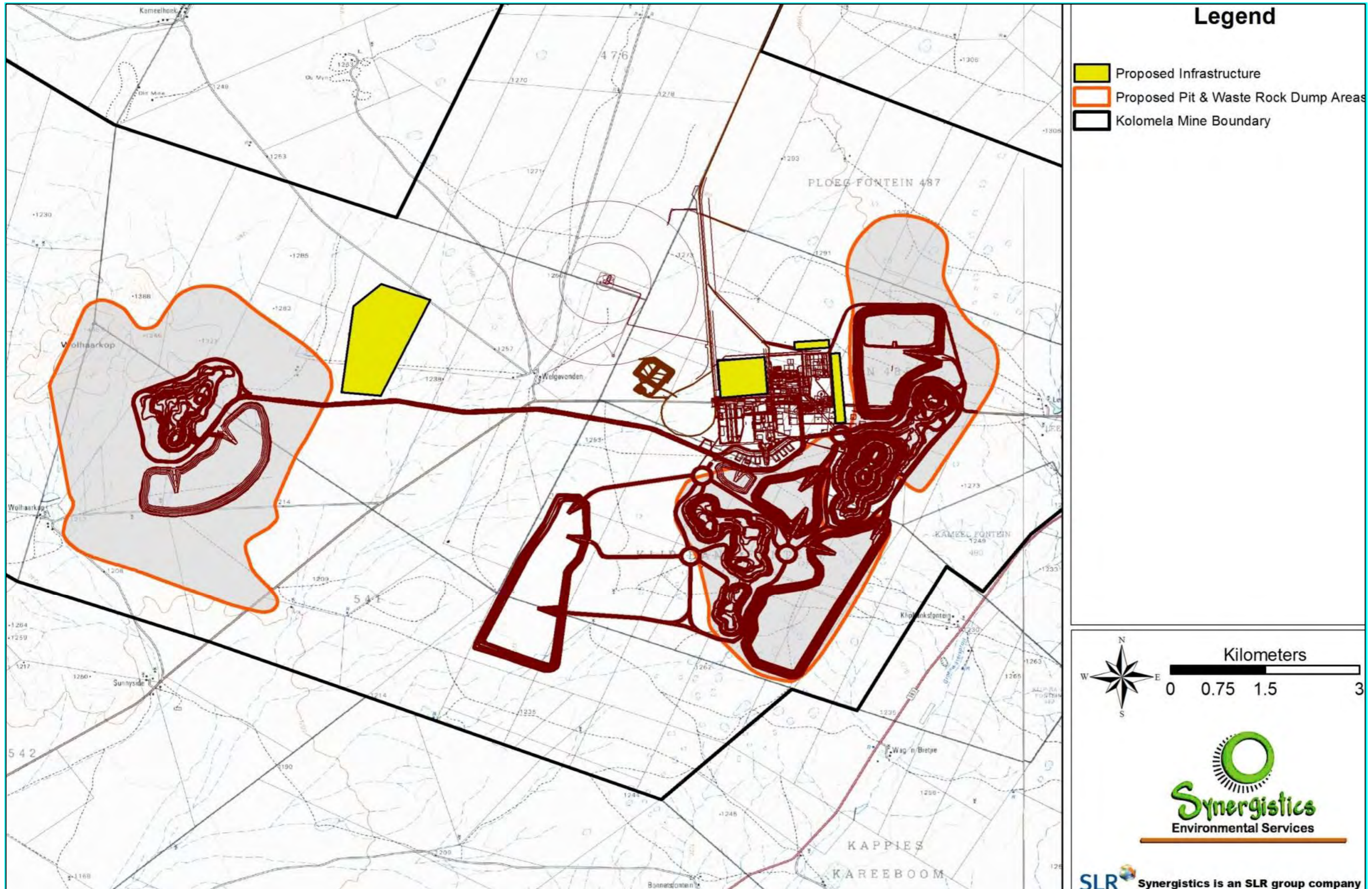


FIGURE 6.1: ORIGINAL PROPOSED SITE LAYOUT 1 BEFORE CONSIDERATION OF ALTERNATIVES AND PUBLIC CONSULTATION.

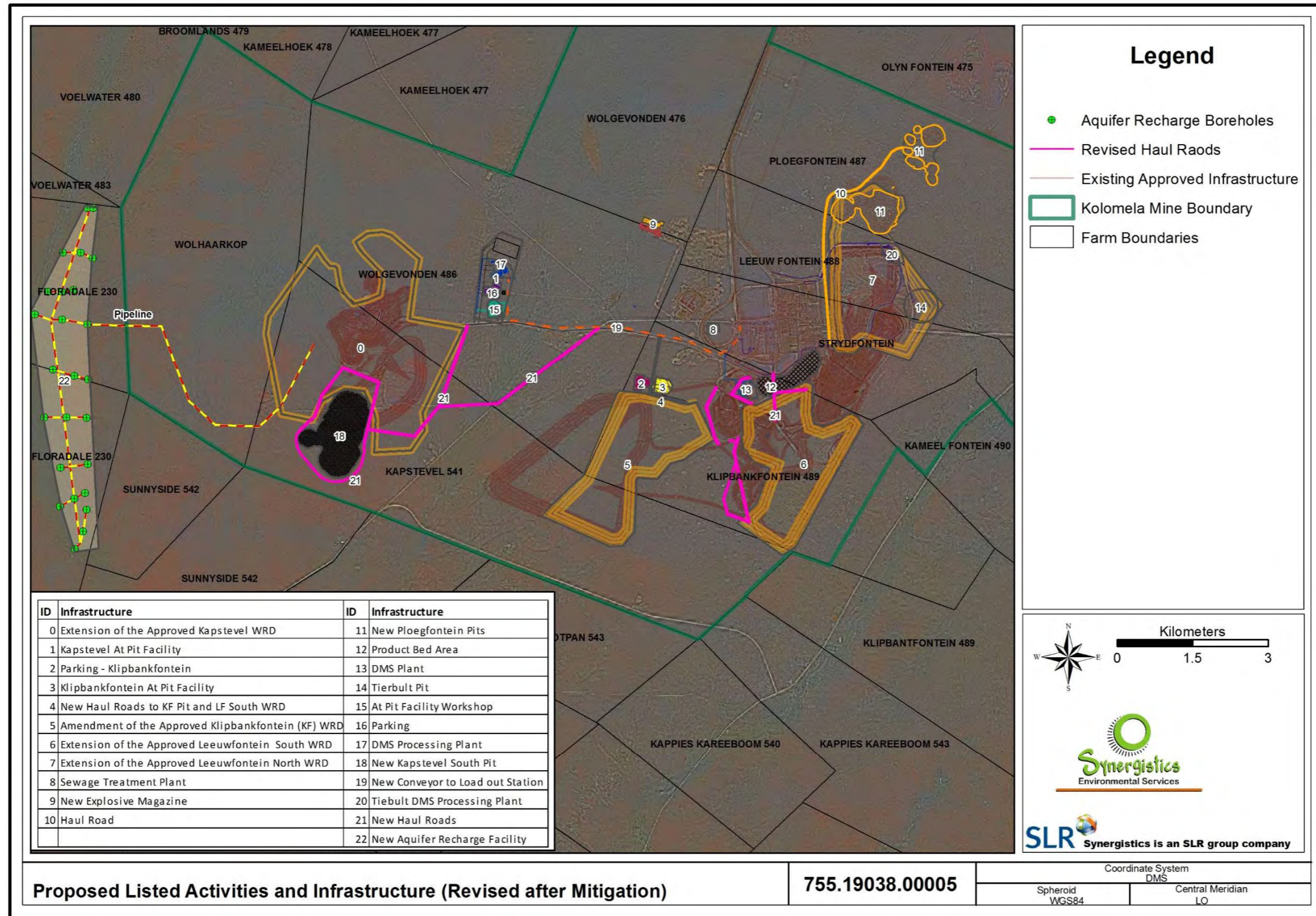


FIGURE 6.3: FINAL LAYOUT PLAN 3 (MITIGATED LAYOUT) TAKING INTO CONSIDERATION THE AVOIDANCE OF SENSITIVITIES HIGHLIGHTED BY THE EIA AND SPECIALIST STUDIES.

6.1.1.2 Type of Activity Alternatives

The type of activity for the Kolomela Expansion project is iron ore mining. This is the activity currently undertaken at the site and this activity will not change as a result of the amendment. Therefore, different activity alternatives were not considered at the site, as there is only one activity option for the expansion of Kolomela mine, and that is to continue with the activity of iron ore mining.

6.1.1.3 Design or Layout alternatives

The layout alternatives are discussed in Section 6.1.1.1 above. The Kolomela Expansion Project included an investigation into the inclusion of the Ploegfontein, Tierbult and Kapstevél South pits into the mining schedule, driven by decisions as to processing options. Initial indications were that the Ploegfontein area would not be included in the planned mine works programme. A stop to the Kolomela Expansion Project forced a decision to be taken by Kolomela Mine to include these pits into the future mining schedule aimed at achieving the 16 Mtpa production objective and to maintain the life of mine.

6.1.1.4 Technology alternatives (DMS plants)

The Sishen Iron Ore Company (SIOC) embarked on a feasibility study to identify alternatives for increasing production at the mine, namely the Kolomela Expansion Project. The current Kolomela plant was initially designed to process 9 million tonnes of iron ore per annum and therefore requires additional capacity to cater for an overall increase in production from the mine. The options investigated as part of the project included:

- New standalone plant options: New primary, secondary and tertiary crushing plant;
- Debottlenecking Options: Especially addressing specific capacity constraints in the existing plant.
- Optimisation alternatives.

Alternatives for increasing the production of the mine to are still being considered. The proposed amendment (this application) provides for the optimisation of the DSO operation (without significant changes) to increase production through the plant to 14 Mtpa.

In addition to this provision has been made for DMS plant to be operational at the mine at any time (3 locations have been identified for the DMS plants) to process between 1 and 2 Mtpa of lower grade ore. There is currently a modular DMS processing plant in operation. Provision has been made for the same (or similar plants) to be located near to the Kapstevél and Klipbankfontein pit areas.

6.1.1.5 Operational alternatives (Excess water management)

In accordance with the Kolomela Mine Water Use Licence (Licence 10/D73A/ABCGIJ/2774) Kolomela Mine is required to dispose of excess water from dewatering activities into the Vaal-Gamagara pipeline. Due to the lack of capacity of the Vaal-Gamagara Water Supply Scheme to take all the water generated from the pit dewatering activities, the mine is currently disposing of excess water into natural drainage structures located on the mining property under directive from the Department of Water & Sanitation. In addition the increased dewatering requirements associated with the new mining activities, the excess water will need to be responsibly disposed.

As an alternative, Kolomela Mine investigated the feasibility of recharging water into the aquifer. Recharge of water into the aquifer via 2 sites along the Groenwaterspruit were investigated and deemed feasible and covered under a separate authorisation (Permit 16/2014). The current application includes an investigation into the recharge of water into the aquifer via the tributary of the Soutloop River located on the farm Floradale

230 and 484.

6.1.1.6 Option of not implementing the activity

In accordance with the National Environmental Management Act No107 of 1998 (NEMA) Regulations, the no-go alternative is required to be investigated and assessed. The no-go alternative would mean that the associated projects are not undertaken and therefore the associated negative environmental and social impacts will not occur. This alternative will need to be weighed against the findings of the EIA as well as the potential socio-economic benefits that may result from the project.

6.2 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

6.2.1 IDENTIFICATION OF INTERESTED AND AFFECTED PARTIES

Potential Interested and Affected Parties (IAPs) were identified using existing databases for Kolomela Mine. The databases included authorities, ratepayers association, farmers unions and surrounding mines. The public participation process and consultation is and will be in adherence to the Anglo standards of Stakeholder Management. People and/or organisations were registered as IAPs for the project if they:

- Are landowners or tenants adjacent to or within 100 m from the proposed study area
- Are the local municipality/ ward councillor with jurisdiction in the area
- Represent the ratepayers association
- Are an authority or organ of state having jurisdiction in respect of any aspect of the activity
- Responded to the BID, press advertisements and site posters
- Attended one of the Kolomela Environmental Forum meetings
- Attended the information-sharing meetings
- Own, operate or administrate infrastructure affected by the project.

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

6.2.2 NOTIFICATION OF LANDOWNERS, LAWFUL OCCUPIERS AND IAPs

The initial public consultation process for the scoping phase of the project was carried out between 6 December 2013 and 29 January 2014. As part of the consultation process, IAPs were notified of the proposed development and the details of the Scoping and EIA process being undertaken. Notifications to IAPs were provided in English and Afrikaans.

An original Background Information Document (BID) was circulated via registered post and email to relevant authorities and all adjacent landowners. Other IAPs received the BID via email. The BID was also provided at the Kolomela Environmental Forum Meeting held on 2 December 2013.

The BID provided background information on the expansion and provided an explanation of the Scoping and EIA process that is currently being undertaken for the project. The BID also invited members of the public to register as IAPs and participate in the EIA process. A response sheet was attached the BID on which IAPs could provide written comments on the proposed development. Potential IAPs were notified of the project by

means of:

- Direct letter and BID to the landowner of the Farm Floradale that SIOC intends to utilise for the Aquifer Recharge project.
- Distribution of the BID by hand during Kolomela quarterly environmental forum meeting held on 2 December 2013.
- Notifications and BIDs sent to identified IAPs via email and registered post.
- Press and site notifications.

Note that additional updated information was circulated to registered IAPs in 2 April 2015. The purpose of this document was to inform persons of the:

- Updated layout and production objectives of Kolomela Mine;
- Decision to submit a new application for authorisation in terms of the new EIA Regulations of 4 December 2014; and
- Application to be made in terms of the National Environmental Management: Waste Act given that mining waste was subsequently captured under the definition of waste.

IAPs were given a further 30 days to submit comment on the above in accordance with the EIA Regulations. Copies and proof of distribution of the original public notifications (December 2013/January 2014) and updated public notifications (April 2015) are contained in Part A: Appendix B2

6.2.3 NOTIFICATION OF COMPETENT AUTHORITIES

6.2.3.1 Northern Cape Department of Environment and Nature Conservation (DENC)

An application for environmental authorisation in terms of NEMA was submitted to the DENC on the 12th of November 2013 and was assigned the reference numbers NC/EIA/15/ZFM/TSA/POS3/2013 (NCP/EIA/0000252/2013).

Subsequently, with the decision to submit an application to the DMR for authorisation under the new EIA Regulations (December 2014), the application to DENC was formally withdrawn on 22 June 2015.

6.2.3.2 Northern Cape Department of Mineral Resources (DMR)

The DMR was been notified of the project via a direct letter sent on 3 December 2013. As part of the public participation process, a BID in December 2013 and the subsequent update of April 2015, was also sent to the DMR. The scoping report was also submitted to the Department.

Subsequently, application has been made to the DMR on 30 October 2015 for authorisation of the proposed development in terms of the new EIA Regulations (December 2014) as well as activities listed in terms of the National Environmental Management Waste Act.

Application was also made for amendment of the environmental management programme in terms of Section 102 of the MPRDA on 30 October 2015. Acknowledgement of receipt of the application was received on 19 January 2016.

6.2.3.3 Northern Cape Department of Water & Sanitation (DWS)

The DWS has been notified of the project through the circulation of the BID on 4 December 2013 and the subsequent update of April 2015. Note that formal application will be made for activities listed in terms of Section 21 of the National Water Act and an amendment to the existing water use licence.

6.2.4 NOTIFICATION OF OTHER AUTHORITIES

In addition to the authorities listed above, the BID (December 2013) and the subsequent update of April 2015, was circulated to the following commenting authorities:

- Tsantsabane Local Municipality.
- ZFM District Local Municipality.
- Northern Cape Provincial Government.
- Northern Cape Department of Agriculture, Land Reform and Rural Development.
- Northern Cape Department of Health.
- Department of Labour (national and provincial).
- Department of Education.
- Department of Social Development.
- Northern Cape Department of Agriculture, Forestry and Fisheries.
- South African Heritage Resources Agency.

Copies and proof of distribution of the original authority notifications (December 2013/January 2014) and updated notifications (April 2015) are contained in Part A: Appendix B3.

6.2.5 MEDIA ADVERTISEMENTS AND SITE NOTICES

The original press adverts were placed in the following newspapers:

- Die Ghaap in Afrikaans on 6 December 2013;
- Volksblad in English 6 December 2013.

Additional press advertisements were placed in the above Newspapers on 2 April 2015 and 31 March 2015, in order to notify persons of the application being made under the new NEMA EIA regulations (GN982 of 4 December 2014) and the need to include an application for a waste management licence give that mining waste was subsequently included under the definition of waste.

Site notices (A2) were placed on the 4 December 2013 at the following areas:

- Entrance of the Kolomela Mine;
- Main entrance to the SIOC administration buildings in Postmasburg (English and Afrikaans);
- Tsantsabane Local Municipality's notice board (English and Afrikaans);
- Notice board of the Spar shopping centre in Postmasburg (English and Afrikaans).

Additional site notices were placed at the above locations on 9 April 2015, in order to notify persons of the application being made under the new NEMA EIA regulations (GN982 of 4 December 2014) and the need to include an application for a waste management licence give that mining waste was subsequently included under the definition of waste.

The press and site notification was undertaken to elicit interest from other IAPs that might not have been identified during the stakeholder identification process. The original (December 2014/January 2014) adverts

and site notices and updated (March/April 2015) are included in Part A: Appendix B4.

6.2.6 PUBLIC AND AUTHORITY MEETINGS

Initial authorities meetings have been held regarding the project with the DMR on the 14 January 2014, with NCDENC on the 8 May 2014 and DWA on 12 December 2013. An additional authority meeting was held with the DMR on 17 February 2015. Copies of the minutes of the authorities meetings are in Part A: Appendix B5.

Focus group meetings were held with IAPs on 13 and 14 October 2014. Copies of the minutes of the focus group meetings are in Part A: Appendix B6.

6.2.7 PUBLIC REVIEW OF DRAFT SCOPING REPORT

The draft scoping report was made available for public review from the 14 April 2014 until the 19 May 2014 (30 calendar days). Only two comments on the report were received from Mr Albertus Viljoen (14 April 2014) and Mr Johan Kotze (15 April 2014).

Additional scoping information was submitted to IAPs on 2 April 2015. The same two IAPs also provided comments on the updated scoping information which was circulated.

Copies of IAP comments received on the original scoping report (April 2014) and updated scoping information (April 2015) are in Part A: Appendix B7.

This version of the scoping report (dated November 2015) was circulated to IAPs for a 30 day review period in accordance with Section 40 (3) of the 2014 EIA regulations. No further comments were received on the updated report.

6.2.8 AUTHORITY REVIEW OF DRAFT SCOPING REPORT

Copies of the draft scoping report were provided for authority review from 14 April 2014 until 29 May 2014 (40 calendar days). The reports were circulated to authorities listed above and those that have been included in the IAP Database.

Additional scoping information was submitted to authorities on 2 April 2015.

Copies of authority comments received on the original scoping report (April 2014) and updated scoping information (April 2015) as well as final scoping report are in Part A: Appendix B8.

The final scoping report was circulated to authorities on 10 December 2015. Comments were received from the Department of Water & Sanitation (regional office) on 12 January 2016 and the Department of Agriculture, Forestry and Fisheries (regional office) on 15 January 2016.

6.2.9 PUBLIC REVIEW OF DRAFT EIA REPORT

The draft EIA report will be made available for public review from the 1 to 30 September 2016 (30 calendar days).

6.2.10 AUTHORITY REVIEW OF DRAFT EIA REPORT

Copies of the draft and final EIA report will be provided for authority review from 1 to 30 September 2016 (30 calendar days). The reports will be circulated to authorities listed above, included in the IAP Database.

6.3 SUMMARY OF ISSUES RAISED BY IAPS

TABLE 6.1: SUMMARY OF ISSUES RAISED BY IAPS AND REGULATORY AUTHORITIES

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
AFFECTED PARTIES				
Landowners/Lawful Occupiers (The applicant is the landowner, thus they are being consulted during the entire process.) X				
Landowners/Lawful Occupiers of Adjacent Properties X				
05/02/2014	Mr Jannie and Johan Kotze (Neighbours)	Requests that a comprehensive aquifer characterisation/ identification assessment be undertaken for all aquifers up until 250 m deep with a radius of 10 km from the Kolomela Mine. This model must then be presented to the surrounding farmers to indicate what the current situation of groundwater is. Feedback of this should be given monthly to the surrounding farmers. This must also be done with taking the farm Heuningkranz into consideration.	The groundwater model is currently being updated/recalibrated on simulations of the updated mine plan. On completion of this assessment the result will be presented to the surrounding landowners at the quarterly Kolomela Environmental Forum Meeting. The Kolomela mine's groundwater monitoring is continuing as always. This includes: <ul style="list-style-type: none"> • Monthly monitoring of abstraction and groundwater water levels around the pits. • Quarterly groundwater level monitoring of the regional environment • Yearly hydro-census of all boreholes within the hydro-census area. This area gets updated as required. The farm Putjie, Heuningkranz and Langverwacht has been included in the 2014 hydro-census. The farm Lynput was added in 2012. Feedback will not be able to be provided monthly as it is currently done on a quarterly level. Danie Vermeulen's appointment has made provisions to provide feedback twice a year at the Kolomela Environmental Forum Meetings. This will provide farmers with the required feedback regarding the current groundwater situation.	Part A: Section 7.1.5 and 8.3.5 Part C: Report D (Groundwater Model)
15/04/2014	Johan Kotzé	1) On page ii [of the 2014 Scoping Report] it was mentioned that the majority	1) Noted. This forms part of the continual	

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
	(Neighbour)	<p>of the boreholes indicated a decline in general, and that it could be attributed to returning to normal after the 2011 rains. I would like you to note my doubt in this, as this happened between 12 and 24 months after the rains.</p> <p>2) Increase in crime has been received as a concern, it is also mentioned that will be addressed in a comprehensive Social Impact Assessment. Please give special attention to this, because I do not think that the current situation on crime has been properly assessed and/or addressed.</p> <p>3) With regards to Noise pollution: I would like to get the baseline noise levels taken at Floradale prior to mining compared to current noise level. Can Floradale please be included in the noise baseline, if not included yet?</p> <p>4) Thanks for making a lot of mention with regards to investigation into a second aquifer recharge.</p> <p>5) Thank you for including our request regarding Aquifer characterization/ identification assessment. I am however concerned that the noises I heard at the quarterly meeting is that it will be too expensive I and your report indicate that monitoring will continue as always – water level monitoring. Therefore I cannot agree that this request has been adhered to.</p> <p>6) In 1.3 it is mentioned that benefits to local communities will be detailed in EIA. Is it possible to draw up a list of benefits to the surrounding farmers as well?</p>	<p>monitoring programmes at Kolomela to establish whether such declines are seasonal or caused by external sources. The University of Pretoria is currently developing a comprehensive groundwater database for Kolomela to comprehensively monitor groundwater fluctuations over time since mining commenced. The completion of this database would provide a comprehensive analysis of changes over time. To more accurate data will indicate whether groundwater level fluctuation is only seasonal or external.</p> <p>2) Noted.</p> <p>3) Initial noise monitoring was conducted on the Farm 230 and will be reassessed as part of the EIA. The initial baseline noise levels were just under 30dB, well below the 45 dB guidelines for rural Areas (SANS 10103). This will be compared to new day and night time measurements.</p> <p>4) Noted.</p> <p>5) This issue will be discussed at the next quarterly Kolomela Environmental forum meeting and integrated into the EIA development. This forum will provide the best platform to resolve these concerns.</p> <p>6) This can be arranged.</p>	<p>Part A: Section 7.1.10 and Section 8.3.10</p> <p>Part C: Report F (Noise Impact Assessment)</p>
14/04/2014	Albertus Viljoen (Neighbour)	<p>1) Earlier in the mining process it was indicated that red iron ore dust will not impact on Soetfontein. I have observed "red" dust in and around the property. How will the expansion further impact on this?</p> <p>2) Where will the relocation be of the secondary access road route branching off the existing R309 (Witsand road)?</p> <p>3) The use of clean water is crucial, wasting water by dumping it on the ground</p>	<p>1) The updating of the Air quality impact assessment as part of the EIA will attempt to clarify your concerns.</p> <p>2) The relocation refers to internal road relocation within the Kolomela Mine Boundary. The subject EIA does not</p>	<p>Part A: Section 7.1 .9 and Section 8.3.9</p> <p>Part C: Report B (Air Quality Impact Assessment)</p> <p>Part A: Section 7.1.10 and Section 8.3.10</p>

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
		<p>is not good water management. I would suggest to broaden the context of where to utilize the surplus water.</p> <p>4) With reference to surplus water. Wasting water is not an option and not utilizing water because of the dependency of locals is sidestepping good water management. Allowing DWA to claim all surplus water is not good management for the area. De-watered water can be utilized to minimize the impact generated by dewatering, rather than exporting the water from the local resource.</p> <p>5) Statement on Pg 53 (of the 2014 scoping report): "Based on the classification system of the Chamber of Mines, the vast majority (98.7%) of the surface area is most suitable for wilderness areas. A small percentage (1.23%), mostly on the farm Kapsteveld, is suitable for agricultural use". Although farming had been taking place for a 150 years? Generalization that the area is not suitable for agriculture is not acceptable.</p> <p>6) I would like to have a discussion with the specialist regarding the wetland classification of the Groenwaterspruit.</p> <p>7) I would like to see noise recordings over a 7 day period. 24 hours is not indicative enough, due to changing climate and wind conditions.</p>	<p>address any off lease development.</p> <p>3) The project will investigate alternative surplus water disposal options. A further phase of the Aquifer recharging project to the west of the mine is also being investigated as part of the EIA.</p> <p>4) Please refer to comment above.</p> <p>5) Noted, however the area is not characterised as having productive agricultural potential, excluding farming with livestock. The context of this statement is such that it refers to arable land suitable for the production of crops. The area is surely suitable for livestock farming as stated.</p> <p>6) This will be arranged.</p> <p>7) We have arranged noise recordings to be undertaken for a 2 day 24 hours cycle. The results of this monitoring run will establish whether additional noise monitoring would be required. This monitoring will be done based on standard practices.</p>	Part C: Report F (Noise Impact Assessment)
14 April 2015	Albertus Viljoen (Neighbour)	<p>1) Will a consultant or relevant person visit me to discuss the expansion in detail and what the possible impact will be to us? My concern is that the activities are getting closer to us and this will increase impacts.</p> <p>2) What are the applicable noise regulations?</p>	<p>1) The EIA will likely be sent to you for your review (and public review) in mid-June 2015. The EIA will contain the detailed description and assessment of the impacts as determined in the specialist studies, as well as the proposed mitigation measures. The individual specialist reports will also be included as appendices to the EIA. During the public review period, we will arrange for a member of the project team to come and meet with you to explain what the impacts on you are likely to be.</p> <p>2) The noise guidelines (SANS 10103 and IFC</p>	See above.

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
			guidelines) were sent to Mr Viljoen.	
21/04/2015	Johan Kotzé (Neighbour MVD Kalahari Consulting Civil & Structural Engineers and Town Planners)	With regards to the proposed aquifer recharge at Floradale, will there also be water quality monitoring in place of the water to be deposited?	1) The water quality will be monitored and information will be made available.	
06/12/2014	Mr J.A. Schoeman (local landowner)	Concerns about Water	The project will involve additional dewatering activities to ensure safe and efficient extraction of iron ore resources within Kolomela. Additional dewatering will have an impact on the local groundwater system. The project will involve the updating of the current Kolomela geohydrological model. This model will provide the necessary information and quantification of the expected additional groundwater impact. This would be visually communicated through a groundwater cone of depression impacts. Your concerns is noted and also already regarded as being a potential significant impact from the proposed expansion project.	Part A: Section 8.3.5 Part C: Report D2 (Groundwater Model)
Municipal Councillor				
Municipality X				
14th October 2014	Community Development Manager from the Tsantsabane Local Municipality	<p>RELATIONSHIP WITH THE MUNICIPALITY</p> <ul style="list-style-type: none"> When Kolomela started, the relationship was a partnership which was good for development. After the resignation of the Community Development Practitioner from Kolomela, that relationship came to an end. The current relationship problems with the mine were created by senior people, which resulted in a power struggle between the municipality and Kolomela mine. Currently there is a lack of trust and communication. There is a perception at the mine that the Municipality cannot operate without the mine, 	The comments are noted and the issue of the mine's relationship with the municipality will be considered further in the EIA.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
		<p>which is not true.</p> <ul style="list-style-type: none"> At some point the mine owed us money, and the perception was created that the mine was pumping money into the municipality to rescue the municipality. It will be difficult to solve the situation and try to rebuild the partnership again. 		
14th October 2014	Environment and Health Practitioner from the District Municipality	<p>RELATIONSHIP WITH THE MUNICIPALITY</p> <ul style="list-style-type: none"> The relationship with the mine is good. The only challenge is that Kolomela mine is using a different approach to health and environment than the district municipality. The mine seems not to be taking any responsibility with regard to its socio economic impact. There is a lot of pressure on the Municipality to deliver due to the expansions brought about by the mine and the mine seems to be unaware of this pressure. Was initially working with Kolomela mine on the management of air quality but this responsibility has now been handed over to the National Government due to financial & capacity constraints at the district municipality level. Currently there is no compliance enforcement on air quality at the municipality level. The Tsantsabane area needs at least two Health and Environmental Officers as a result of the rapid growth brought about by Kolomela mine. Another challenge is the failure of the national government to align its plans with municipal plans and strategies. The national government does not consider the current rapid growth in the region, which definitely requires a different approach as opposed to the approach followed in other regions. 	<p>The comments are noted and the issue of the mine's relationship with the municipality will be considered further in the EIA. The issue of the mine putting pressure on municipal services will also be considered.</p> <p>The air quality impact assessment will be updated as part of the EIA. This will include the programme of air quality monitoring which will be carried out by the mine.</p>	<p>Part A: Section 7.1 .9 and Section 8.3.9 Part C: Report B (Groundwater Model)</p>
14th October 2014	District Municipality (Health & Environment Component)	<ul style="list-style-type: none"> Health & Environment is a component within the District & Local Municipality responsible for the monitoring of food quality, water quality, waste management & outbreaks of diseases. The challenge encountered currently is lack of coordination from health role players in government, on local, district and provincial levels. 	Comment is noted.	
14th October 2014	The Municipal Manager of Tsantsabane	<p>RELATIONSHIP WITH THE MUNICIPALITY</p> <ul style="list-style-type: none"> The mine focuses more on building a relationship with regulators in national government due to legislative requirements, rather than building relations with the local municipality. Building a relationship with the municipality should also be prioritised. Initially the relationship was not good and not strategic. There was no disclosure or alignment with the IDP. Initially when the mine built houses in 	The comments are noted and the issue of the mine's relationship with the municipality will be considered further in the EIA.	<p>Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)</p>

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
		<p>Postmasburg, they did not engage with the Municipality. It would have been appropriate for the mine to engage with the municipality to enhance integration and sharing of technical expertise. There has been improvement on engagement, but there are still serious shortcomings in terms of good stakeholder management i.e. non-disclosure of information by the mine.</p> <ul style="list-style-type: none"> • The Tsantsabane Municipality is aligned with Government strategies and the mine should also do the same. According to the participants it seems the mine is only planning the extraction without having commitments to invest in the area and build Tsantsabane. • There are currently no discussions between the mine and the municipality on sustainable development in the area. 		
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA etc.) X				
08/01/2014	Mr P Saayman (Department of Social Development)	This expansion project will obviously entail the appointment of much more employees. The resources in Postmasburg are already under pressure i.e. a shortage of water and housing. Will the construction of water storage include the provisioning of the water to Postmasburg town?	Kumba is currently working with the municipality to develop a spatial development master plan for Postmasburg for the next 50 years. This development plan will prioritise key infrastructural development projects such as water, power, sewage, housing, waste management and roads infrastructure. The project will only involve construction activities required for on lease infrastructural requirements for Kolomela Mine and not Postmasburg Town. It is noted that water provision for the town is currently a problem in Postmasburg and Kumba is currently trying to resolve issues between the Municipality and Sedibeng Water responsible for managing the Vaal Gamagara Pipeline. It should also be noted that Kolomela Mine is not water services provider. All dewatering water is required to be pumped to the Vaal Gamagara Pipeline for distribution through the local water services authority (Sedibeng Water).	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
11/12/2013	Mr Neville Claasens (SAPS)	The impact associated with the influx of job seekers during construction and operational phases of projects have a significant impact on crime.	The exact extent of social related impact will be assessed in detail and contained in a comprehensive Social Impact Assessment process planned as part of the EIA phase of the proposed project.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
08/01/2014	Mr P Saayman (Department of Social Development)	Is the recruitment of people from Postmasburg scoped for this project? Already experienced strikes in 2013, because mines employ people from other towns. Skills development projects to empower unemployed youth in Postmasburg, is essential.	The project will take due cognisance of your concern raised. As part of the EIA a detailed updated social impact assessment will be undertaken to insure the various management measure to be taken to address various impact such as local recruitment policies and plants. The project will however also be integrated into current practices and process of addressing these issues.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
08/01/2014	Mr P Saayman (Department of Social Development)	What measures are in place to control the air pollution during/ after operations at the mine?	Currently at the Kolomela Mine various management intervention measures are employed to reduce dust generation from the site. These aspects have been included in the mines approved EMPr. Some of these measures are employed through the application of dust suppressants on exposed road surface and plant dust extraction system. It is however very difficult to reduce dust generation due to blasting operations, however various other measures are employed to try and reduce dust generated from the site. The planned updating of the existing air quality impact assessment will re-evaluate existing practices and identify if there are any additional management intervention measure to implement on site. The study will also model the extent of the additional impact on air quality as part of the expansion project.	Part A: Section 8.3.9 Part C: Report B (Air Quality Impact Assessment)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
14th October 2014	Health Department Area Manager	<ul style="list-style-type: none"> The clinic in Postmasburg serves 3,000 to 4,580 patients per month depending on the season. He mentioned that there are 2 mobile clinics in Tsantsabane donated by Kumba, but the challenge experienced currently is the availability of health professionals. The high staff turnover is also a challenge due to lack of affordable accommodation and inflated property prices. At all the local public health institutions, there are a lot of queues which impacts negatively on the staff. Another challenge experience is limited medical supplies. 	<p>Comment is noted.</p> <p>Note: Kolomela has funded the construction of the new Postmasburg Clinic as well as living quarters for the staff – both these projects are completed.</p>	<p>Part A: Section 7.1.12 and Section 8.3.14</p> <p>Part C: Report H (SIA)</p>
14th October 2014	Health Department Area Manager	<ul style="list-style-type: none"> There is a Household Registration Process underway to build a profile of households and the community to know and understand the current community status which will inform what interventions are to be brought into the community. The survey will also ensure that households are linked to other Government Department services. The Local Health Department engages with Ward Councillor so that they create awareness amongst the community about this initiative. An ideal clinic should have enough staff members to serve the community and have improved infrastructure. This is why the Health Department is lobbying for the private sector to become partners. Another Government initiative is national software to help pregnant mothers to enrol and ask questions about pregnancy. In dealing with the shortage of doctors in Government Hospitals, there is an initiative to make it compulsory for Private Doctors to see patients in Government Health institutions and be paid accordingly. 	<p>Comment is noted.</p>	<p>Part A: Section 7.1.12 and Section 8.3.14</p> <p>Part C: Report H (SIA)</p>
14th October 2014	Regional Director – Department of Health	<ul style="list-style-type: none"> The headcount of patients has increased due to the increase in population brought about by Kolomela mine. Kolomela employees are staying in the community, which results in a number of social ills including teenage pregnancy and an increase in prostitution. Due to the increase in population, there is a need to increase staffing in the various health institutions. Another challenge is the inflated local property prices. Accommodation for professional health practitioners has become very expensive which makes it difficult to attract and retain medical professionals. There is a Memorandum of Understanding that the Department is currently 	<p>The social impact of the mine expansion will be assessed in the EIA.</p>	<p>Part A: Section 7.1.12 and Section 8.3.14</p> <p>Part C: Report H (SIA)</p>

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
		<p>arranging with the mines in the area.</p> <ul style="list-style-type: none"> There are good interventions that Kolomela mine has implemented: <ul style="list-style-type: none"> Building of a fully equipped clinic Provision of mobile clinics and the planned extension of the hospital The building of staff accommodation <p>The only problem is the recruitment of people from outside rather than locals.</p>		
Communities X				
13 th October 2014	Tsantsabane Youth United Vision	ARTS AND CULTURE Opportunities in Tsantsabane, particularly for youth within Arts and Culture. Many artists end up working in the mines due to the lack of opportunities.	Comment is noted	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
13 th October 2014	Postmasburg youth (refer to Appendix B6 for list of youth focus group meeting attendees)	SOCIAL ILLS <ul style="list-style-type: none"> Alcoholism amongst youth (often as a result of unemployment). Lack of recreational facilities and multipurpose centres for youth in the area. Young people are now more exposed to drugs, due to the increase in mining activities in the area. If the mine closes, the effect of the social problems will stay. 	Comment is noted. The social impact of mine closure will be considered in the EIA.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H
13 th October 2014	Postmasburg youth (refer to Appendix B6 for list of youth focus group meeting attendees)	MIGRANT LABOUR <ul style="list-style-type: none"> Perception that Kolomela employs a lot of people from Namaqualand because they want to repay them due to the damage they caused in their town. [It seems that participants were confusing Kolomela with De Beers.] Perception that migrant labourers are a burden for municipality. Due to the increase in population, there is a market for Human Trafficking. 	Comment is noted. The issue of the mine putting pressure on municipal services will be considered in the EIA.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
13 th October 2014	Postmasburg youth (refer to Appendix B6 for list of youth focus group meeting attendees)	UNEMPLOYMENT AND WORK/STUDY OPPORTUNITIES AT KOLOMELA <ul style="list-style-type: none"> Many of the youth either do not finish school or do not meet the requirements to work at the mine. The perception is that this is mainly due to lack of appropriate career advice for the youth. The high level of unemployment in the area amongst the youth is attributed mainly to lack of skills. The request made is for the mine to assist in developing the required skills. Unrealistic expectations from the youth, linked to the economic opportunities associated with mining. It is difficult for the youth to access mining-related opportunities and this creates a lot of frustration. 	<p>The issues of skills development, career advice and bursaries available will be considered in the EIA.</p> <p>Note: Kolomela has a skills training centre in Postmasburg that provide N1-N6 training in several subject matters</p>	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
		<ul style="list-style-type: none"> Lack of motivation amongst the youth. A lot of information that will assist the youth is being held back i.e. there are no mining career exhibitions for the community. If it is done, it is done too late, when learners are already in matric. Suggested that career guidance information from Kolomela mine should be shared with learners in younger grades to ensure they select the appropriate subjects. Kolomela mine's information about its bursary programme is usually shared with learners too late. Learners should receive information in time for them to adhere to application requirements. There are few bursary opportunities. Kolomela should also have bursaries for FET students to complete N1 to N6, and those studying through correspondence. A FET college or alternative post school training should be established in Tsantsabane, focusing on mining skills and skills in the Renewable Energy sector. Financial support should be provided to students. 		
13th October 2014	Postmasburg youth (refer to Appendix B6 for list of youth focus group meeting attendees)	<p>EDUCATION</p> <ul style="list-style-type: none"> Perception that high school drop-out rate is due to the high poverty level. Due to the high cost of housing (as a result of mining), schools find it difficult to recruit and retain good Maths and Science teachers. Quality of schools in Tsantsabane is a challenge. Perception that there is a huge difference between quality of white and black schools. Teacher-learner ratio and attendance by some educators is also becoming a challenge. Lack of transport to/from school, and the distance some learners have to travel to get to schools. Overcrowding in classrooms. Not enough secondary schools. Capacity at secondary schools did not increase in line with sudden population growth. Lack of post school education facilities in and around Postmasburg. Learners have to travel to Kuruman or Kathu to access post school training opportunities. 	<p>Comment is noted</p> <p>Note: Kolomela has built teacher accommodation for the schools to address this issue.</p>	<p>Part A: Section 7.1.12 and Section 8.3.14</p> <p>Part C: Report H (SIA)</p>
13th October 2014	LoveLife	<p>There is a lot of desperation amongst young people due to high level of unemployment. Unrealistic expectations are created by Kolomela mine through its Learnership programs and the volunteering opportunities.</p>	<p>The issues of skills development, career advice and bursaries available will be considered in the EIA.</p>	<p>Part A: Section 7.1.12 and Section 8.3.14 (SIA)</p> <p>Part C: Report H</p>
13th October	Postmasburg youth (refer to	<p>PUBLIC FACILITIES</p> <p>Libraries in the area are not well maintained and equipped. Stationary at the</p>	<p>Comment is noted</p>	<p>Part A: Section 7.1.12 and Section 8.3.14</p>

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
2014	Appendix B6 for list of youth focus group meeting attendees)	library is old and outdated.		Part C: Report H (SIA)
13th October 2014	Postmasburg youth (refer to Appendix B6 for list of youth focus group meeting attendees)	<p>KOLOMELA SKILLS DEVELOPMENT PROGRAMME</p> <ul style="list-style-type: none"> Participants indicated awareness of the mine's skills development programme, consisting of courses in upholstery, construction, brick laying and farming, with a stipend of R3500. Participants expressed frustration with the focus of the programme, as core mining skills are not a focus. The mine's training programme should focus on mining skills, because that is what is required to get employed by the mine. Youth participating in the training programs struggle to find employment after completing Kolomela mine's training programme. This training program is just done just for marketing purposes. A representative from the Department of Social Development mentioned that at some point the Department was prepared to invest R500 000 into a project to assist the youth with mining skills. The project was not supported by Kolomela and was therefore discarded. Perception of participants that Kolomela is doing well with its SLP and CSI projects, but they lack conversation and direct relationships with the community. Often, the mine's interventions are not informed by community needs. No skills audit has been conducted in the community to assess the level of skills required by the youth. The perception is that all training interventions fail because they are not aligned with community needs. 	The issues of skills development and the alignment with community needs will be considered in the EIA.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
13th October 2014	Postmasburg youth (refer to Appendix B6 for list of youth focus group meeting attendees)	<p>RELATIONSHIP WITH THE COMMUNITY, SLP AND CSI.</p> <ul style="list-style-type: none"> There is no relationship between the mine and communities (and especially the youth) due to a lack of proper consultation. Kolomela interprets its relationship with the municipality, as a relationship with the community, which is not good. Kolomela should learn to liaise with the community via multiple avenues. The mine misses the heart and the thinking of the community by failing to create a direct relationship with community structures. Participants acknowledge that the first point of contact should be the Councillors or Municipality, but this alone is not sufficient. 	Comments are noted. Kolomela will endeavour to improve community consultation.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
		<ul style="list-style-type: none"> When asked whether they are being offered opportunity to comment on Kolomela's Social Labour Plan, they youth responded by saying they have been requested to provide input. The community is becoming uncomfortable with Kolomela's employment practices and Corporate Social Investment (CSI) projects. The perception is that there is a lot of bias, especially with regard to the mine's initiatives to support education. It was mentioned that schools and early childhood development centres only receive support if children of Kolomela employees attend that school. The mine's support of non-governmental organisations is also perceived to be biased. Kolomela is generally seen to be performing better with regard to socio economic development as compared to other mines, such as Assmang and other small mines. There is an expectation that Kolomela mine should do more, because of its size and its contribution to damaging the environment and social fibre of the community. The perception is that Kolomela is putting a lot of money into arts festivals without promoting local artists. The content of these festivals should speak to the average Tsantsabane community member. The Field Band Foundation mentioned that Kolomela has given them money to buy music instruments, but this will not be meaningful if they are not given opportunity to perform during festivals. The advice from participants is for Kolomela to be cautious on how it spends money on its corporate social investment projects. Participants wanted a more long term and sustainable view from the mine when it comes to CSI projects. 		
13th October 2014	Postmasburg youth (refer to Appendix B6 for list of meeting attendees)	SPORT Participants explained that the Tsantsabane community is a soccer community. The expectation is that investment should be made in soccer, and not cycling, which is currently getting support.	Comment is noted	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
13th October 2014	Postmasburg youth (refer to Appendix B6 for list of youth focus)	<ul style="list-style-type: none"> There is a need to capacitate civil organisations in the area, so they become stronger partners in community development. The youth said that they have a lot of consultation/ engagement with Kolomela but nothing gets done post the engagement process. There are generally no results or any form of feedback. 	During the meeting, Synergistics clarified that Kolomela was weighing up different options and models in relation to optimisation, but it is not clear which option will be opted for. Participants	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
	group meeting attendees)	<ul style="list-style-type: none"> It is critical for the youth to be fully prepared in advance for the mine's expansion. The participants suggested that local people are provided with the necessary skills so that they are able to benefit. It is also critical for Kolomela to ensure that the community is well informed about the expansion program. Participants confirmed that they will be grateful if Kolomela can start training the community on skills required for the expansion. 	<p>were assured that as soon as the detailed scope is known to Kolomela, it will be shared with the community.</p> <p>Feedback on the issues mentioned in this report will be provided in the EIA report.</p> <p>The community will be kept informed of progress with the EIA for the expansion of Kolomela and the issue of skills development will be covered in the EIA.</p>	
13th October 2014	Postmasburg youth (refer to Appendix B6 for list of meeting attendees)	The youth of Tsantsabane will not benefit from the expansion. Need to strengthen the skills base of local people so that they get employed by the mine. Very few local community members employed by the mine. It is critical for the mine to employ locals. There are local people who are skilled but fail to get employed by Kolomela mine.	The issues of skills development and employment will be considered in the EIA.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	Mark S. Jina, Principal, Blinkklip High School	Long distance for learners to travel.	Comment is noted	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	M. Coetzee, Principal, Postmasburg high School	There is currently a shortage of space.	Comment is noted	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	Bella Lekwene, Principal H.T.T Bidi Primary School	<ul style="list-style-type: none"> Overcrowding in classes is a challenge. There is a need of a second primary school in Boichoko. 	Comment is noted	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	Julian Anne Beets, Assmang Primary School, Principal	<ul style="list-style-type: none"> A drastic increase from 200 to 1085 learners. Desperate need for accommodation. 	Comment is noted	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
14th October 2014	Conrad Rooihand, Postdene Primary School	<ul style="list-style-type: none"> • Very old infrastructure. • The current new fence is not secured. • Safety at schools is a challenge which is directly relating to Kolomela. • There is no support currently, in the past the mine has helped but it will never be enough. 	Comment is noted	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	Christo Sehako, Ratang Thuto High School Principal	Too few classes	Comment is noted	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H
14th October 2014	Postmasburg Education Focus Group (refer to Appendix B6 for list of meeting attendees)	<p>INFLUX OF PEOPLE The mine has to take responsibility for the influx of people into the area. This increase has brought a lot of social ills which have an adverse impact on the quality of education in Tsantsabane.</p>	The social impact of the mine expansion will be assessed in the EIA.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	Postmasburg Education Focus Group (refer to Appendix B6 for list of meeting attendees)	<p>BLASTING</p> <ul style="list-style-type: none"> • Damage to housing and school infrastructure as a result of blasting by Kolomela mine. • Postdene Primary school is a double story building with cracks from blasting, however due to lack of funds, it is difficult to hire structural engineers to resolve the issue. • Blasting sometimes takes place during school hours. Concerned that the mine's blasting can become a safety risk for learners in school buildings that are already badly cracked. • The process to lodge a complaint is not easy and not known. • Concern about the mine's expansion/optimisation project due to the possible impact of more intense blasting. • Blasting has a negative impact on small animals such as snakes. Most of the school principals mentioned that they have seen snakes within the school premises in number of occasions, which is not safe for learners. Their theory is that snakes are fleeing to town from the mining area due to blasting. 	<p>In the meeting, the representative from Synergistics however assured the participants that Kolomela is monitoring the vibration levels on an ongoing basis and that he will escalate their concerns to the mine. The impact of blasting will be assessed in the EIA.</p> <p>Note: Kolomela has placed several seismographs monitoring blasting vibrations. None of the monitoring towards town have indicated any exceedances to date. The process to lodge a complaint is as follows: submit complaint at the town offices. The process has also been included in an advert that was placed in local newspapers a few years ago.</p>	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October	Postmasburg Education Focus	OVERCROWDING	Comments are noted. The social impact of the mine expansion will be assessed in the EIA.	Part A: Section 7.1.12 and Section 8.3.14

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
2014	Group (refer to Appendix B6 for list of meeting attendees)	<ul style="list-style-type: none"> • Kolomela mine employs families and provides houses without checking the capacity of other facilities like education and health facilities. Overcrowding in schools is becoming a serious challenge and this is attributed mainly to Kolomela mine. The main reason why this is attributed to Kolomela is that, as the mine started expanding, other businesses started to emerge in town. • Overcrowded schools mean increased pressure on the already limited sanitation facilities at schools, which leads to health risks. • No fair distribution of learners across the different schools. Postmasburg High School, which is has mainly white learners, has only 400 learners whereas other schools have in excess of 1,300 learners. This problem was raised with the Department of Education before but nothing was done. The principal of Postmasburg High School explained that the school does not have enough classrooms to accommodate more learners. • Participants indicated that they've engaged the Department of Education regarding their challenges, mainly on the issue of lacking or ageing school infrastructure, but nothing was done. • Although it is the responsibility of the Government to build schools, participants pointed out that the mine has to take into consideration that the children of its employees are the cause of overcrowded classrooms. As a result of this overcrowding, the mine has to assist. • Kolomela should consider, what the situation would have been like if they did not have Postmasburg nor Tsantsabane as a host town, according to participants. It would have cost the mine a lot to build a new town. They instead have a host community with facilities and infrastructure, and therefore should try to assist where there is a need. 		Part C: Report H (SIA)
14th October 2014	Postmasburg Education Focus Group (refer to Appendix B6 for list of meeting attendees)	<p>SOCIAL ILLS</p> <ul style="list-style-type: none"> • Due to an increase in mining activities, there has been a drastic increase in teenage pregnancy. The perception was that learners see the presence of single men working at the mine as an opportunity to break free from their poverty-stricken lives. • Mining activities have resulted in a decline of morals and an increase in criminal activities. • The feeling among some educators was that the mine has created a lot of social 	Comments are noted. The social impact of the mine expansion will be assessed in the EIA and mitigation measures will be recommended.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
		<p>problems, therefore the mine should address these problems.</p> <ul style="list-style-type: none"> The Postdene Primary School SGB representative mentioned that there have been a lot of break-ins and damage to property (a fence) at the school, which according to him is as a result of the social ills brought about by mining activities. The fence was put up by Kolomela mine. One of the social ills mentioned was the prevalence of substance abuse in Postmasburg. With young people employed by the mine, there is more money to buy drugs. 		
14th October 2014	Postmasburg Education Focus Group (refer to Appendix B6 for list of meeting attendees)	<p>TRANSPORT Public transport for learners is becoming a challenge, and there is fear for community unrest. Postdene & Postmasburg have boarding schools. Quite often buses provided by the Department of Education are not running and learners are impacted negatively. Participants explained that, in most cases when the mine helps out, the Department of Education sits back and fails to take responsibility.</p>	Comments are noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	Postmasburg Education Focus Group (refer to Appendix B6 for list of meeting attendees)	<p>KOLOMELA'S RELATIONSHIPS WITH SCHOOLS</p> <ul style="list-style-type: none"> Unfair distribution of Kolomela's support to different schools and the unequal distribution of resources. It is important for the mine to conduct a needs analysis before coming with interventions. An example given was a situation where the mine bought 20 computers for each school without considering the number of children per class at these schools and the fact that the learners were not computer literate. The failure of the mine to respond to the needs was also mentioned by the Postmasburg High School principal, who indicated that they once sent a submission/proposal for a fence, but were given 35 computers with maths software on. However, the software was only a trial version and the school is unable to access the full package. According to the participants the mine does not go to schools and build direct relationships with different schools within Tsantsabane. Although the mine allocates 10 bursaries per school, the distribution of these bursaries is contentious. The relationship between educators and Kolomela mine, and communication from the mine is generally good. The main challenge is in relation to unfair distribution of resources among schools. The perception in the community is 	Comments are noted. Kolomela Mine will aim to more closely match its donations, with the needs of schools.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
		<p>that white schools get a bigger share than black schools.</p> <ul style="list-style-type: none"> Irrespective of some negative points made, the participants generally showed appreciation for the support provided by Kolomela. The Assmang Primary School principal mentioned that she has requested the mine to carry the salary of an additional cleaner, but her request was rejected. She is still hopeful to get support in future. 		
14th October 2014	Postmasburg Education Focus Group (refer to Appendix B6 for list of meeting attendees)	<p>ACCOMMODATION COSTS</p> <p>Due to an increase in mining activities residential prices have become expensive and educators cannot afford to live and work in Postmasburg. It is difficult for the Department to attract and retain talented educators. It is not possible to rent or buy a decent house for less than R15 000 a month. One of the school principals mentioned that he had to accommodate educators in a hostel room because of the lack of affordable accommodation. Educators are professionals and therefore it is an insult to their dignity to be accommodated in hostels.</p>	Comments are noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	Postmasburg Education Focus Group (refer to Appendix B6 for list of meeting attendees)	The mine must pre-empt and prevent the negative impacts associated with mine expansion.	The social impact of the mine expansion will be assessed in the EIA and mitigation measures will be put in place.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	Postmasburg Education Focus Group (refer to Appendix B6 for list of meeting attendees)	<p>ECONOMIC DIVERSIFICATION</p> <p>The educators suggested the following:</p> <ul style="list-style-type: none"> Growth in tourism industry, given that Tsantsabane has a heritage site. Build an Agricultural high school with high quality educators. Train children in Agricultural Studies because the area is also good for Agriculture. Provide training in Woodwork, including Arts and Crafts. It is proposed that the mine build recreational facilities. Enhance entrepreneurial skills in the community. 	Comments are noted. The issue of skills development will be considered in the EIA.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	Postmasburg Education Focus Group (refer to Appendix B6 for list of meeting attendees)	<p>TERTIARY EDUCATION</p> <ul style="list-style-type: none"> Few children pass matric, but those who do, are unable to pursue further studies due to a lack of funds. Some manage to go to higher education institutions. There is an FET college in Kathu, learners have to travel to Kathu to access 	The request to transport learners will be passed on to the mine for their consideration.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
	attendees)	<p>the college. This is a challenge since there is a shortage of transport and accommodation in Kathu is expensive. Request from the mine to provide a bus to assist in transporting learners to Kathu. There is a need for a post school training institution in Postmasburg, so that the mine can build the skills pipeline.</p> <ul style="list-style-type: none"> The participants said that most children aspire to work in local mines because of high salaries associated mine employment. 		
14th October 2014	Postmasburg Education Focus Group (refer to Appendix B6 for list of meeting attendees)	A special request was made for Kolomela to educate employees on financial management.	<p>This request will be passed on to the mine for their consideration.</p> <p>Note: Financial management assistance is provided through Ithuseng and all employees that take part in the envision programme receive financial management training before any payments are made</p>	<p>Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)</p>
13th October 2014	Obakeng Sibiyi, the chairperson of TBBC (Tsantsabane Black Business Chamber)	<p>BLACK-OWNED BUSINESSES</p> <ul style="list-style-type: none"> When the mine was created, black people were kept outside, and there was totally no engagement with them during the process. The consultation was not broad based enough. Most of the houses in town were changed to Bed & Breakfasts when Kolomela was constructed. People living in town, majority of who are whites, were aware of business opportunities well in advance and were able to capitalise on these opportunities. He mentioned that as blacks they did not foresee and were not aware of all the economic opportunities, because they were not engaged. The majority of business ownership in the area is still white. The blame is also shifted on the Local Municipality, because they had inside information about the upcoming growth and opportunities on time and they also held it back from the Tsantsabane community. 	Comments are noted. The community will be kept informed of progress with the EIA for the expansion of Kolomela.	<p>Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)</p>
13th October 2014	Lesley of Renznz Creations	<ul style="list-style-type: none"> Lesley of Renznz Creations added that it is difficult to get office space in town as a black business owner. Blacks do not own any of the buildings in the CBD. Most businesses, particularly black owned, do not have physical presence in town because there are a lot of financial implications associated with living and having an office space in town. The rental prices are inflated because of the presence of the mine. 	Comments are noted.	<p>Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)</p>

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
		<ul style="list-style-type: none"> Black owned businesses opt for the townships because working from the township and living there will not harm or break the business. 		
13th October 2014	Johan Kotze, Vice Chairman of NOCCI (Northern Cape Chamber of Commerce and Industry)	<p>WHITE-OWNED BUSINESSES</p> <ul style="list-style-type: none"> In response to the above points, there should be appreciation of the differences in relation to the sizes of businesses. The notion that white owned businesses are far more advanced than black business and that land in Tsantsabane is still belonging to the whites, is just a perception. There is a very small percentage of white people owning land in Tsantsabane. Some white owned businesses are closing down because there is currently no business. The business is also not easy on whites particularly since the passing of the DMR regulations on BEE. 	Comments are noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
13th October 2014	Anton Meyer- the owner of Burma Plant Hire Company	<ul style="list-style-type: none"> Mentioned that his company is a medium sized company and they have been experiencing the same problems experienced by smaller businesses. One of the challenges is that it is difficult to buy land. There are currently few people owning land in the region. There are a lot of small mining companies popping up and as a result of their financial muscle they are able to buy land in the area, unlike the locals. Another challenge is the high prices of residential property. 	Comments are noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
13th October 2014	Postmasburg Small Business Focus Group (refer to Appendix B6 for list meeting attendees)	<p>CHALLENGES FOR SMALL BUSINESSES</p> <ul style="list-style-type: none"> In terms of economic changes over the past 5 years, a lot has changed, especially with regard to improved infrastructure. Some changes are not great like the influx of foreigners. Foreigners have financial resources and therefore they can afford renting shops and living in town. All the previously open spaces in town are now occupied by foreign nationals. Black emerging businesses do not have land, or the money to pay inflated rental prices in town. 	Comments are noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
13th October 2014	Obakeng Sibiya, the chairperson of TBBC	<p>TBBC</p> <ul style="list-style-type: none"> The TBBC is one of the positive things that happened to black businesses in Tsantsabane. Some of the black owned businesses are able to access opportunities through the involvement of the TBBC. 	Comments are noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
		<ul style="list-style-type: none"> Responding to the question whether there is any possibility of TBBC & NOCCI working together, the response from black participants was that NOCCI gives the impression that they want to work with black business, but unfortunately is still too white. Most business owners who are members of NOCCI are more advanced. There is a big gap between black and a white owned business which will make it difficult to collaborate. The TBBC chairperson emphasised that TBBC serves as a great platform for black owned businesses, but he believes that as it grows collaboration with NOCCI will be possible and a great idea. 		
13th October 2014	Johan Kotze, Vice Chairman of NOCCI	NOCCI <ul style="list-style-type: none"> According to Johan Kotze; the main focus of NOCCI is to get municipal services in place since it impacts negatively on businesses. The local municipality is associated with corruption and lack of proper leadership, which impacts negatively on local businesses. Maintenance of infrastructure and provision of basic services by the municipality is a big challenge and economic growth in the region makes it even more difficult for municipality to cope. 	Comments are noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
13th October 2014	Anton Meyer- the owner of Burma Plant Hire Company	<ul style="list-style-type: none"> Mentioned that his company has already made contact with Kolomela to collaborate on support for emerging small businesses in the form of mentorships and experiential training programs. They asked the mine to identify candidates. He emphasised that his company is doing this out of goodwill and not for BEE compliance purposes. He mentioned that he will put pressure on the mine to give beneficiaries of this training program projects at the mine. According to him most of the contractors are not involved in the community and if more companies can contribute towards socio economic development, it will make a huge difference in the community. All participants agreed that this was a good initiative. The TBBC emphasised that this should be made part of the contractual agreement by Kolomela, and that they will bring it to the attention of Kolomela management at their next meeting. 	This request will be passed on to the mine for their consideration.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
13th October	Postmasburg Small Business	BUSINESS WITH KOLOMELA <ul style="list-style-type: none"> During CAPEX close to R10 billion was spent on the new mine and most of the 	Comments are noted.	Part A: Section 7.1.12 and Section 8.3.14

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
2014	Focus Group (refer to Appendix B6 for list meeting attendees)	<p>local businesses did not benefit from that. Nothing was left for Tsantsabane except for the steady increase on property prices which had a negative impact on local businesses.</p> <ul style="list-style-type: none"> • The core business of the mine according to TBBC, excludes black owned businesses. Opportunities for black business owners are still non-existent. • NOCCI on the other hand emphasised that it is only a perception that white owned businesses are the only ones benefitting from the mine. White owned businesses are also not benefitting from the core mining opportunities. There was however a collective view that it has been a long journey to get small businesses integrated into the mine's supply chain, and that a lot of efforts have been made. • Some of the participants emphasised that although they do not do business with Kolomela, they understand that the mine is currently on a survival mode due to the deterioration of the iron ore price. The chairperson of the TBBC differed with this view, since according to him Kolomela was making profits at some point and as a global company, provision must have been made for the fall of the iron ore price. • Generally the participants felt that irrespective of some negative issues raised, a great thing about Kolomela mine is that it is accessible. 		Part C: Report H (SIA)
13th October 2014	Postmasburg Small Business Focus Group (refer to Appendix B6 for list meeting attendees)	<p>BUSINESS WITH KOLOMELA</p> <ul style="list-style-type: none"> • Most black owned businesses complained that the management of Kolomela and other surrounding mines is still white and as the end users, they give projects mostly to white owned businesses. It is really about time for the mine to take the risk especially on the promise they made to the Department of Mineral Resources. • The end users and the Departmental Heads at the mine have the power and they always dictate to supply chain without following the correct procedures, on who to give business to. As a result black owned businesses are always in a disadvantaged situation. All black business owners think the role of TBBC is vital as a result of this prejudice. • Lesley, the owner of Rentzu creations narrated his experience. He mentioned that his company was made to be a "parallel contractor" to one white owned company, but to his surprise when the project came out it was given to the white owned company and his company was expelled from the process. He is of the 	Comments are noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
		<p>opinion that this was an extreme form of corruption.</p> <ul style="list-style-type: none"> The high rental and the price of acquiring business premises are really impacting badly on local black owned businesses. According to TBBC the upliftment of black business still has not happened, it is still on paper but has not happened yet. The JV option between smaller and bigger companies is a challenge due to the gap existing. White owned businesses fronting with Black businesses is also one of the challenges experienced by the business community in Tsantsabane. According to the participants, sometimes it is a struggle for small business to access opportunities at the mine. This was also emphasised by two ladies owning a laundry business. They indicated that getting a contract with Kolomela mine was a struggle. Initially there was also a lot of struggle between them and the municipality, since the municipality wanted to take their idea and make it their own. 		
13th October 2014	Postmasburg Small Business Focus Group (refer to Appendix B6 for list meeting attendees)	<p>TOTAL FACILITY MANAGEMENT SERVICE COMPANY (TFMSC) AND ZIMELE</p> <ul style="list-style-type: none"> According to one of the participants Matatia, who was able to build his business through the funding, received from Zimele, Zimele is a good intervention. He could not get money from the bank and Zimele was able to assist. He is currently doing work through TFMSC, which is a company getting direct contracts from Kolomela who then outsources some of the services to small companies, at a lower rate. There was a negative perception about TFMSC amongst participants citing that this company exploits smaller companies by subcontracting them at a very low rate and as result the benefit is not mutual. The documentation TFMSC requires for putting sub-contracting in place, is also a lot, according to participants. The view of TBBC on Zimele is that although it is a good initiative, the process can be rigorous which makes it difficult for some of the small businesses to access loans. As a small business you will not be considered when you are at the credit bureau. You are mostly likely to get assistance/loan when you have a contract with the mine. 	Comments are noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
13th October 2014	Postmasburg Small Business Focus Group (refer	<ul style="list-style-type: none"> There should be engagement of all the stakeholders in order to accelerate development in the region. There is also an urgent need to develop local suppliers. 	Comments are noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
	to Appendix B6 for list meeting attendees)	<ul style="list-style-type: none"> The mine focuses mostly on big businesses. They want the mine to also focus on smaller local businesses. Currently most of the local businesses are closing down because Kolomela brings businesses coming from outside the Northern Cape. There is an urgent need for Kolomela to make an effort to sustain local businesses and it is also essential that the municipality work closely with local businesses. 		
13th October 2014	Postmasburg Small Business Focus Group (refer to Appendix B6 for list meeting attendees)	<p>SOCIAL ILLS</p> <ul style="list-style-type: none"> The high level of crime and social ills is a problem for everyone including businesses in Tsantsabane. Due to the growth brought by the mine, the town has exploded. There is a lot of unhappiness, because there is no control as to who is belonging to Postmasburg. Someone has to manage the situation since it is getting out of control (but not the Municipality because it is not trustworthy); according to participants. The suggestion made is that the mine should control the influx of people coming for employment in Tsantsabane. 	Comments are noted. The social impact of the mine expansion will be assessed in the EIA.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	South African National TB Association (SANTA)	<ul style="list-style-type: none"> Since the construction of the mine there has been an increase in the number of TB patients. SANTA's focus is to establish soup kitchen for TB patients, door to door visits in informal settlement areas, and provision of assistance with applications for social grants. SANTA is active in 3 townships within the area, and is currently working with 24 volunteers with little sponsorship. They have approached Assmang, and were given limited financial support. 	Comments are noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	UGM Clinic at Kolomela mine	<ul style="list-style-type: none"> Serves employees and contractors, and is does not extend its services to community members. They are currently involved in raising awareness among employees and contractor employees for screening for diseases. 	Comment is noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	Kolomela Life Clinic (Wellness Practitioner)	Life Clinic is a private health institution operation within Kolomela mine.	Comment is noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October	Postmasburg Hospital CEO	Postmasburg Hospital is supposed to have 51 beds but is currently only operating with 45 beds. It is very small in comparison to the current population	Comment is noted.	Part A: Section 7.1.12 and Section 8.3.14

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
2014		<p>growth. The mine has come up with a lot of positive interventions - Kolomela's plan to extend the hospital to 71 beds.</p> <ul style="list-style-type: none"> • Staffing and a fair distribution of health professionals in the area are the biggest challenges. The Postmasburg hospital is currently only operating with 8 professional nurses; whereas the Barkley West hospital with a smaller population has 23 professional nurses. • The building of the clinic is one of the great interventions from the mine. The old clinic has been turned into a rehabilitation centre. 		Part C: Report H (SIA)
14th October 2014	Postmasburg Health Practitioners Focus Group (refer to Appendix B6 for list meeting attendees)	Given the fact that the region is surrounded by a number of mines there is a perception that it is a rich and well-resourced area, which is not necessarily true.	Comment is noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	South African National TB Association (SANTA)	<ul style="list-style-type: none"> • Patients, particularly HIV/AIDS and TB patients do not receive quality care due to the shortage of Home Based Carers. • A lot of health problems come from informal settlements due to lack of services e.g. water, electricity and sanitation. The increase in informal settlements impacts negatively on the quality of health services and facilities in the area. 	Comment is noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	Postmasburg Health Practitioners Focus Group (refer to Appendix B6 for list meeting attendees)	<p>ASSISTANCE FROM KOLOMELA</p> <ul style="list-style-type: none"> • The CEO of the Postmasburg Hospital mentioned that Kolomela mine's health projects are helpful and sustainable citing the renovation of the hospital and the building of the clinic as examples. He mentioned this as a great partnership given that the Mine assisted with the building of structures and the Department is responsible for staffing. • Participants expressed their gratitude for the collaboration with Kolomela mine and advised that long term support is ideal. • The representative from the Kolomela Wellness Program emphasised that they have good collaboration with civil society particularly on the issue of fighting substance abuse. They have currently provided funding towards substance abuse but believe that this can be improved in future. There are a lot of proposals received so far by the mine. 	Comments are noted. Kolomela will continue to carefully consider all proposals received and assist where possible.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
		<ul style="list-style-type: none"> • According to the Environment and Health Practitioner from the District Municipality, Kolomela is doing a lot in assisting the Department of Health. Their relationship with Kolomela is good. She however emphasised the challenges experienced as a result of population growth. She indicated that the district municipality has a better partnership with Kolomela mine than with the provincial Department of Health. • The SANTA representative said that Kolomela mine has not supported them so far. They have sent a lot of proposals to the mine, but have not been successful. However, the mine does provide feedback, even if their applications for support are unsuccessful. • The Area Manager for Clinics mentioned that he has seen a lot of involvement from Kolomela mine. There are a lot of interventions from Kolomela e.g.: <ul style="list-style-type: none"> ○ Purchasing of ambulances ○ Mobile Clinics ○ Expansion of the hospital & building of the clinic ○ The building of the nursing staff accommodation which is underway • His concern is failure of Kolomela to involve the Provincial Health Department on their planning so that there is alignment. He emphasised that the Provincial Department should be involved as a partner. • The Area Manager further emphasised the need to track records on the funding received from Kolomela in relation to Health Interventions made. He is currently designing a template, and will make it available to Kolomela, so that as Health practitioners they are able to have a track record of funding made available so far and whether there is alignment with the Provincial Department's planning. 		
14th October 2014	UGM Clinic at Kolomela mine	Currently the UGM clinic is serving employees and contractor employees. The clinic's biggest challenge is contractor employees who default on their medication when their contracts come to an end. There is a need for collaboration with the government clinics in this regard.	Comment is noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	Postmasburg Infrastructure Focus Group (refer to Appendix B6 for list meeting)	<p>POPULATION GROWTH</p> <ul style="list-style-type: none"> • The population has indeed increased and is still growing at an alarming rate. After the stabilisation of the mine (after construction) there was an expectation that the population would stabilise, but this has not happened. • The increase is also due to the emergence of other smaller mining companies 	Comment is noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
	attendees)	<p>in the area. As a result of increased mining activities in Tsantsabane, all people in the Northern Cape are willing to come and stay in the area with or without jobs with the hope of getting employed. Another influencing factor is the higher salaries offered by Kolomela mine in comparison to other industries.</p> <ul style="list-style-type: none"> Exclusion of the municipality in planning economic activities in the region is a challenge. The municipality has been excluded from participation in the development of existing national plans, aiming at creating the Northern Cape as an economic corridor. The Solar Energy project in the area is one example of a national project on which the municipality has not been engaged or consulted. The participants indicated that they don't know if and how the Environment Impact Assessment was conducted for the Solar Energy Project. According to the participants the project will be based in Groenwater and is driven by the Department of Energy. There are also private companies involved. There are a lot of developments happening, some of which the Municipality is not aware of which makes it difficult to prepare for the changes and the increase in the population. 		
14th October 2014	Postmasburg Infrastructure Focus Group (refer to Appendix B6 for list meeting attendees)	<p>IMPACTS ON MUNICIPAL SERVICES</p> <ul style="list-style-type: none"> There were no studies / assessments done on the impact brought about by the mine on bulk services. The system is unable to cope because it has not been designed for a big population. The current infrastructure has to be upgraded before bringing new development into the current system. Considering the money Kolomela mine makes, they should also take responsibility of bulk infrastructure maintenance, as well as the upgrade of old infrastructure. The incapacity of the current Infrastructure to cater for the increase in population. The design of the infrastructure was done almost 80 years back and was done for a small population. Sewerage, roads were designed for a smaller population and therefore as a result of the increase there is a challenge. The socio economic demand for jobs has doubled. The municipality is the point of entry for the unemployed. People come from as far as North West and other provinces with the hope of finding a job because they see more opportunities in Tsantsabane. 	Comments are noted. The socio-economic impact and impact on infrastructure of the mine expansion will be assessed in the EIA.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
		<ul style="list-style-type: none"> The design of public health care facilities (hospital and clinics) was also done for a small population. 		
14th October 2014	Postmasburg Infrastructure Focus Group (refer to Appendix B6 for list meeting attendees)	<p>POPULATION GROWTH</p> <ul style="list-style-type: none"> The municipality is unable to quantify the projected population growth, given the demand in the area. They indicated that there is a need for population growth estimations. Informal settlements have doubled in size and are still growing rapidly. Due to the rapid growth the municipality might even find itself in a position where there is an underestimation of social and infrastructural challenges. According to a representative from Aurecon which is a Consulting Company contracted by Assmang to develop a spatial development framework for the area, population size projections from 2011 to 2030 will be on a scale of high growth based on the current expansions and expected future growth in the area. 	Comment is noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	Postmasburg Infrastructure Focus Group (refer to Appendix B6 for list meeting attendees)	<p>UPGRADING MUNICIPAL INFRASTRUCTURE</p> <ul style="list-style-type: none"> The municipality is exploring a number of options to fund the upgrading of infrastructure, one of which is obtaining funding from the National Government, or a loan from DBSA. The Municipal Manager said that there is a demand from the private sector to invest in the region. There is a need to create a fund where all these private sector companies who are interested in investing in the region, should be requested to contribute towards an infrastructure fund, in exchange for land and opportunity to invest. This can be used as an opportunity to create revenue for the region. The master plan for spatial development (once finalised) will be shared with all the developers in the area, including Kolomela mine to request funding. 	Comment is noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	Postmasburg Infrastructure Focus Group (refer to Appendix B6 for list meeting attendees)	<p>HOUSEHOLD SURVEY</p> <ul style="list-style-type: none"> The participants demonstrated a great support for the current household survey that Kolomela mine has commissioned. The survey will provide information on the current population including people migrating, for the purpose of future projection. The outcome thereof will inform the Municipal 5 year plan on Development. The household survey is proposed to be used as a baseline. It will also be great 	Comments are noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
		if the survey findings can outline the level of skills amongst youth.		
14th October 2014	Postmasburg Infrastructure Focus Group (refer to Appendix B6 for list meeting attendees)	<p>LAND IN POSTMASBURG</p> <ul style="list-style-type: none"> The Municipal Manager gave background on the land moratorium issue by mentioning that the moratorium came into place because there was a concern that the municipality was selling land for various reasons without policies and without considering Government's agenda for transformation. The moratorium is currently partially lifted to cater for current demand of land for residential development purposes. The moratorium will only be fully lifted once there is a finalised spatial development plan in place. The municipality has conducted a land audit and is in the process of developing guidelines for the sale of land as well as a land use strategy, which should be in place before completely lifting the moratorium. 	Comment is noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	Postmasburg Infrastructure Focus Group (refer to Appendix B6 for list meeting attendees)	<p>TSASSAMBA PARTNERSHIP BETWEEN THE MUNICIPALITY, KOLOMELA MINE AND ASSMANG</p> <ul style="list-style-type: none"> As part of the partnership a fund has been created where the role players contribute towards infrastructure development. The Community Development Manager of the municipality, said that there are always bullying techniques employed by the mine due to its financial muscle. This partnership is regarded by the mines as a begging opportunity for the Municipality. It usually looks like the mine is "bailing out the municipality", which is not true. According to the participants Kolomela mine underestimates disparity between what they contribute to the fund and the mine's negative impact on infrastructure and service delivery in the area. The current municipal structure feeds the growth of the mine, but the mine is not giving back. There are power struggles between the mine and the municipality. There are lot of discussions currently happening to build a long term relationship with Kolomela mine, but the mine's focus is only on what they can benefit without looking at a bigger picture. There is always a perception that we do not deliver as the Municipality. We believe that the municipality should be a more powerful partner within structures created through these partnerships. There is currently a lot of stress at the Municipal level because of the growth 	Comments are noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
		<p>brought about by the mines.</p> <ul style="list-style-type: none"> The partnership was quite great in the beginning, to an extent that the model was envied by other mines, but currently the municipality is trying to reclaim its space. 		
14th October 2014	Postmasburg Infrastructure Focus Group (refer to Appendix B6 for list meeting attendees)	<p>USE OF LOCAL SUPPLIERS</p> <ul style="list-style-type: none"> The mine has a duty to develop local suppliers, the mine is perceived to exclude local suppliers, as it is mostly whites & outside companies who are benefitting. The revenue generated through the mine goes outside Tsantsabane, the locals have approached the municipality to assist in unlocking opportunities for HDSA companies. Implementation of the Mining Charter is not done. Kolomela is white dominated and its procurement system is white therefore it is failing to cater for HDSA companies. The information on supplier development is not normally shared with the municipality, and in future we will assess the value of their investment in the community. 	Comments are noted.	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
14th October 2014	Postmasburg Infrastructure Focus Group (refer to Appendix B6 for list meeting attendees)	<p>AIR QUALITY</p> <ul style="list-style-type: none"> The participants asked whether the mine has conducted an air quality assessment previously? The Municipal Technical Manager suggested that the National & Provincial department should conduct an air quality assessment with or without the participation of the mine. 	<p>The response from Synergistics at the meeting was that Kolomela does monitor air quality around Postmasburg on a continuous basis as part of its legislative responsibility. So far the levels have been according to the required standards. The air quality impact assessment will be updated as part of the EIA. This will include the programme of air quality monitoring which will be carried out by the mine.</p>	Part A: Section 7.1.12 and Section 8.3.14 Part C: Report H (SIA)
Department of Land Affairs				
Traditional Leaders				
Department of Environmental Affairs X				
8/5/2014	Mr M. Mathews (NC DENC)	The proposed process for the scoping and EIA were discussed. NCDENC were satisfied with the proposed process.	The EAP and NCDENC were in agreement.	
13/8/2014	D. Moleko (NC DENC)	NCDENC accepted the final scoping report and stated that the EAP could continue with the EIA.	The EAP and NCDENC were in agreement.	

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
Other Competent Authorities affected X				
10/02/2014	Jenna Lavin (Heritage Offices for the South Africa Heritage resource Agency)	<p>SAHRA is unable to comment on the likely impact of the proposed expansion project on heritage resources as insufficient information has been provided. As such, SAHRA requires that the following information is provided before any further comments are issued;</p> <ul style="list-style-type: none"> • A Desktop Palaeontological Assessment is required to determine the impact of the proposed mine expansion on the Cambell Rand Subgroup which is known to have moderate heritage significance. This report must be authored by a palaeontological specialist. • A report on the likely impact of the new proposed infrastructure on the heritage resources identified in the reports by D. Morris (2005), U. Kusel (2011) and M. van der Ryst (2011) is required. This report must identify the proposed location for new infrastructure development in relation to the known heritage resources. This report must also take into consideration the recommendations contained in the Heritage Management Plan for Kolomela Mine (Kusel, 2011). 	Thank you for your response. A desktop palaeontological Assessment and assessment of the likely project impacts on features identified in D. Morris (2005), U. Kusel (2011) and M. van der Ryst (2011) reports will be undertaken and submitted to SAHRA.	Part A: Section 7.1.11 and Section 8.3.12 Part C: Report E (Heritage Impact Assessment)
14/1/2014	Raisibe Sekepane; Daniel Mashau; Kgaudi Shapo (DMR)	<ul style="list-style-type: none"> • Queried whether Kolomela is backfilling mine pits. • Queried infrastructure required for Kolomela Expansion. • Queried the resources at Kolomela. • The process for the section 102 amendment and other authorisations was discussed with the EAP. • The Mine Works Programme should be aligned with the EMPr. 	The EAP explained the backfilling at Kolomela, the infrastructure required for the expansion and the resources present. The DMR's other comments are noted.	Part A: Section 3
17 February 2015	Ntsundeni Ravhugoni; Poloko Nkatlholang; Humbulani Mashau; Takalani Khorombi (DMR)	<ul style="list-style-type: none"> • It was agreed that the preferred action would be to withdraw the current application made to DENC and then reapply under the 2014 EIA Regulations to the DMR. • It was agreed that the completed scoping process could be used provided that it complies with the current legislative requirements. It would need to be clearly indicated as to how the process followed previously complies. • It was requested by the DMR that the scoping report be reformatted into the DMR template in order to facilitate the process. • An integrated licence/authorisation is to be issued by the DMR and thus it is important that other approvals under the SEMA's are in place within the 300 day period (from application). 	The EAP agrees with all of the DMR's comments mentioned here, though, in accordance with the National Environmental Management: Air Quality Act (39 of 2004) and regulations, it is required that the Environmental Authorisation is issued before submitting the Application for an Atmospheric Emissions Licence.	

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
		<ul style="list-style-type: none"> The waste rock material is captured under the listed NEM: WA listed activities as of 2 September 2014. All mining waste is considered to be hazardous waste and thus the application for a waste licence is to be supported by a full EIA process. It is not practical to comply with the liner requirements as set out in the NEM: WA regulations. It would however need to be motivated why it is possible to deviate from the liner requirements. 		
12/01/2016	Esther Makungo Department of Water & Sanitation Northern Cape	<ul style="list-style-type: none"> Pre-consultation meeting is to be held with DWS. Relevant reports and supporting documentation required will be identified during pre-consultation. Scoping report to show water courses and flood lines. No activity to occur in flood line or within 500 m of a pan without authorisation. EMP to address waste management, including written consents. EMP to address risks associated with the project area and state all implementable measures to prevent and respond to accidents and abnormal events. GN. 704 to be complied with. 	Pre-consultation meeting to be arranged. Flood lines and water courses included in EIA baseline. EMP addresses waste management. Waste management undertaken by Kolomela, no written consents are necessary. Risk management addressed in Part B. Where required application has been made for exemption from GN. 704	Part A: Section 7.1.6 Part B: Section 4 Part B: Section 8.3.6 Water Use Licence Amendment Application.
15/01/2015	Jacoline Mans Department of Agriculture, Forestry and Fisheries Northern Cape	<ul style="list-style-type: none"> Reference to protected trees No person may cut, disturb, damage or destroy any protected tree without a licence. It is a first category offence to not comply. It is not clear if the clearance of 2 221 ha will be a gradual process over the life of the mine or what percentage will be cleared as a once off activity. There may be a need for a biodiversity offset. Copy of the offset strategy is to be provided. Ghaap Plateau Vaalbosveld has been flagged as a vegetation type possibly in need of conservation in the Northern Cape. The proposed expansion at Kolomela might affect this vegetation type. Include Mrs Elsabe Swart at DENC in consultation. 	Kolomela Mine will apply for a licence for the removal of protected trees. The vegetation will be cleared as required for the development to take place. Note that pits and waste rock dumps expand gradually and clearance will be undertaken to accommodate immediate operations. Application for removal of protected trees will be submitted to DAFF on an annual basis for trees cleared during that year. DAFF is to provide input into offset requirements. Noted. Scoping report was sent to DENC.	
OTHER AFFECTED PARTIES				

DATE	NAME OF IAPs X = indicates IAPs that were consulted	ISSUES RAISED	EAP'S RESPONSE TO ISSUES	SECTION & PARAGRAPH IN THIS REPORT WHERE ISSUES & RESPONSE ARE INCORPORATED
INTERESTED PARTIES X				
02/01/2014	Ms Marlaine Anderson	Is the project undergoing an EIA?	The project is currently in the scoping phase of the required full Environmental Impact Assessment (EIA) Process.	
2014/28/01	Mr Hentie Fourie	Request to gain understanding of product increase Kolomela mines has on logistics channel and available capacities for junior miners	A traffic impact assessment study will be undertaken as part of the EIA. The assessment will include the impacts associated with the junior miners on existing transport routes to Kolomela Mine. The spatial development master plan currently being developed by Kumba with the Municipality. The master plan would include a cumulative assessment on the entire Postmasburg region.	Part C: Report I (Traffic Assessment)
17/12/2013	Ms S.R. Browne	Concerns about water and dust pollution	Currently at the Kolomela Mine various management intervention measure are employed to reduce dust generation from the site. These aspects have been included in the mines approved EMP. Some of these measures are employed through the application of dust suppressants on exposed road surface; plant dust extraction system. It is however very difficult to reduce dust generation due to blasting operations, however various other measure are employed to try and reduce dust generated from the site. The planned updating of the existing air quality impact assessment will re-evaluate existing practices and identify if there are any additional management intervention measure to implement on site. The study will also model the extent of the additional impact on air quality as part of the expansion project.	Part A: Section 7.1.5 and Section 8.3.5 Part A: Section 7.1.9 and Section 8.3.9 Part C: Report D2 (Groundwater Model) Part C: Report B (Air Quality Impact Assessment)

7 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE DEVELOPMENT FOOTPRINT ALTERNATIVES

7.1 TYPE OF BASELINE ENVIRONMENT AFFECTED BY THE PROPOSED ACTIVITY

7.1.1 GEOLOGY

The description of the site geology is sourced from the authorised Kolomela EIA and EMP (Synergistics, 2010). No specific geological features are pertinent to the proposed Kolomela Amendment.

The Transvaal Supergroup lithologies have been deposited on a basement of Archaean granite gneisses and greenstones, and/or lavas of the Ventersdorp Supergroup. In the Kolomela – Postmasburg region, the oldest rocks of the Transvaal Supergroup form a carbonate platform sequence (i.e., dolomites with minor limestone, chert and shale) known as the Campbell Rand Subgroup. The upper part of the Transvaal Supergroup comprises a banded iron formation unit (i.e. the Asbestos Hills Subgroup), which has been conformably deposited on the carbonates. The upper portion of the banded iron formations has in places, been supergene-enriched to ore grade. The iron ore / banded iron formation zone is often referred to as the Kuruman Formation. The ores found within this formation comprise the bulk of the higher-grade iron ores in the region.

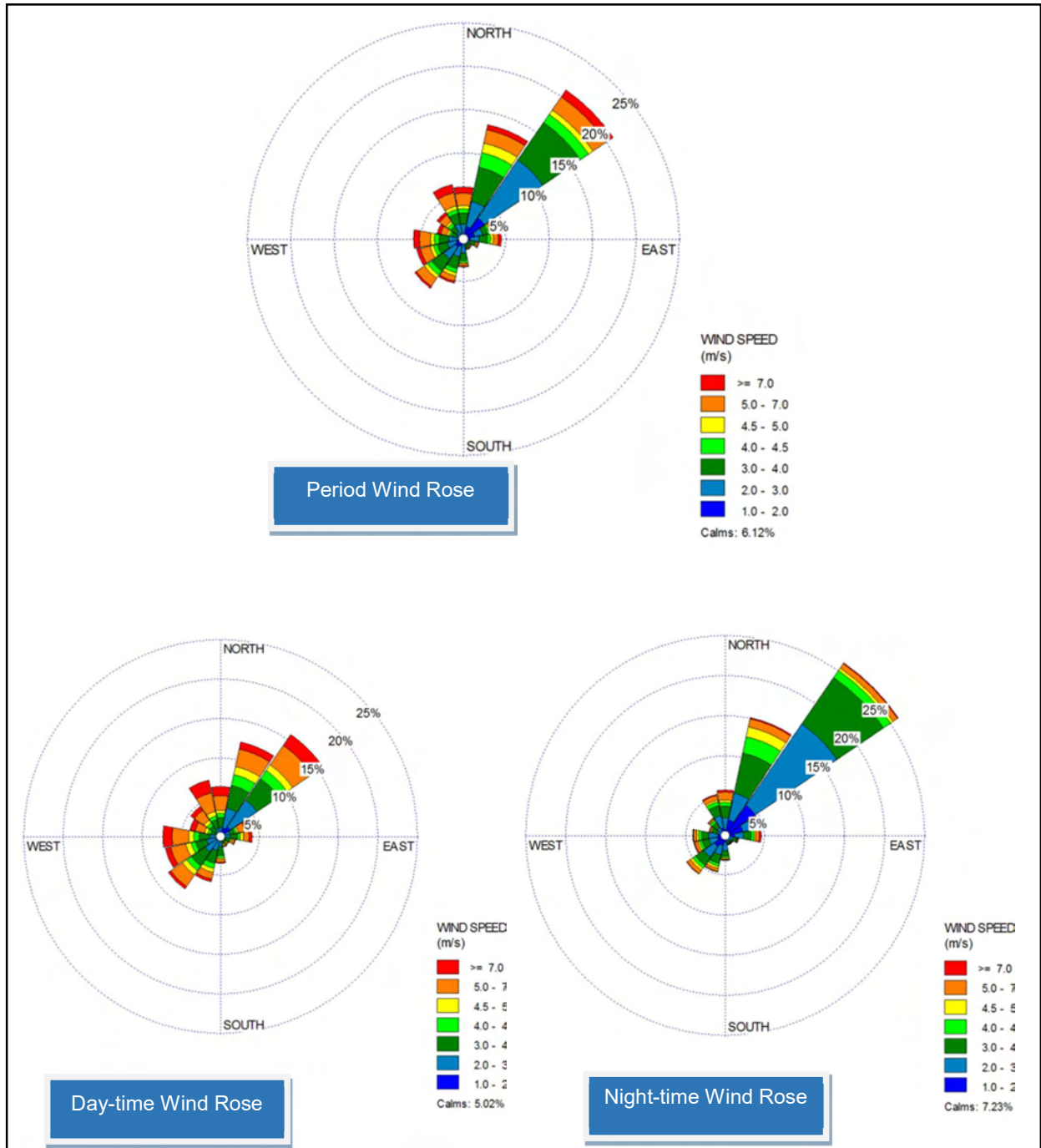
Iron ore at the Kolomela deposit is preserved in chemical and clastic sediments of the Proterozoic Transvaal Supergroup. These sediments define the western margin of the Kaapvaal Craton in the Northern Cape Province. The stratigraphy has been deformed by thrusting from the west and has also undergone extensive karstification. The thrusting has produced a series of open, north to south plunging, anticlines, synclines and grabens. Karstification has been responsible for the development of deep sinkholes. The iron ore at Kolomela has been preserved from erosion, within these geological structures.

7.1.2 CLIMATE

The description of the local climate has been extracted from Air Quality Specialist Report (Airshed, 2015) and presents data collated from the Kolomela Mine weather station located on the Farm Kappieskareboom and includes data from November 2011 to October 2014.

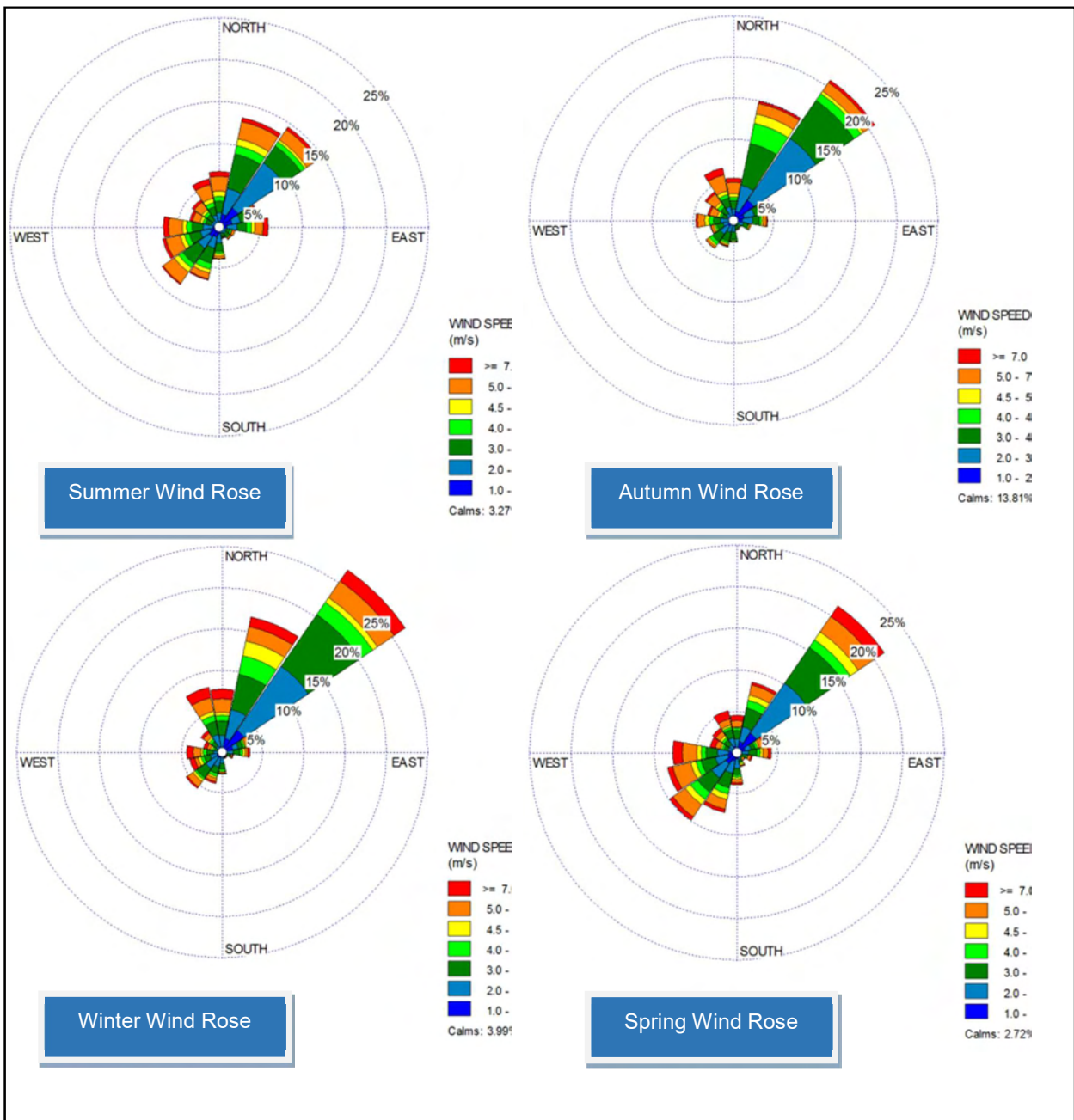
7.1.2.1 Wind

Wind field are dominated by winds from the north-east (see Figure 7.11). The strongest winds (>6 m/s) were also from these directions. Calm conditions occurred only 6% of the time, with the average wind speed being 3.6 m/s. During the day the predominant wind direction are predominantly from the north-north east and north east. At night winds tender to blow from the south west and west south west. Strong winds in excess of 6 m/s occurred most frequently during winter and spring months (see Figure 7.2). Calm conditions occurred most frequently during autumn months. There is also a clearly visible decrease in higher wind speeds (3 - 7 m/s) during autumn and summer months from the north-north-east and north-east.



Source: Airshed Planning Professionals (2015)

FIGURE 7.1: PERIOD, DAY AND NIGHT-TIME WIND ROSES (2011 – 2014)



Source: Airshed Planning Professionals (2015)

FIGURE 7.2: SEASONAL WIND ROSES (NOVEMBER 2011 TO OCTOBER 2014)

7.1.2.2 Temperature

Monthly mean and hourly maximum and minimum temperatures are given in Table 7.1. Temperatures range between -7.2 °C and 40 °C. The highest temperatures occur in December and the lowest in July.

Table 7.1: Monthly temperature summary

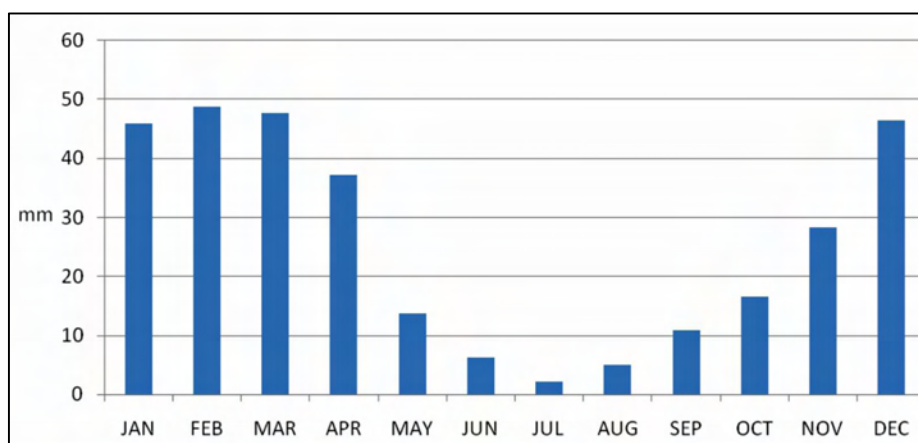
Hourly Minimum, Hourly Maximum and Monthly Average Temperatures (°C)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	9.0	8.0	5.1	1.9	-5.0	-6.0	-7.2	-6.0	-5.0	1.0	2.0	6.0
Maximum	26.7	25.2	22.7	17.1	14.6	10.1	10.3	12.7	16.3	20.1	23.6	24.4
Average	40.0	39.0	38.0	33.0	32.2	27.0	28.2	32.0	38.1	36.0	38.0	40.0

Source: Airshed Planning Professionals (2015)

7.1.2.3 Rainfall and Evaporation

In the absence of recent rainfall data from the Kolomela Mine weather station, information has been sourced from the authorised Kolomela EIA and EMPr (Synergistics, 2010).

Postmasburg occurs within a low rainfall area (see Figure 7.3) with a mean annual rainfall of approximately 285 mm. Rainfall is highly unpredictable with most rainfall occurring between November and April. The rainfall usually falls as a result of thunderstorms when tropical thunderstorm activity extends southwards over the Kalahari. Mean annual evaporation (2 450mm) is higher than annual rainfall (374 mm), which results in a major net moisture deficit of over 2 000 mm throughout the year.



Source: Synergistics (2010)

FIGURE 7.3: RAINFALL STATISTICS (POSTMASBURG WEATHER STATION – 1917 TO 1991)

7.1.3 SOIL

The description of the soils on site is sourced from the authorised Kolomela EIA and EMPr (Synergistics, 2010).

The dominant soils in the mining area are Augrabies, Coega and Mispah. The Augrabies soil type is characterised by an Orthic A-Horizon overlying Neo-carbonate B-Horizon material which overlies unspecified material. The Coega soils comprise an Orthic A-Horizon overlying a Hard Carbonate B-Horizon and the Mispah soil is characterised by an Orthic A-Horizon overlying rock.

In the Wolhaarkop and Welgevonden sections of the mining area, Mispah soils are dominant and have an average depth of less than 300 mm. The Ploegfontein, Leeuwfontein and Klipbankfontein areas are dominated by Coega soils with an average soil depth also less than 300 mm. Augrabies soils are present on a portion of Wolhaarkop and also some sections of Kapsteveld. These soils are deeper (< 1200 mm).

The agricultural potential of the Augrabies, Coega and Mispah soils are considered to be low under dryland

conditions and medium to high under irrigation conditions (>10- 15mm/week 33-1,500 kPa plant available water) in areas where soil depth exceeds 600 mm.

The mining area can generally be described as suitable for livestock grazing purposes. The agricultural potential of the dominant soils present at the sites investigated is summarised in Table 7.2. The low plant biomass on account of the dry climate limits the volume of organic material that enters the soil profile, further reducing the agricultural potential of the soil.

Table 7.2: Agricultural potential of dominant soils on the Kolomela mine

Soil Form	Effective Depth (mm)	Agricultural Potential (Dryland)	Agricultural Potential (Irrigated)
Mispah	<300	Low	Low
Coega	<300	Low	Medium
Augrabies	<1200	Low	High

Source: Synergistics (2010)

Soil samples were collected in areas typical of the soil form in question and chemically analysed. These analyses revealed that the soil is of neutral pH with low electrical conductivity levels indicating that there are no signs of soil salinisation. Low sodium levels indicate that there is a low risk of erosion due to dispersion of clay particles by sodium ions. No determinants are present at levels that would inhibit plant growth.

The soils are chemically and physically suitable for rehabilitation. However, due to their shallow effective depth in this area, limited topsoil is available to be stripped and stockpiled for rehabilitation purposes and it is likely that there may be a shortfall of soil for use in rehabilitation.

7.1.4 TOPOGRAPHY

This description of the site topography is sourced from the authorised Kolomela EIA and EMPr (Synergistics, 2010).

Surface topography of the mining area is relatively flat with an ephemeral stream, the Groenwaterspruit, incising a dendritic drainage pattern up to 40 m deep along the eastern border of the Kolomela mining right area. The majority of the area slopes gently to the south west from the Ploegfontein area (approximately 1 290 masl) to Welgevonden (1 220 masl) with several drainage courses converging to the south of the mining area into a small spruit, which has generally been referred to as the Welgevondenspruit and is a tributary of the Soutloop River. A second tributary of the Soutloop River flows in a southerly direction along the eastern sections of the Floradale and west of Kolomela Mine boundary, the proposed area for Aquifer Recharge.

Numerous topographic depressions and pans distributed across the flat-lying, central portions of the area collect and hold rainwater for short periods after the seasonal rains. A prominent hill, Wolhaarkop (1 448 masl), rises above the plains on the south-western portion of the project area.

The topography of the area has already been altered as a result of the mining operations at the mine, the most significant being the development of the Kapstevel, Leeuwfontein and Klipbankfontein pits and associated waste rock dumps.

7.1.5 GEOHYDROLOGY

This geohydrological description has been sourced from the authorised Kolomela EIA and EMPr (Synergistics, 2010) as well as Groundwater Complete (2014) - Simulation of dewatering requirements with the aid of the

numerical groundwater model (Part C -Report D2).

7.1.5.1 Aquifer Description

The geohydrological regime in the study area is made up of two main aquifer systems. The first, the upper, unconfined to semi-confined aquifer occurs in the calcrete that cover most of the surface area of Kolomela. The aquifer is usually developed on the contact between the calcrete and underlying clay formations of Kalahari age or in localised pebble horizons within the calcrete. Although relative low yields occur in this aquifer, it is developed widely throughout most of the region and has been the sole reliable source of water supply to most of the farms in the area for more than a century. Yields of up to 2 litres per second occur in this aquifer with shallow water table and spring formation common in especially the lower-lying topography.

The second aquifer is associated with fractures, fissures, joints and other discontinuities within the consolidated bedrock and associated intrusives of the Transvaal/Griqualand West Sequences. The aquifer occurs at depths from 40 to more than 200 meters below surface in the area. It is semiconfined and has greatly varying yields that are directly associated with the geology and geological structure. Yields of the aquifer are as high as 40 litres per second in mainly the chert breccia and banded iron formation and iron ore formations. Contrary to general beliefs, the dolomite in the mining area is not a significant groundwater yielding area and yields of no more than 2 to 4 litres per second have been recorded in dolomite formations during the exploration drilling program. The dolomite is however considered to have good storage properties for groundwater.

In the Postmasburg area, static groundwater levels vary from zero meters (springs flowing out at surface), usually in the topographically lower lying areas, to a maximum of approximately 75 meters below surface to the north-east of Postmasburg. There are no definite groundwater level trends, apart from a possible distinction of deeper groundwater levels to the east and north-east of Postmasburg on the banded iron formation with shallower groundwater levels to the south-east on the Ghaap Plateau dolomites. In the mining area, static groundwater levels vary from 35 m below surface in the Welgevonden area, about 12 m on Ploegfontein, 8 m on Leeuwfontein and 5 m on Klipbankfontein, which is the lowest lying area. Groundwater moves in secondary, fractured rock aquifers which occur over the entire area, with groundwater moving through the fissures and fractures within the geology. This means that static groundwater levels can vary significantly, even on a localised scale, depending at what depth a fissure or fracture is intersected by a borehole. The overall transmissivity of the chert breccia and the banded iron formation is very high, meaning that high groundwater flow rates occur.

The natural groundwater flow direction generally mimics surface topography, with groundwater moving in a south-south-easterly direction. Both the abstraction of groundwater for irrigation within the Groenwaterspruit valley and the mine dewatering taking place at the Beeshoek mine to the north of the site affect the natural groundwater flow direction significantly.

The effective recharge to the aquifer is considered to be as high as 10% of rainfall and even higher in certain areas. A significant part of surface precipitation infiltrates through cracks, fissures and weathered zones in the calcrete surface cover or through the permeable sand that has gathered in surface depressions. Once infiltration from the open surface has taken place, evaporation losses are minimised and only limited transpiration losses occur. The surface area covered by the groundwater zone is approximately 350 km². If a conservative recharge estimate of 4% of MAP is assumed, the annual aquifer recharge to the maximum

affected groundwater zone is in the order of 5 300 000 m³/y.

7.1.5.2 Groundwater Abstraction

The information on current dewatering impacts has been sourced from Groundwater Complete (Part C – Report D2).

The dewatering operation at Kolomela (and Beeshoek) is conducted at a higher rate than the aquifer recharge, which results in a depletion of the aquifer(s) in the area. The area influenced by the abstraction and associated water level decline/impact is referred to as the cone of depression. The depth and extent of the cone of depression is determined by the type, geometry and hydraulic properties of the aquifer.

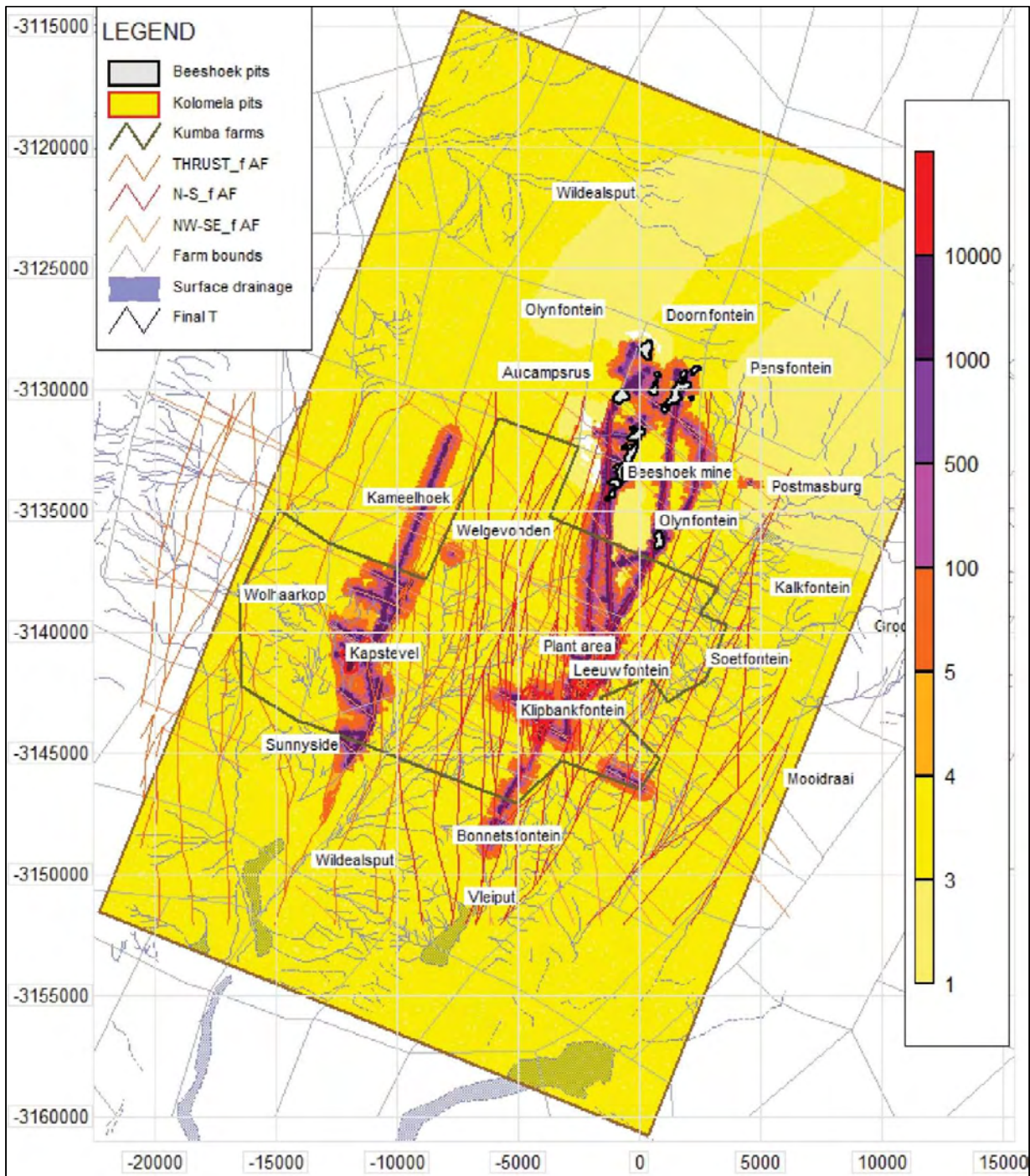
The main aquifer of the area is a secondary fractured rock system with a high heterogeneity that is very much structurally (geologically) controlled. In the secondary, fractured rock aquifers, flow occurs by preference through open, transmissive fractures among the solid rock matrix. The major structures in the Kolomela area trends roughly north-south and follows the trend of the Maremane dome (anticline). The distribution of transmissivity values together with the structural trends on which the values are based are indicated in Figure 7.4. The simulated drawdown cone as a result of dewatering activities at Kolomela and Beeshoek Mines are illustrated in Figure 7.5. Current abstraction rates at Kolomela Mine are approximately 1 950 m³/hr.

7.1.5.1 Groundwater Use

Groundwater is mainly used for domestic supply, livestock watering and watering of gardens. The borehole yields from the upper calcrete aquifer are relatively low and groundwater cannot be pumped in quantities sufficient for extensive crop irrigation purposes. The only exception is in most parts of the Groenwaterspruit to the east of the mining area and the Lucasdam Vlei to the west. These two areas are low-lying drainage areas to the west of Postmasburg where higher recharge occurs due to seepage from a large surface area and transmissivity has also been enhanced with the occurrence of paleo-river channels consisting of coarse gravels and boulders in the calcrete.

Noteworthy, however is the crop (i.e., maize and lucerne) irrigation using groundwater in the Groenwaterspruit to the east and the Lucasdam Vlei to the west. Different farmers irrigate an estimated total of 20 hectares of maize and/or lucerne in the Groenwaterspruit and approximately 12 hectares of maize is irrigated in the Lucasdam Vlei.

Although well outside the expected affected groundwater zone, the municipality of Postmasburg also utilises groundwater from boreholes in the Groenwaterspruit as a significant portion of water supply to the town.



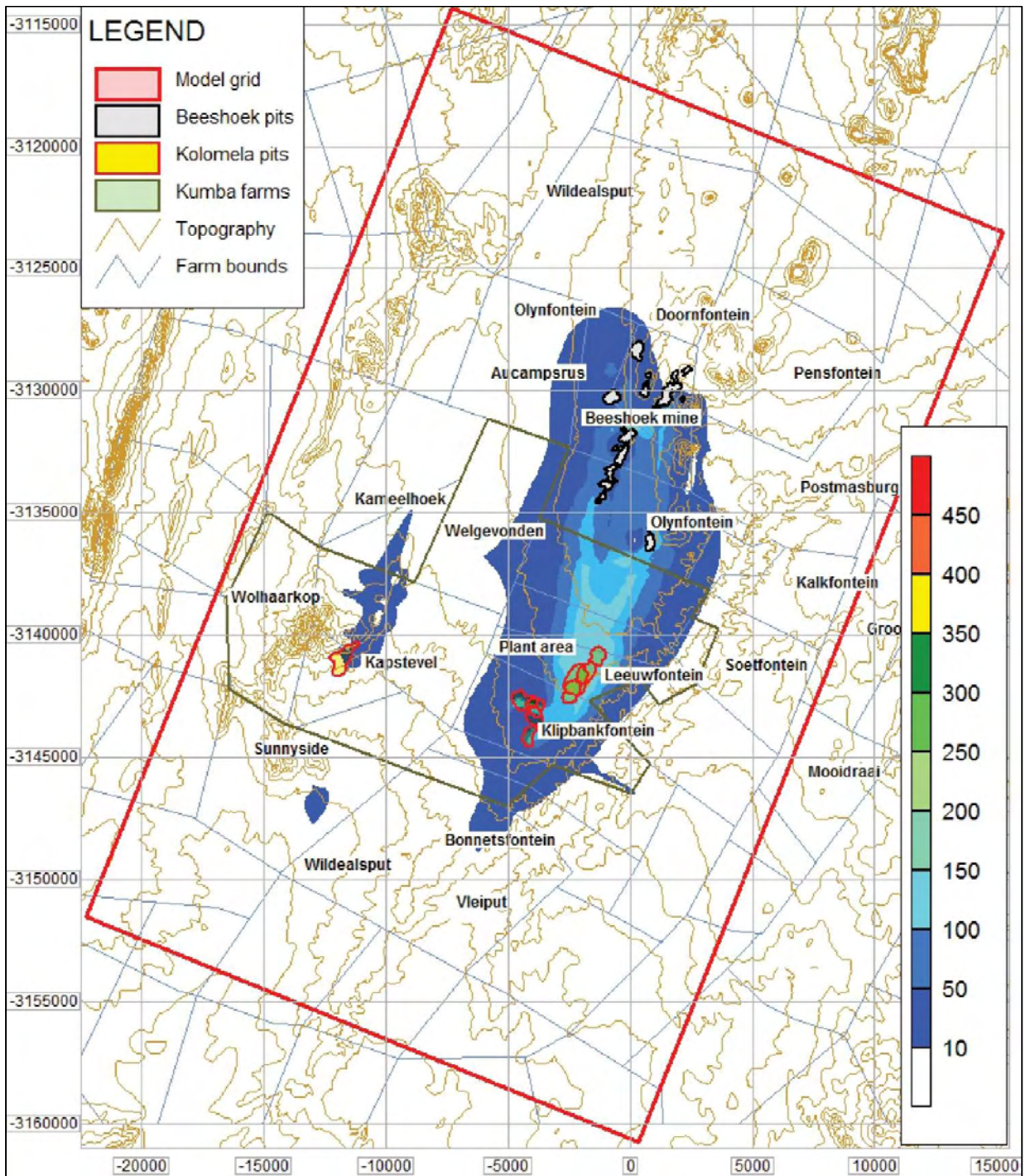


FIGURE 7.5: SIMULATED DRAWDOWN AT END OF 2014 (Source: Groundwater Complete, 2014)

7.1.5.2 Groundwater Levels

Groundwater monitoring of boreholes on properties surrounding Kolomela Mine has been undertaken, by Aquatico on behalf of Kolomela Mine, on an annual basis from 2008. The hydrocensus report is included as Part C: Report D1.

The water levels recorded since 2008 are shown in Table 7-3. Groundwater level depths in 2015, generally compare well with previous records and remained relatively stable with varying degrees of decline recorded at the majority of localities. In 2015, the water levels remained stable (fluctuating by less than 1 meter) at the majority of the monitoring boreholes. The water-levels at some boreholes however showed varying degrees of decline and can be attributed to various impacts. The water-level at 34 localities measured lower by more than 1 meter where a rise by more than one meter was recorded at 4 of the localities (SF9, LD1, LT10, and LT11). Four localities had a water-level fall of more than 5 meters. Due to the locality of the boreholes where the drop has been detected, it is not anticipated that this is related to activities at Kolomela Mine.

7.1.5.1 Groundwater Quality

According to Aquatico (2015), the most pronounced variables that exceed the Domestic Use guidelines are total hardness (including the major cation Magnesium), salts (Electrical conductivity, Total Dissolved Solids, Sodium, Sulphates and Chlorides) and Nitrates (NO₃_N). Most of these chemical variables are found in high concentrations due to natural conditions relating to the geology and climate of the region, notably Hardness (which is related to Calcium and Magnesium) and salt (EC, TDS, Chloride, Sulphate and Sodium) concentrations. Nitrate occurrences may be related to industrial processes, human and animal waste, crop fertiliser and nitrogen fixation by the soil ecosystem.

The water quality results from boreholes recorded at surrounding farms are presented in Table 7.4. The overall water quality profile of the boreholes in the region can be classified as alkaline to neutral conditions (pH values ranging from 7.74 to 9.11 with an average of 8.14 for the region). Salinity levels ranged from non-saline to extremely saline (TDS ranged 310 mg/l to 3 259 mg/l with an average of 857 mg/l for the region) and Hardness concentrations ranged from 123 mg/l to 1 573 mg/l with the regional average being "Very Hard" (580 mg/l).

Table 7.3: Groundwater levels recorded in farms surrounding Kolomela from 2008 to 2015

(Note: the location of boreholes are shown in Part C: Report D1)

Kolomela Mine Hydrocensus - February 2015												
Farm	Loc Nr	1st Reading (2008)	2nd Reading (2008-where applicable)	3rd Reading (Feb/Mar 2009)	4th Reading (Feb/Mar 2010)	5th Reading (Feb/Mar 2011)	6th Reading (Feb/Mar 2012)	7th Reading (Feb/Mar 2013)	8th Reading (Feb/Mar 2014)	9th Reading (May 2014)	Last Reading (Feb 2015)	Description
Sunnyside	Sun1	10.88 (Mar 08)	11.95 (Aug 08)	11.20	11.38	8.21	9.46	8.04	N/A for probe		9.45	Open borehole
	Sun2	12.98 (Mar 08)	13.06 (Aug 08)	13.75	13.83	9.67	8.84	10.52	10.36		11.60	Submerged pump
	Sun3	NA (Mar 08)	12.39 (Aug 08)	13.08	13.10	9.96	8.65	9.83	N/A for probe	10.98	10.80	Wind pump
	Sun4	12.38 (Mar 08)	12.45 (Aug 08)	12.82	12.91	9.54	8.63	Blocked at 4.10m	NA	10.31	10.80	Open borehole
	Sun5	12.22 (Mar 08)	-	12.38	12.46	9.68	8.14	9.48	N/A for probe	N/A for probe	N/A	N/A for probe
	Sun6	13.55 (Mar 08)	13.62 (Aug 08)	15.78	15.84	12.36	10.38	Blocked at 5.11 m	N/A for probe	Windpump removed	N/A	N/A for probe
Wildealspuit	Sun7	9.50 (Mar 08)	-	9.38	8.26	6.80	7.44	7.67	7.74		8.10	Wind pump
	Sun8	8.59 (Mar 08)	-	8.65	7.38	5.95	6.63	6.75	6.98		7.20	Open borehole
	Sun9	8.85 (Mar 08)	-	8.60	7.47	6.14	6.70	6.89	N/A for probe	6.84	7.52	Wind pump
	Sun10	9.61 (Mar 08)	-	9.15	8.08	6.34	6.30	7.49	N/A Bees-Nest	N/A Bees-Nest	N/A	N/A for probe
	Sun11	N/A (Mar 08)	-	N/A	7.30	N/A	N/A Bees-nest	N/A Bees-Nest	N/A for probe	6.48	7.75	Open borehole
	Sun12	7.75 (Mar 08)	-	7.50	6.25	5.42	6.28	N/A Wasp-Nest	6.24		6.80	Well
Sunnyside	Sun13	10.26 (Mar 08)	-	10.38	9.45	8.43	7.23	7.05	N/A for probe		N/A	N/A for probe
	Sun14	29.64 (Mar 08)	-	29.60	26.30	23.41	N/A Gates locked	31.39	31.20			Sheduled for May
	Sun15	9.77 (Mar 08)	-	N/A	Blocked	Blocked	N/A Gates locked	N/A for probe	N/A for probe			Sheduled for May
Kappieskaree	KK1	14.41 (Mar 08)	-	14.08	13.51	9.95	11.58	N/A Bees-Nest	N/A for probe	N/A for probe		Sheduled for May
	KK2	77.50 (Mar 08)	-	75.05	72.88	60.98	74.15	75.97	43.98 (Suspect)			Sheduled for May
	KK3	19.05 (Mar 08)	19.05 (Aug 08)	11.30	11.23	7.84	8.62	N/A for probe	9.07		10.60	Wind pump
	KK4	9.35 (Mar 08)	9.35 (Aug 08)	9.45	8.95	6.12	5.95	7.86	7.70	7.81	8.80	Wind pump
	KK6	11.89 (Mar 08)	-	17.15	17.84	10.88	8.97	10.21	11.55		14.95	Wind pump
Grootpan	GR1	57.93 (Mar 08)	-	54.35	59.85	54.90	55.91	47.25	36.28	41.85		Sheduled for May
Vleiput	VP1	9.36 (Mar 08)	-	9.70	10.14	8.39	8.12	7.77	8.94	8.63	9.60	Open borehole
	VP2	N/A (Mar 08)	-	N/A	N/A	N/A	N/A	N/A for probe	N/A for probe		N/A	No access for probe
Kameelfontein	KMF1	9.64 (Mar 08)	9.77 (Oct. 08)	10.08	11.34	7.30	8.33	11.11	12.96		14.85	Submerged pump
	KMF2	10.80 (Mar 08)	10.13 (Oct. 08)	10.80	11.29	6.78	8.88	11.42	11.73	11.54	15.83	Wind pump
	KMF3	15.36 (Mar 08)	15.05 (Oct. 08)	15.55	15.67	12.32	12.88	13.32	14.24		14.90	Wind pump
	KMF4	18.12 (Mar 08)	-	18.55	18.31	17.94	17.94	18.11	18.21		18.32	Wind pump
	KMF5	23.03 (Mar 08)	23.08 (Oct. 08)	23.30	23.28	22.95	22.85	23.07	23.12	23.16	23.60	Wind pump
	KMF6	23.27 (Mar 08)	23.21 (Oct. 08)	23.90	23.51	23.05	22.95	23.06	23.21		26.05	Wind pump
	KMF7	18.08 (Mar 08)	17.35 (Oct. 08)	17.10	18.29	14.18	11.77	12.90	15.74		18.45	Wind pump

Kolomela Mine Hydrocensus - February 2015												
Farm	Loc Nr	1st Reading (2008)	2nd Reading (2008-where applicable)	3rd Reading (Feb/Mar 2009)	4th Reading (Feb/Mar 2010)	5th Reading (Feb/Mar 2011)	6th Reading (Feb/Mar 2012)	7th Reading (Feb/Mar 2013)	8th Reading (Feb/Mar 2014)	9th Reading (May 2014)	Last Reading (Feb 2015)	Description
Soetfontein	SF1	Dry (Aug 08)	-	12.50	11.06	9.30	10.64	9.31	9.26		9.65	Wind pump
	SF2	Blocked (Aug 08)	-	N/A	N/A	N/A	N/A	Blocked at 4.55 m	Blocked at 4.55 m		Blocked at 4.55 m	Submerged pump
	SF3	N/A (Aug 08)	-	N/A	N/A	N/A	N/A	7.82	Not sampled		8.10	Submerged pump
	SF4	10.06 (Aug 08)	-	9.67	9.58	6.27	4.85	6.51	6.38	6.33	6.88	Open borehole
	SF5	10.80 (Aug 08)	-	9.31	9.93	4.40	9.14	5.35	4.56		5.30	Open borehole
	SF6	9.31 (Aug 08)	-	7.85	7.45	0.81	8.28	5.89	4.56		5.88	Monopump
	SF7	8.39 (Aug 08)	-	7.46	7.89	5.02	2.55	3.39	2.71		3.50	Open borehole
	SF8	N/A (Aug 08)	-	N/A	N/A	N/A	N/A	Blocked at 1.66	N/A Bees-Nest		Blocked at 1.20 m	Open borehole
	SF9	30.29 (Aug 08)	-	30.80	30.65	30.12	31.98	31.64	34.56		31.90	Open borehole
	SF10	34.78 (Aug 08)	-	34.92	34.83	34.50	34.19	34.14	34.08		N/A	No access for probe
	SF11	N/A (Aug 08)	-	N/A	N/A	N/A	N/A	N/A for probe	N/A for probe		N/A	No access for probe
Bermoli	Ber1	9.94 (Aug 08)	-	10.24	10.32	9.16	9.82	N/A Bees-Nest	N/A Bees-Nest		9.60	Open borehole
	Ber2	10.07 (Aug 08)	-	10.82	10.87	8.49	10.84	N/A Bees-Nest	N/A Bees-Nest	N/A Bees-Nest	N/A	Wind pump
	Ber3	13.33 (Aug 08)	-	N/A	N/A	N/A	N/A	10.24	N/A for probe		10.65	Wind pump
	Ber4	16.36 (Aug 08)	-	16.65	N/A	17.94	N/A	N/A for probe	N/A for probe		N/A	Wind pump
	Ber5	16.37 (Aug 08)	-	16.20	18.91	16.14	14.35	15.39	16.02		16.70	Submerged pump
	Ber6	N/A (Aug 08)	-	N/A	50.51	48.11	N/A	N/A due to pump	N/A for probe		N/A	Submerged pump
Brand	Br1	16.39 (Aug 08)	-	N/A	N/A	11.41	10.61	11.77	Blocked at 12.23 m		Blocked at 13m	Wind pump
	Br2	8.28 (Aug 08)	-	N/A	N/A	6.28	5.40	5.85	6.38		8.15	Wind pump
	Br3	8.66 (Aug 08)	-	N/A	N/A	6.41	5.81	6.28	6.72		7.65	Wind pump
	Br4	-	-	-	-	6.12	5.68	6.08	6.36		7.90	Open borehole
Klipbanks fontein	Kbf1	9.13 (Aug 08)	-	9.50	9.48	5.43	7.32	8.34	9.81		11.61	Submerged pump
	Kbf2	8.76 (Aug 08)	-	9.14	9.11	5.12	6.95	7.98	9.47		12.30	Open borehole
	Kbf3	9.56 (Aug 08)	-	9.32	8.91	4.98	5.64	N/A for probe	N/A for probe		N/A	No access for probe
	Kbf4	11.16 (Aug 08)	-	11.62	11.75	8.86	9.02	10.11	11.62		Dry	Open borehole
	Kbf5	11.37 (Aug 08)	-	11.80	11.99	8.91	9.28	10.33	11.82		13.32	Open borehole
	Kbf6	5.77(Aug 08)	-	7.10	6.94	3.85	7.20	7.22	6.92		7.10	Wind pump
	Kbf7	N/A (Aug 08)	-	N/A	13.65	8.94	5.52 (blocked)	Blocked at 5.58m	Blocked at 5.70 m		Dry	Open borehole
	Kbf8	N/A (Aug 08)	-	N/A	0.22	0.00	0.00	1.11	2.70		4.80	Open borehole
	Kbf9	13.01 (Aug 08)	-	13.52	13.38	9.01	10.46	11.42	11.52		13.18	Open borehole

Kolomela Mine Hydrocensus - February 2015													
Farm	Loc Nr	1st Reading (2008)	2nd Reading (2008-where applicable)	3rd Reading (Feb/Mar 2009)	4th Reading (Feb/Mar 2010)	5th Reading (Feb/Mar 2011)	6th Reading (Feb/Mar 2012)	7th Reading (Feb/Mar 2013)	8th Reading (Feb/Mar 2014)	9th Reading (May 2014)	Last Reading (Feb 2015)	Description	
Olyfontein	Of1	3.62 (Aug 08)	-	11.00	10.46	2.90	6.40	7.87	5.26	7.15	7.78	Wind pump	
	Of2	16.35 (Aug 08)	-	17.00	16.73	9.86	11.23	8.05	9.00		10.85	Submerged pump	
	Of3	16.11 (Aug 08)	-	16.60	16.14	9.14	N/A	N/A Locked	N/A for probe		N/A	No access for probe	
	Of4	N/A (Aug 08)	-	N/A	N/A	6.70	N/A	11.42	N/A for probe	9.13	10.88	Mono pump	
	Of5	14.30 (Aug 08)	-	14.84	14.38	6.43	7.18	9.00	6.51		9.05	Open borehole	
	Of6	14.60 (Aug 08)	-	15.20	15.03	8.14	8.64	9.18	N/A for probe	6.12	8.80	Mono pump	
	Of7	14.37 (Aug 08)	-	14.85	14.52	7.18	Blocked	9.21	7.06		8.85	Open borehole	
	Of8	24.14 (Aug 08)	-	N/A	N/A	N/A	17.01	18.96	N/A	10.86	Probe stuck in borehole	21.98	Open borehole
	Of9	0 (Aug 08)	-	0.00	0.00	0.00	0.00	0.00	0.00		0.00	Fountain	
Witboom	Wit1	-	-	27.35	18.88	19.14	20.48	15.88	10.21		25.70	Wind pump	
	Wit2	-	-	16.20	19.19	18.87	18.62	19.19	N/A for probe		N/A	Submerged pump	
Grasvla kte	Gv1	8.13 (Aug-08)	-	8.60	8.48	7.14	8.41	7.04	8.15		8.15	Open borehole	
	Gv2	Dry (Aug-08)	-	Dry	Dry	Dry	Dry	Dry	Dry			Well / dry	
	Gv3	N/A (Aug-08)	-	N/A	12.36	10.48	11.21	11.50	11.73		12.00	Wind pump	
	Gv4	N/A (Aug-08)	-	N/A	N/A	N/A	N/A	N/A for probe	N/A for probe		8.05	Wind pump	
	Gv5	7.60 (Aug-08)	-	8.10	7.80	6.31	N/A	7.02	7.28		7.40	Mono pump	
	Gv6	N/A (Aug-08)	-	N/A	N/A	N/A	6.46	Mud at 5.35m	N/A for probe		Blocked at 3m	Mono pump	
	Gv7	7.50 (Aug-08)	-	7.00	N/A	N/A	N/A	N/A Bees-Nest	NA		Not found/demolished	Open borehole	
	Gv8	5.62 (Aug-08)	-	N/A	7.20	6.96	6.35	6.54	6.68		6.81	Open borehole	
	Gv9	7.41 (Aug-08)	-	8.02	7.55	7.31	6.98	7.10	6.71		7.35	Well	
	Gv10	7.50 (Aug-08)	-	8.85	8.18	7.41	6.78	7.76	7.95		8.50	Well	
	Gv11	N/A (Aug-08)	-	N/A	N/A	N/A	N/A	N/A for probe	N/A for probe		N/A	Wind pump	
	Gv12	7.12 (Aug-08)	-	7.55	7.20	8.50	7.84	6.73	7.22		7.35	Well	
	Gv13	-	-	7.30	7.03	6.75	5.93	6.35	6.67		6.80	Wind pump	
	Gv14	N/A (Aug-08)	-	N/A	N/A	N/A	N/A	N/A for probe	N/A for probe		N/A	Wind pump	
	Gv15	-	-	7.05	6.65	6.58	5.84	N/A for probe	N/A for probe		6.60	Wind pump	
	Gv16	6.03 (Aug-08)	-	6.48	6.52	6.01	5.79	6.03	Dry		5.80	Well	
	Gv17	-	-	36.35	29.30	27.48	28.15	N/A for probe	N/A for probe		N/A	Wind pump	
	Gv18	-	-	14.90	11.82	9.04	12.11	11.71	12.93		15.07	Wind pump	
	Gv19	N/A (Aug-08)	-	N/A	12.55	9.18	10.90	12.21	N/A for probe	N/A - sunpump		13.71	Solar pump
	Gv20	12.62 (Aug-08)	-	12.92	11.60	9.69	9.42	10.92	12.38	12.43		N/A	Submerged pump

Kolomela Mine Hydrocensus - February 2015												
Farm	Loc Nr	1st Reading (2008)	2nd Reading (2008-where applicable)	3rd Reading (Feb/Mar 2009)	4th Reading (Feb/Mar 2010)	5th Reading (Feb/Mar 2011)	6th Reading (Feb/Mar 2012)	7th Reading (Feb/Mar 2013)	8th Reading (Feb/Mar 2014)	9th Reading (May 2014)	Last Reading (Feb 2015)	Description
Bonnetfontein	Bt1	11.25 (Aug 08)	-	13.10	11.44	10.60	9.21	10.21	11.53		12.70	Wind pump
	Bt2	17.90 (Aug 08)	-	23.25	18.22	18.10	15.54	N/A Bees-Nest	N/A Bees-Nest		16.70	Open borehole
	Bt3	11.62 (Aug 08)	-	11.25	12.10	9.42	9.19	11.90	10.62	10.79	11.29	Open borehole
Geelbult	Gb1	N/A (Aug 08)	-	N/A	N/A	N/A	N/A	N/A for probe	N/A for probe		N/A	Wind pump
	Gb2	11.50 (Aug 08)	-	11.92	12.21	10.14	8.23	8.71	9.28	9.68	9.65	Well
	Gb3	N/A (Aug 08)	-	N/A	N/A	N/A	N/A	N/A for probe	N/A Bees-Nest		N/A	Wind pump
	Gb4	N/A (Aug 08)	-	N/A	N/A	N/A	N/A	N/A for probe	N/A for probe		N/A	Wind pump
	Gb5	-	-	-	13.68 (Dec 2010)	11.41	10.58	11.05	11.32		12.32	Open borehole
Kalkfontein	Ka11	51.03 (Aug 08)	-	29.80	23.86	N/A	N/A Gates locked	22.00	19.44		N/A	Not able to sample due to site rules
	Ka12	25.47 (Aug 08)	-	N/A	24.15	N/A	N/A Gates locked	22.40	N/A for probe		30.31	Submerged pump
	Ka13	N/A (Aug 08)	-	N/A	18.05	16.46	15.79	19.31	N/A Bees-Nest	Gates locked	15.25	Wind pump
	Ka14	1.95 (Aug 08)	-	1.95	1.95	0.00	0.86	1.22	2.34	1.50	1.30	Fountain
	Ka15	12.10 (Aug 08)	-	13.75	12.00	10.60	9.85	10.07	9.89	9.68	9.85	Open borehole
	Ka16	N/A (Aug 08)	-	N/A	N/A	N/A	N/A	N/A Locked	N/A Locked		N/A	Gate locked
Aucampsrus	Au1	N/A (Sept 08)	-	14.60	13.68	12.84	11.05	N/A for probe	N/A for probe		N/A	Wind pump
	Au2	13.65 (Sept 08)	-	13.95	13.12	10.48	11.15	21.11	13.55	N/A for probe	19.47	Submersible
	Au3	15.02 (Sept 08)	-	17.30	20.21	11.12	10.04	10.63	10.34		10.75	Submersible
	Au4	14.88 (Sept 08)	-	14.60	15.10	13.48	12.18	12.21	14.04		14.30	Open borehole
	Au5	14.30 (Sept 08)	-	14.40	14.68	14.25	14.40	14.88	14.83	14.36	14.88	Wind pump
	Au6	N/A (Sept 08)	-	N/A	N/A	N/A	N/A	N/A Locked	N/A Locked		N/A	Assmang monitoring BH
	Au7	38.35 (Sept 08)	-	39.50	38.35	37.41	37.79	38.97	N/A for probe	Probe get stuck	38.90	Wind pump
	Au8	40.01 (Sept 08)	-	40.12	39.95	38.82	38.31	39.49	39.94	40.03	40.40	Open borehole
	Au9	45.38 (Sept 08)	-	45.50	45.32	44.90	37.48	Blocked at 2.09	Blocked at 2.18 m		Blocked at 2.2m	Open borehole
	Au10	45.54 (Sept 08)	-	45.42	45.31	44.42	45.31	45.13	45.60		47.05	Open borehole
	Au11	57.53 (Sept 08)	-	58.40	58.62	56.17	57.75	N/A Bees-Nest	N/A Bees-Nest		N/A	Wind pump
	Au12	11.80 (Sept 08)	-	12.25	10.85	11.24	11.18	11.25	12.72		12.40	Wind pump
	Au13	30.20 (Sept 08)	-	34.50	56.38	54.69	N/A new baseplate	N/A for probe	N/A for probe		N/A	Wind pump
	Au14	13.05 (Sept 08)	-	13.05	13.12	13.12	12.98	10.30	N/A Bees-Nest		10.55	Well
	Au15	10.81 (Sept 08)	-	10.95	10.72	9.58	9.58	9.58	10.00		10.38	Wind pump

Kolomela Mine Hydrocensus - February 2015													
Farm	Loc Nr	1st Reading (2008)	2nd Reading (2008-where applicable)	3rd Reading (Feb/Mar 2009)	4th Reading (Feb/Mar 2010)	5th Reading (Feb/Mar 2011)	6th Reading (Feb/Mar 2012)	7th Reading (Feb/Mar 2013)	8th Reading (Feb/Mar 2014)	9th Reading (May 2014)	Last Reading (Feb 2015)	Description	
Floradale	Fd1	N/A (Sept 08)	-	N/A	N/A	N/A	N/A	N/A for probe	N/A for probe		N/A	Wind pump	
	Fd2	11.91 (Sept 08)	-	12.20	12.14	11.14	11.04	11.75	12.00	12.03	12.25	Open borehole	
	Fd3	11.82 (Sept 08)	-	12.10	12.03	10.98	10.86	11.69	11.92		Blocked	Open borehole	
	Fd4	11.99 (Sept 08)	-	12.30	12.26	11.49	11.46	N/A for probe	N/A for probe		N/A	Submerged pump	
	Fd5	13.16 (Sept 08)	-	13.36	13.18	12.14	11.18	13.02	13.21		13.48	Well	
	Fd6	13.70 (Sept 08)	-	13.90	13.74	12.48	10.93	13.71	13.92		14.20	Well	
	Fd7	N/A (Sept 08)	-	N/A	N/A	N/A	N/A	19.16	19.69		20.40	Wind pump	
	Fd8	12.63 (Sept 08)	-	12.65	12.38	10.49	10.46	N/A for probe	N/A for probe		N/A	Wind pump	
	Fd9	6.50 (Sept 08)	-	9.00	8.99	7.58	9.86	7.85	8.28	7.76	7.90	Wind pump	
	Fd10	N/A (Sept 08)	-	N/A	N/A	N/A	N/A	N/A Locked	Dry		N/A	Monitoring point	
	Fd11	19.42 (Sept 08)	-	N/A	19.44	19.05	18.69	22.18	N/A for probe	N/A for probe	N/A	Wind pump	
	Fd12	N/A (Sept 08)	-	85.22	85.05	84.92	81.46	84.71	N/A for probe		85.25	Wind pump	
	Fd13	11.68 (Sept 08)	-	11.94	12.03	10.48	11.50	N/A Bees-Nest	11.91		12.02	Wind pump	
	Fd14	N/A (Sept 08)	-	N/A	N/A	N/A	N/A	N/A for probe	N/A Bees-Nest		N/A	Wind pump	
Broomlands	BI1	N/A (Oct 08)	-	N/A	N/A	N/A	N/A	N/A for probe	N/A for probe		N/A	No access for probe	
	BI2	7.93 (Oct 08)	-	8.11	8.31	7.51	6.58	6.62	6.29		6.70	Wind pump	
	BI3	8.05 (Oct 08)	-	8.24	7.81	7.18	6.20	6.20	6.37		6.65	Open borehole	
	BI4	9.01 (Oct 08)	-	9.51	9.13	8.01	7.15	7.55	7.46		7.90	Wind pump	
	BI5	11.34 (Oct 08)	-	11.45	10.89	8.22	9.18	9.36	8.89		9.38	Open borehole	
	BI6	11.97 (Oct 08)	-	11.71	11.55	8.04	9.32	9.50	N/A for probe	N/A for probe	N/A	No access for probe	
	BI7	11.55 (Oct 08)	-	11.45	11.14	8.32	9.15	9.49	8.94		9.40	Submerged pump	
	BI8	35.12 (Oct 08)	-	35.35	35.63	35.18	36.71	37.61	35.25		37.10	Wind pump	
	BI9	35.75 (Oct 08)	-	35.75	36.53	35.84	35.09	34.61	34.29		N/A	Wind pump	
	BI10	9.40 (Oct 08)	-	9.42	N/A	N/A	13.72	N/A for probe	14.84		Blocked at 8.8m	Wind pump	
	BI11	3.78 (Oct 08)	-	3.70	N/A	N/A	N/A	No entry - Farmer	N/A		Blocked at 1.5	Wind pump	
Koespeen	Ko1	17.95 (Sept 08)	-	18.63	18.28	16.49	14.18	12.95	10.62	11.60	12.35	Mono pump	
	Ko2	20.59 (Sept 08)	-	N/A	N/A	N/A	N/A	15.60	N/A for probe		N/A	No access for probe	
	Ko3	N/A (Sept 08)	-	N/A	N/A	N/A	N/A	N/A Locked	N/A for probe		N/A	No access for probe	
	Ko4	N/A (Sept 08)	-	N/A	N/A	N/A	N/A	N/A for probe	N/A for probe		N/A	No access for probe	
	Ko5	22.42 (Sept 08)	-	N/A	N/A	N/A	N/A	17.49	15.12		16.62	Clear	

Kolomela Mine Hydrocensus - February 2015													
Farm	Loc Nr	1st Reading (2008)	2nd Reading (2008-where applicable)	3rd Reading (Feb/Mar 2009)	4th Reading (Feb/Mar 2010)	5th Reading (Feb/Mar 2011)	6th Reading (Feb/Mar 2012)	7th Reading (Feb/Mar 2013)	8th Reading (Feb/Mar 2014)	9th Reading (May 2014)	Last Reading (Feb 2015)	Description	
Kameelhoek	Kh01	13.24 (Jun 08)	12.9 (Jul 08)	13.56	12.95	11.81	12.48	12.52	12.73	12.81	13.88	Open borehole	
	Kh02	Blocked (Jun 08)	-	N/A	1.45	27.14	27.45	25.31	28.54	28.03	28.40	Wind pump	
	Kh03	29.66 (Jun 08)	-	29.34	29.84	27.48	27.15	28.58	29.47	29.61	29.91	Wind pump	
	Kh04	-	-	N/A	N/A	N/A	N/A	N/A Locked	N/A Locked		N/A	Gate locked	
	Kh05	27.50 (Jun 08)	-	27.40	27.69	27.10	27.48	27.01	27.48		27.90	Wind pump	
	Kh06	27.65 (Jun 08)	-	27.75	28.10	28.04	27.01	27.27	27.73	27.89	28.15	Open borehole	
	Kh07	Dry (Jun 08)	-	Dry	N/A	N/A	Dry	N/A Cap welded	N/A Cap welded		N/A	Cap welded shut	
	Kh08	Dry (Jun 08)	-	Dry	N/A	N/A	Dry	Dry	Dry		Dry at 3m	Open borehole	
	Kh09	Dry (Jun 08)	-	Dry	N/A	N/A	Dry	Dry	Dry		Dry	Open borehole	
	Kh10	Dry (Jun 08)	-	Dry	N/A	N/A	Dry	21.87	19.87		20.20	Open borehole	
	Kh11	30.84 (Jun 08)	-	Blocked	N/A	N/A	Blocked	31.87	31.20		32.70	Wind pump	
	Kh12	23.67 (Jun 08)	-	24.05	24.67	21.45	29.45	36.45	43.72	46.13	Dry at 49m	Wind pump	
	Kh13	8.44 (Jun 08)	6.35(Jul 08)	8.92	2.50	2.14	6.48	5.01	2.72	3.74	6.60	Open borehole	
	Kh14	7.46 (Jun 08)	7.19(Jul 08)	7.86	7.50	5.01	7.26	5.01	7.15		8.00	Water Affairs (G0113NC) - Open borehole	
	Kh15	Blocked (Jun 08)	-	N/A	N/A	N/A	N/A	N/A - tree roots	NA		N/A	Demolished	
	Kh16	Sealed (Jun 08)	-	N/A	N/A	N/A	N/A	N/A for probe	N/A for probe		N/A	Locked	
	Kh17	22.22 (Jun 08)	-	20.19	17.18	22.22	16.94	15.18	19.21	15.89	17.98	19.65	Wind pump
	Kh18	16.85 (Jun 08)	-	16.98	16.77	16.61	16.16	16.36	16.59	16.17	16.91	Wind pump	
	Kh19	9.39 (Jun 08)	-	9.70	9.48	6.10	7.62	7.84	7.91		N/A	No access for probe	
	Kh20	6.02 (Jun 08)	5.98 (Jul 08)	N/A	5.84	5.10	3.50	N/A for probe	N/A for probe	N/A for probe	4.25	Open borehole	
	Kh21	Sealed (Jun 08)	-	N/A	N/A	6.95	6.51	6.67	N/A for probe	7.21	7.50	Submerged pump	
	Kh22	Sealed (Jun 08)	-	N/A	N/A	7.48	6.82	N/A Bees-Nest	N/A for probe		N/A	Submerged pump	
	Kh23	Sealed (Jun 08)	-	8.85	8.62	6.91	6.88	7.04	N/A for probe	2.38	7.75	Open borehole	
	Kh24	9.08 (Jun 08)	-	9.25	9.18	8.14	8.18	7.52	7.63		8.05	Wind pump	
	Kh25	10.92 (Jun 08)	-	Blocked	N/A	7.40	7.55	8.35	9.24	9.39	9.80	Water Affairs (G0114NC) - Open borehole	
Voelwater	Vw01	10.08 (Jun 08)	-	8.93	8.23	7.49	8.12	7.99	7.30	7.65	8.25	Wind pump	
	Vw02	39.60 (Jun 08)	-	37.65	36.25	33.14	32.17	N/A	N/A for probe		N/A	No access for probe	
	Vw03	65.52 (Jun 08)	-	N/A	N/A	N/A	N/A	N/A Bees-Nest	N/A for probe		N/A	No access for probe	
	Vw04	51.50 (Jun 08)	50.6 (Jul 08)	N/A	60.65	56.65	45.70	35.34	45.95	46.44	47.05	Wind pump	
	Vw05	9.55 (Jun 08)	9.62 (Jul 08)	N/A	N/A	N/A	10.04	N/A for probe	N/A for probe		N/A	No access for probe	
	Vw06	N/A (Jun 08)	-	N/A	N/A	N/A	N/A	N/A for probe	N/A for probe		N/A	No access for probe	
	Vw07	10.52 (Jun 08)	-	10.99	11.02	10.16	10.18	8.76	8.89		9.28	Wind pump	

Kolomela Mine Hydrocensus - February 2015												
Farm	Loc Nr	1st Reading (2008)	2nd Reading (2008-where applicable)	3rd Reading (Feb/Mar 2009)	4th Reading (Feb/Mar 2010)	5th Reading (Feb/Mar 2011)	6th Reading (Feb/Mar 2012)	7th Reading (Feb/Mar 2013)	8th Reading (Feb/Mar 2014)	9th Reading (May 2014)	Last Reading (Feb 2015)	Description
	Ld1	6.60 (Oct 08)	-	6.84	6.35	5.48	5.98	6.25	6.29	8.18	6.60	Well
	Ld2	5.46 (Oct 08)	-	5.80	4.91	4.18	4.73	N/A Bees-Nest	N/A Bees-Nest		5.40	Well
	Ld3	5.13 (Oct 08)	-	5.53	4.55	4.23	4.75	N/A Bees-Nest	N/A Bees-Nest	N/A Bees-Nest	5.15	Well
	Ld4	5.37 (Oct 08)	-	6.82	4.69	4.59	4.74	4.98	N/A Bees-Nest		5.30	Well
	Ld5	7.72 (Oct 08)	-	8.50	6.68	6.14	6.91	7.40	7.46		N/A	No access for probe
	Ld6	40.07 (Oct 08)	-	50.37	42.21	37.14	36.55	N/A for probe	N/A for probe		N/A	No access for probe
	Ld7	20.55 (Oct 08)	-	20.50	20.44	19.58	20.47	19.48	N/A for probe	N/A for probe	N/A	No access for probe
	Ld8	31.12 (Oct 08)	-	34.50	53.43	31.46	30.55	Blocked	Blocked at 0.35m		N/A	No access for probe
	Ld9	7.55 (Oct 08)	-	7.60	6.55	6.75	6.42	6.58	7.84		7.10	Windpump
	Ld10	9.59 (Oct 08)	-	9.75	8.75	9.80	8.55	8.75	9.08		9.32	Open borehole
	Ld11	N/A (Oct 08)	-	N/A	N/A	N/A	N/A	6.87	N/A Cap Stuck		7.50	Open borehole
	Ld12	N/A (Oct 08)	-	N/A	N/A	N/A	N/A	N/A	N/A - Locked	N/A Locked	N/A	Gate locked
Heuningkrantz	Hk01	-	-	-	30.19 (Sept 10)	N/A	26.56	N/A Gates locked	29.17		30.40	Solarpump
	Hk02	-	-	-	16.57 (Sept 10)	15.92	15.25	N/A Probe stuck	Blocked at 3m		16.10	Wind pump
	Hk03	-	-	-	64.43 (Sept 10)	NS	65.05	62.65	N/A for probe	60.14	59.60	Solarpump
	Hk04	-	-	-	17.63 (Sept 10)	17.62	17.07	17.73	17.40		Not sampled	No access to site, Sheduled for May
	Hk05	-	-	-	7.86 (Sept 10)	7.62	7.55	N/A Borehole closed	8.35		N/A	Not found
	Hk06	-	-	-	-	7.82	7.67	N/A	N/A		N/A	No access to site, Sheduled for May
	Hk07	-	-	-	-	7.91	7.78	N/A	N/A		N/A	No access to site, Sheduled for May
	Hk08	-	-	-	7.71 (Sept 10)	6.91	7.55	N/A Borehole closed	7.80		8.12	Wind pump
	Hk09	-	-	-	7.69 (Sept 10)	7.01	7.25	7.47	7.67		8.52	Well
	Hk10	-	-	-	7.49 (Sept 10)	7.14	7.38	7.40	N/A Bees-Nest		8.31	Well
	Hk11	-	-	-	8.72 (Sept 10)	8.42	8.46	Unable to measure	Blocked at 4.55 m		9.06	Wind pump
	Hk12	-	-	-	9.41 (Sept 10)	9.18	9.03	9.19	10.52		9.80	Wind pump
	Hk13	-	-	-	NA	10.93	10.58	Blocked - Rocks	N/A		Not sampled	No access to site, Sheduled for May
	Hk14	-	-	-	11.43 (Sept 10)	11.65	10.97	N/A Probe stuck	N/A Bees-Nest		11.70	Wind pump
	Hk15	-	-	-	13.21 (Sept 10)	12.92	12.57	12.98	13.21		13.60	Wind pump
	Hk16	-	-	-	7.31 (Sept 10)	7.13	7.00	7.15	7.33	Unable to Open	7.66	Monitoring borehole
	Hk17	-	-	-	-	11.82	10.93	N/A Gates locked	Unable to locate		N/A	No access to site, Sheduled for May
Lynput	LT09	-	-	-	-	-	-	N/A for probe	N/A for probe	N/A for probe	N/A	No access for probe
	LT10	-	-	-	-	-	-	53.99	40.97	67.29	40.20	Wind pump
	LT11	-	-	-	-	-	-	N/A for probe	50.94		49.15	Wind pump
	LT12	-	-	-	-	-	-	Unable to locate	Unable to locate		Unable to locate	Unable to locate
	LT13	-	-	-	-	-	-	Unable to locate	Unable to locate	Unable to locate	Unable to locate	Not found
	LT14	-	-	-	-	-	-	N/A Locked	N/A Locked		N/A	Gate locked
	LT21	-	-	-	-	-	-	Unable to locate	Unable to locate	Unable to locate	Unable to locate	Not found
	LT22	-	-	-	-	-	-	Unable to locate	Unable to locate	Unable to locate	Unable to locate	Not found

*N/A = No Access
x = Suspect record

Source: Aquatico (2015)

Table 7.4: Water quality recorded on farms surrounding Kolomela mine in 2015.

(Note: Exceedances of domestic water quality guidelines (DWAf, 1998) are highlighted in red. The location of boreholes are shown Part C: Report D1.

EXCEEDANCE TABLE:																	
PROJECT NAME		Kolomela Mine										DATE COMPILED		2015/03/04 01:57:41 PM			
LOCALITY GROUP		Annual Hydrocensus										COMPILED BY		Jurgen De Swardt			
DATE RANGE		1 February 2015 to 28 February 2015															
ASSESSMENT SET		Quality of Domestic Water Supplies: Drinking Class 1															
VARIABLE	UNIT	ASSESSMENT Value	Monitoring Localities Annual Hydrocensus														
			AU02	BL08	BT02	BT03	FD02	GB02	GV01	KBF06	KH06	KH20	KK04	KMF01	KMF02	KO01	LT10
pH		5 / 9.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electrical conductivity (EC)	mS/m	150.0 mS/m	0	0	X	0	0	0	0	X	0	0	X	X	0	0	0
Total dissolved solids (TDS)	mg/l	1000 mg/l	0	0	X	0	0	0	0	X	0	0	X	0	0	0	0
Total hardness	mg/l	0.00 / 300.00 mg/l	X	X	X	0	X	X	X	X	X	X	X	X	X	X	X
Calcium (Ca)	mg/l	150.0 mg/l	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Magnesium (Mg)	mg/l	100.0 mg/l	0	0	X	0	0	0	0	0	X	0	X	X	0	0	X
Sodium (Na)	mg/l	200.0 mg/l	0	0	0	0	0	0	0	X	0	0	X	0	0	0	0
Potassium (K)	mg/l	50.00 mg/l	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total alkalinity	mg/l		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride (Cl)	mg/l	200.0 mg/l	0	0	X	0	0	0	0	X	0	0	0	0	0	0	0
Sulphate (SO ₄)	mg/l	400.0 mg/l	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fluoride (F)	mg/l	1 mg/l	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrate (NO ₃) as N	mg/l	10.00 mg/l	X	0	0	0	X	X	X	0	0	0	0	0	0	0	0
Ammonium (NH ₄) as N	mg/l		0	0	0	X	0	0	0	0	0	0	0	0	0	0	0
Orthophosphate (PO ₄) as P	mg/l		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aluminium (Al)	mg/l		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iron (Fe)	mg/l	1 mg/l	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0
Manganese (Mn)	mg/l	0.4 mg/l	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

0 = Complies with assessment set (Quality of Domestic Water Supplies: Drinking Class 1 (1998); DWAf SAWQG for Domestic Use (1996))
X = Does not comply with assessment set

EXCEEDANCE TABLE														
PROJECT NAME		Kolomela Mine								DATE COMPILED		2015/05/06 04:56:30 PM		
LOCALITY GROUP		Annual Hydrocensus								COMPILED BY		Jurgen De Sw ardt		
DATE RANGE		1 February 2015 to 28 February 2015												
ASSESSMENT SET		Quality of Domestic Water Supplies: Drinking Class 1												
VARIABLE	UNIT	ASSESSMENT Value	Monitoring Localities Annual Hydrocensus											
			BER04	OF01	SF04	SUN02	SUN09	VP01	VW01	VW04	WIT01	HK09		
pH@ 25°C		5 / 9.5	0	0	0	0	0	0	0	0	0	0	0	
Electrical conductivity (EC)	mS/m	150.0 mS/m	X	0	X	0	0	X	0	0	X	0		
Total dissolved solids (TDS)	mg/l	1000 mg/l	X	0	X	0	0	X	0	0	X	0		
Total hardness	mg/l	0.00 / 300.00 mg/l	X	X	X	X	X	X	X	X	X	X	X	
Calcium (Ca)	mg/l	150.0 mg/l	0	0	0	0	0	0	0	0	0	0		
Magnesium (Mg)	mg/l	100.0 mg/l	X	X	0	0	0	X	0	X	X	0		
Sodium (Na)	mg/l	200.0 mg/l	0	0	0	0	0	0	0	0	X	0		
Potassium (K)	mg/l	50.00 mg/l	0	0	0	0	0	0	0	0	0	0		
Total alkalinity	mg/l		0	0	0	0	0	0	0	0	0	0		
Chloride (Cl)	mg/l	200.0 mg/l	X	X	0	0	0	X	0	0	X	0		
Sulphate (SO ₄)	mg/l	400.0 mg/l	0	0	0	0	0	0	0	0	X	0		
Fluoride (F)	mg/l	1 mg/l	0	0	0	0	0	0	0	0	0	0		
Nitrate (NO ₃) as N	mg/l	10.00 mg/l	X	0	X	0	0	0	X	0	0	0		
Ammonium (NH ₄) as N	mg/l		0	0	0	0	0	0	0	0	0	0		
Orthophosphate (PO ₄) as P	mg/l		0	0	0	0	0	0	0	0	0	0		
Aluminium (Al)	mg/l		0	0	0	0	0	0	0	0	0	0		
Iron (Fe)	mg/l	1 mg/l	0	0	0	0	0	X	0	0	0	0		
Manganese (Mn)	mg/l	0.4 mg/l	0	0	0	0	0	0	0	0	0	0		

0 = Complies with assessment set (Quality of Domestic Water Supplies: Drinking Class 1 (1998); DWAF SAWQG for Domestic Use (1996))
X = Does not comply with assessment set

Source: Aquatico (2015)

7.1.6 HYDROLOGY

Information pertaining to the hydrology of the area has been sourced from the Wetland Assessment (SAS, 2015 – Part C – Report K) and the Pan Assessment (Jones & Wagener, 2015 – Part C – Report C) undertaken in support of the EIA.

The site is located in Quaternary catchment D73A of the Orange River Primary Drainage Region. The general area is considered flat, with a few ephemeral rivers traversing the mining boundary. The main streams in the vicinity of the mine are the Groenwaterspruit which flows along the eastern boundary of the mine. Tributaries of the Soutloop River flow from the north east to south western sections of the mining area forming which is locally referred to as the Welgevondenspruit. A tributary of the Soutloop River also flows from north to south through the Farms Floradale, a section of which has been identified for the purposes of aquifer recharging as part of this application (see Figure 7.6).

According to SAS (2015), the Groenwaterspruit River and the unnamed tributaries of the Soutloop River are ephemeral systems classified as a *Resilient* and fall into Class B (largely natural) rivers.

Table 7.5: Summary of the ecological status of quaternary catchment D73A based on Kleynhans (1999).

Catchment	Resource	EIS	PESC	DEMC
D73A	Endorheic - Postmasburg	LOW/MARGINAL	CLASS B	D: Resilient system

Source: SAS (2015)

The Groenwaterspruit River as well as the unnamed tributaries of the Soutloop River are located within a sub-quaternary catchment classified as a National River Freshwater Ecosystem Priority Area (NFEPA). River NFEPA's have been defined in order to achieve biodiversity targets for river ecosystems and were identified in rivers that are currently in a good condition (A or B ecological category). Their NFEPA status indicates that they should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources.

There are also many runoff flow paths in the flat environment that act as water courses during rainfall events, directing water to a number of pans in the immediate area. The functionality of a pan is typically driven by a combination of surface water and groundwater inflows. The extent to which its functionality is driven by either surface water or ground water is dependent on the proportion of each that it receives on an annual and a seasonal basis. Hardpan calcrete underlies the entire site. With the exception of the gravel layers within the calcrete the hardpan calcrete is considered to have a very low permeability. As a result a very shallow, perched aquifer may be present on top of the hardpan calcrete. Due to the very shallow depths this aquifer is expected to only contain water after rain events. As a result the pans are also solely sustained by surface water (Jones & Wagener, 2015). A particular pan is therefore unlikely to be impacted by mining, unless the mining or related activities encroach on the physical surface catchment to the pan. Jones & Wagener (2015) delineated the catchment of pans occurring within the proposed expansion areas at Kolomela Mine. Due to the large number of terrestrial and wetland pans (see Section 7.1.7) at Kolomela Mine, it is proposed that they be managed as clusters (SAS, 2015) rather than individual pans (see Figure 7.7).

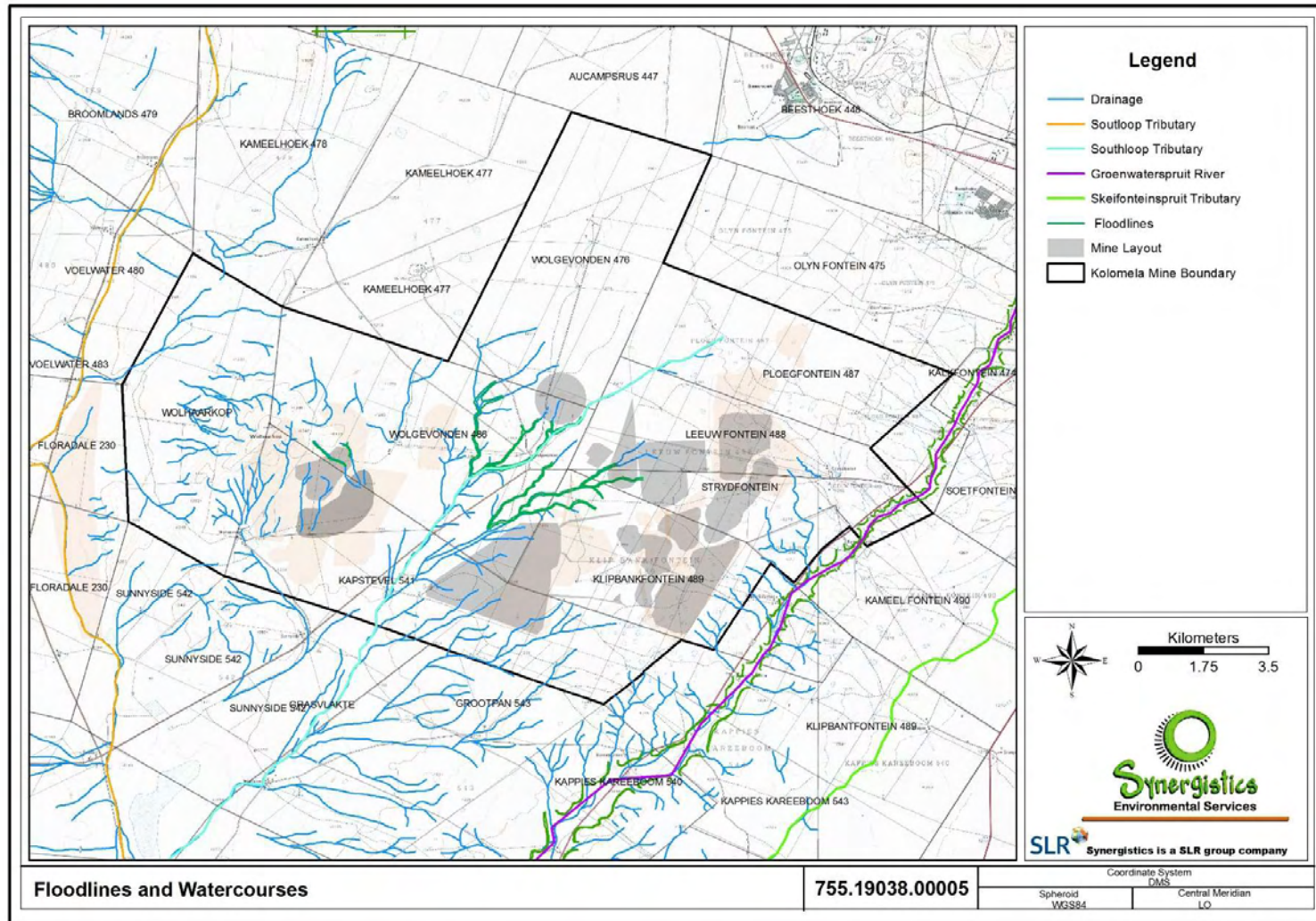
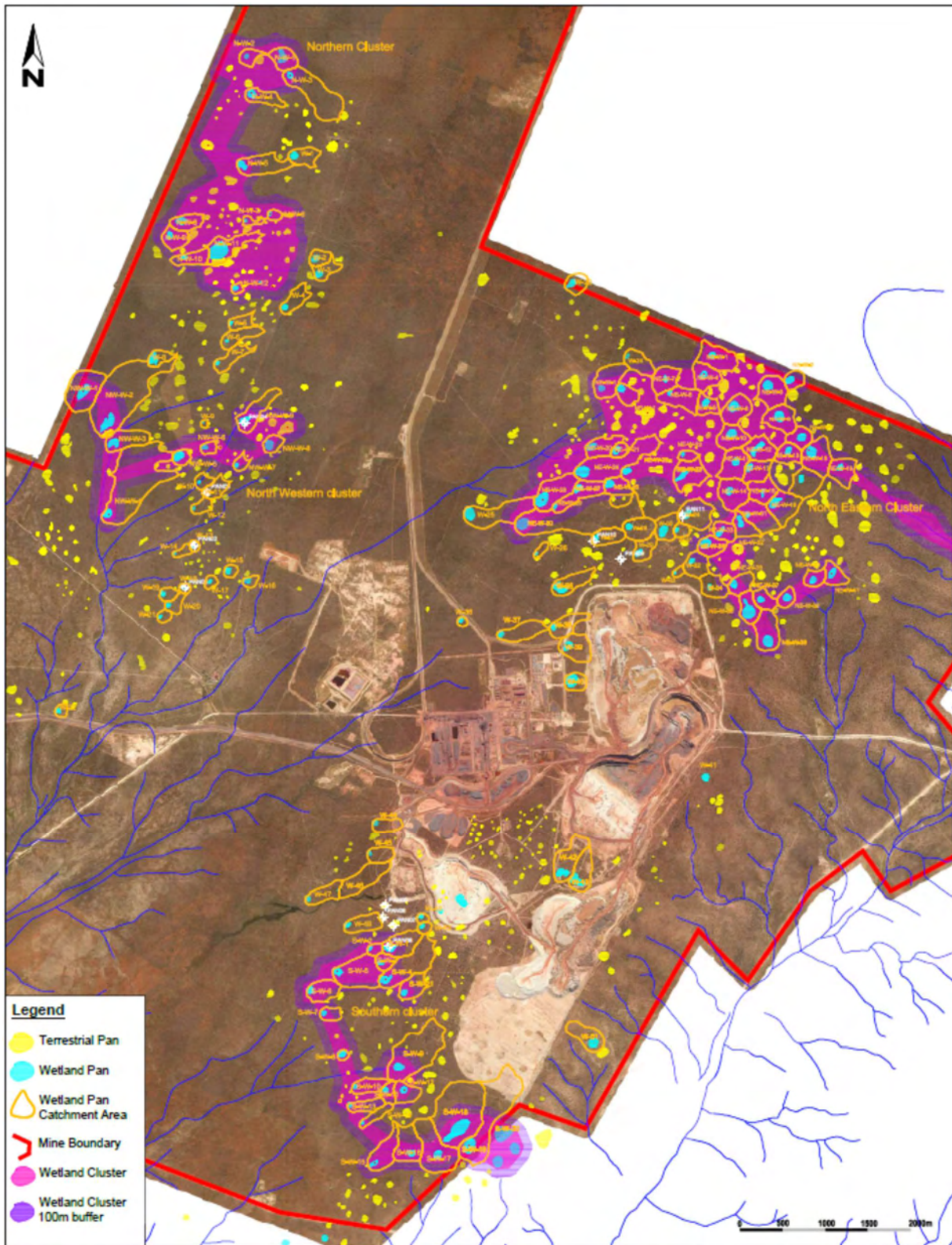


FIGURE 7.6: WATERCOURSES AT AND WITHIN THE PROXIMITY OF KOLOMELA MINE

(Source: SAS, 2015)



(Source: Jones & Wagener, 2015)

FIGURE 7.7: PAN CLUSTERS AT KOLOMELA MINE

7.1.7 WETLANDS

SAS (2015) has undertaken a specialist Wetland Assessment in support of this application for environmental authorisation (see Part C – Report K). The following information provides a summary of the findings in terms of the baseline wetland environment.

Two wetland types were identified within the proposed expansion areas namely Valley Bottom Wetlands and Wetland Pans (see Figure 7.10). Terrestrial Pans and Drainage Lines also occur but are not classified as wetlands (see SAS, 2015).

Valley Bottom Wetlands have been identified within the Groenwaterspruit River, one tributary of the Groenwaterspruit River that flows through the eastern portion of the study area and the western tributary of the Soutloop River located on the farm Floradale 230 in the area identified for aquifer recharging. The lack of flowing water within the Valley Bottom Wetland features decreases the importance in terms of stream flow regulation, flood attenuation and water supply. However, the systems are considered to be of some importance in terms of sediment trapping due to the sandy nature of soil with evidence of erosion in some areas.

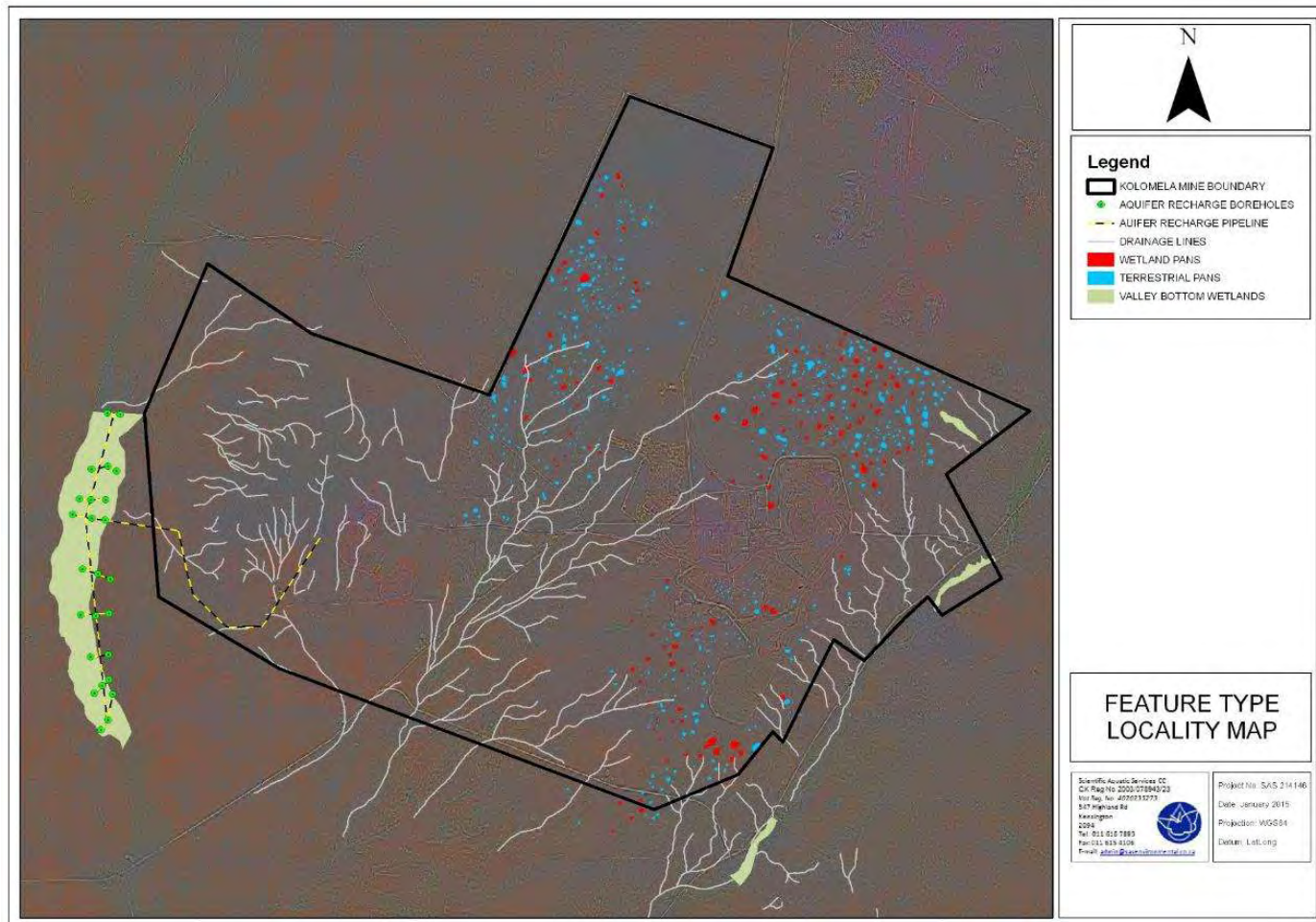


Source: SAS (2015)

PLATE 7.1: VALLEY BOTTOM WETLAND

According to SAS, the Valley Bottom Wetlands fall within Category A/B in terms of the Present Ecological Status (PES) i.e. largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.

Wetland Pans show characteristics of a wetland temporary zone in which soil is saturated for a short period of the year, but are saturated for a sufficient period, under normal circumstances, to allow for the formation of hydromorphic soils and the growth of wetland vegetation.



Source: SAS (2015)

FIGURE 7.8: LOCATIONS OF WETLANDS, TERRESTRIAL PANS AND DRAINAGE LINES

These pans are considered to be of increased Ecological Importance and Sensitivity for aquatic and terrestrial species which rely on these systems for parts of their life cycles.



Source: SAS (2015)

PLATE 7.2: WETLAND PAN

Many of the **terrestrial pans** identified were small and the associated endorheic catchments of the systems very small. As such these systems do not collect sufficient volumes of water to support wetland conditions. When soils were assessed in these areas it was also observed that the soils contained less moisture than soils within the wetland pans further supporting the observations that soils in the Terrestrial Pans do not retain high levels of moisture for sufficient periods of time to support facultative or obligate wetland vegetation or to lead to the formation of hydromorphic soils. Terrestrial Pans are however considered to be of some importance in terms of biodiversity maintenance.



Source: SAS (2015)

PLATE 7.3: TERRESTRIAL PAN

The study area is located approximately 7 km from the nearest town and due to the low grazing value of vegetation; farms tend to extend over much larger areas when compared to other regions used for grazing within South Africa. Both these aspects have resulted in minimal impact on most of the Wetland Pans due to anthropogenic activities such as water quality modification, roads and pipelines traversing wetlands, developments, surface runoff as well as trampling and overgrazing of wetlands by livestock. As a result SAS (2015) suggest that the Wetland Pans fall into Category A (unmodified, natural) in terms of the PES.

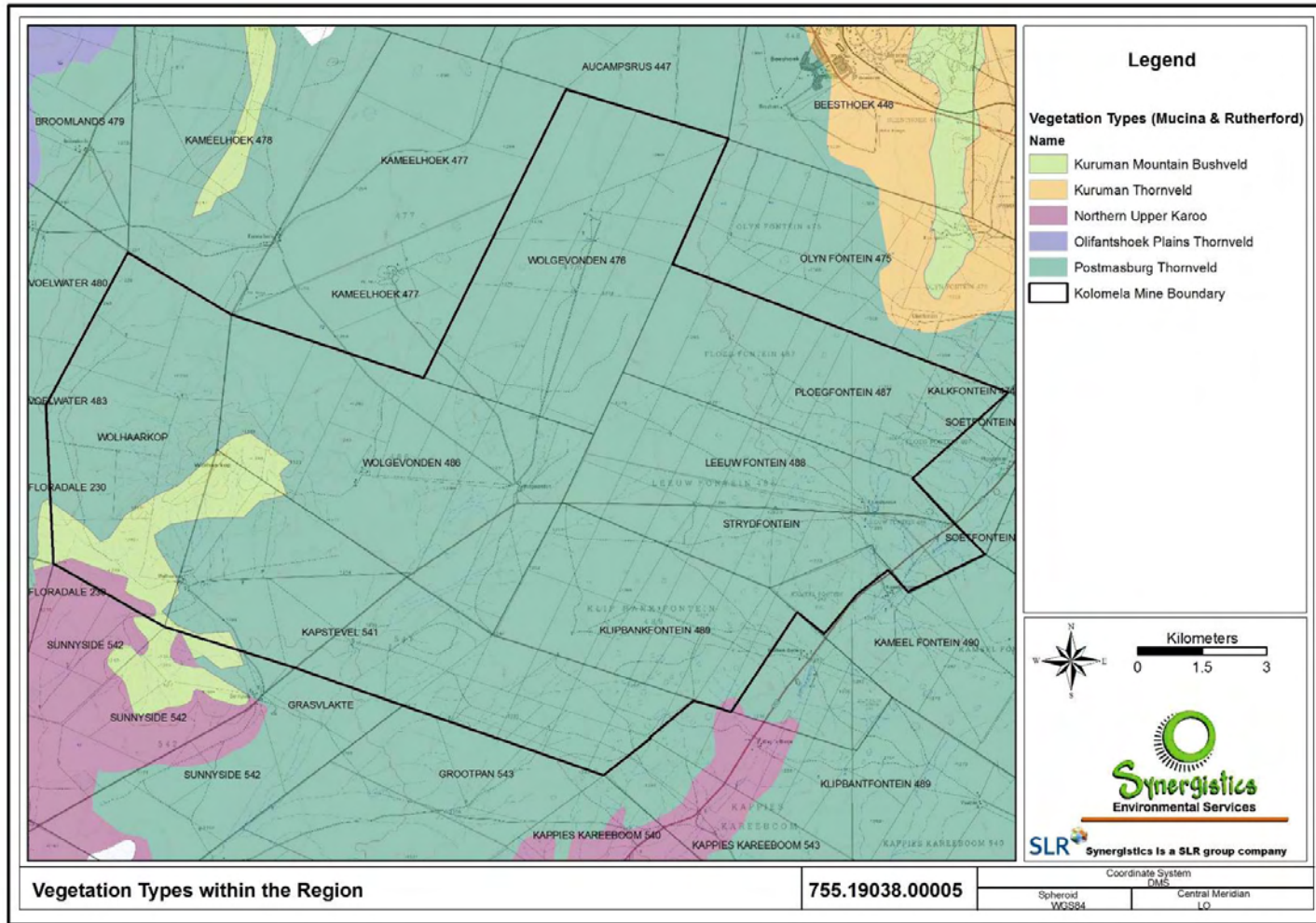
7.1.8 BIODIVERSITY

Omni Eko was appointed to undertake an assessment of the fauna and flora in support of the EIA (see Part C – Report G). Relevant baseline information has been summarised below.

According to Mucina & Rutherford (2006) Kolomela Mine falls within the Kuruman Mountain Bushveld and the Postmasburg Thornveld (see Figure 7.11). This vegetation forms part of the Savanna Biome in the Eastern Kalahari Bushveld Bioregion. Although a number of endemic or near-endemic plant species occur in the area it is not regarded as veld types needing protection. Van Wyk & Smith (2001) however, regard the Ghaap Plateau, of which the study area forms a part, as a unique area where many near-endemic succulent plant species may still be found.

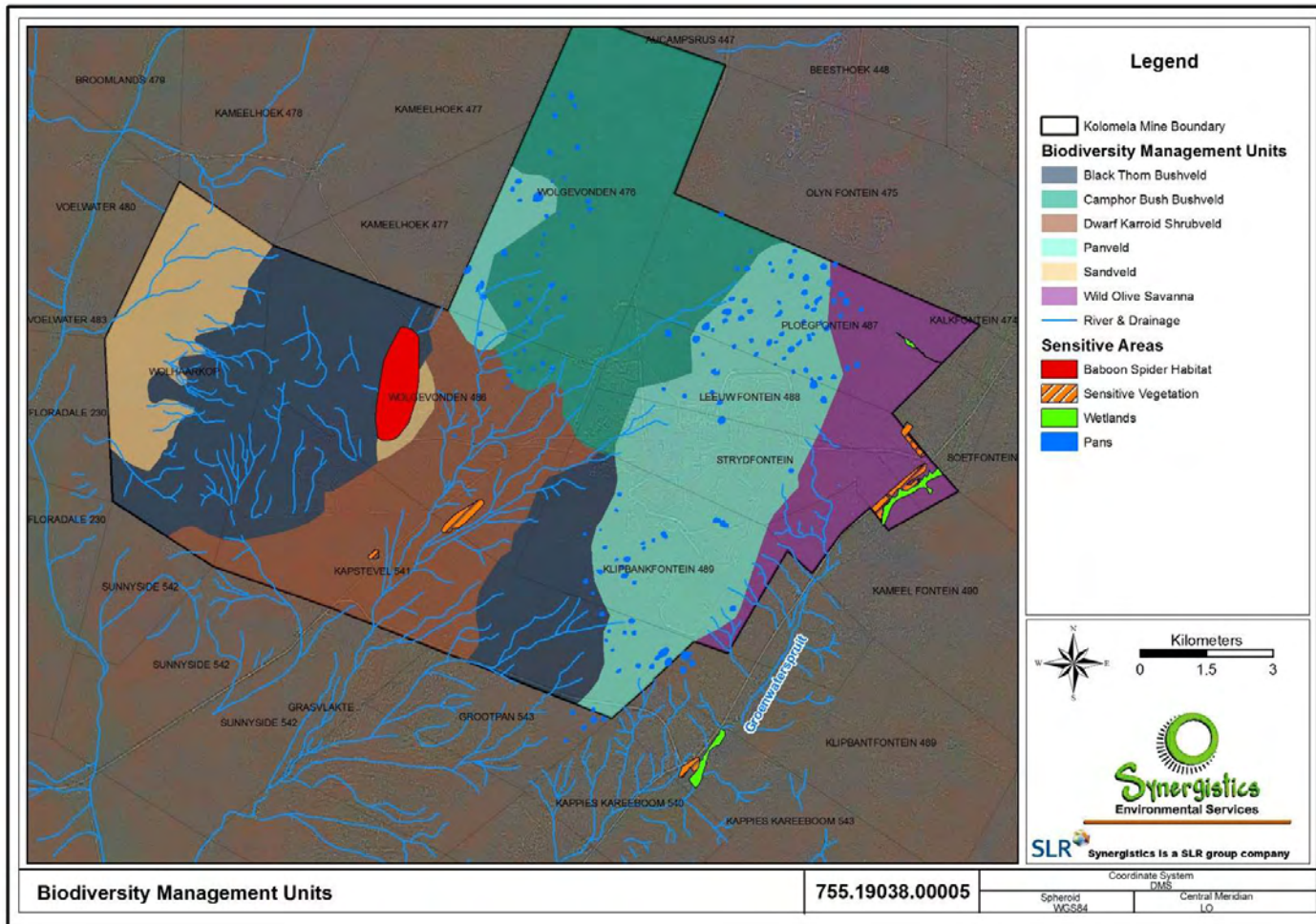
Biodiversity Management Units and sensitive sites at Kolomela Mine (updated from Anderson, 2004) are shown in Figure 7.12.

Protected plants and tree species that can be expected to occur in the disturbed footprint area include the Nationally Protected Tree species: *Vachellia erioloba* (Camel Thorn) and *Boscia albitrunca* (Shepherd's tree). The protected geophytes (protected under the Northern Cape Nature Conservation Act) observed include *Boophone distycha*, *Ammocharis corranica* and *Harpagophytum procumbens*, are all medicinal plants.



Source: Omni Eko (2015)

FIGURE 7.9: VEGETATION TYPES WITHIN THE REGION



Source: Omni Eko (2015)

FIGURE 7.10: BIODIVERSITY MANAGEMENT UNITS

7.1.9 AIR QUALITY

A specialist Air Quality Assessment was undertaken in support of the EIA (Airshed, 2015). A summary of the baseline air quality as per Airshed (2015) is provided below. For more information the reader is referred to the specialist report included as Part C – Report B.

7.1.9.1 PM10 and PM2,5

The PM (particulate matter) monitoring station at the Farm Kappieskareeboom has been in operation since 2011 and thus presents the most comprehensive database of PM10 and PM2,5 data available (see Table 7.5 and Table 7.6).

TABLE 7.6: SUMMARY OF PM₁₀ CONCENTRATIONS FOR THE KAPPIESKAREEBOOM STATION

Year	Data availability	Annual average ($\mu\text{g}/\text{m}^3$) ^(a)	Highest daily average ($\mu\text{g}/\text{m}^3$) ^(b)	Number of exceedances of 75 $\mu\text{g}/\text{m}^3$ ^(c)
2011	16%	28	48	0
2012	96%	30	94	8
2013	73%	40	126	15
2014	41%	33	104	9

Source: Airshed (2015)

(a) NAAQS Annual Average Limit Value = 40 $\mu\text{g}/\text{m}^3$ as of 1 Jan 2015

(b) NAAQS Highest Daily Limit Value = 75 $\mu\text{g}/\text{m}^3$

(c) NAAQS Frequency of Exceedances allowed = 4

Note: the number of exceedances related to the 2012 NAAQS limits and were not necessarily exceedances under the previous limit of 120 $\mu\text{g}/\text{m}^3$

Currently, the ambient air quality in the vicinity of Kolomela is **not** in compliance with the South African National Ambient Air Quality Standards (NAAQS) for PM₁₀.

TABLE 7.7: SUMMARY OF PM_{2,5} CONCENTRATIONS FOR THE KAPPIESKAREEBOOM STATION

Year	Data availability	Annual average ($\mu\text{g}/\text{m}^3$) ^(a)	Highest daily average ($\mu\text{g}/\text{m}^3$) ^(b)	Number of exceedances of 40 $\mu\text{g}/\text{m}^3$ ^(c)
2011	16%	9	18	0
2012	96%	10	26	0
2013	76%	10	59	0
2014	39%	7	29	0

Source: Airshed (2015)

(a) NAAQS Annual Average Limit Value = 25 $\mu\text{g}/\text{m}^3$

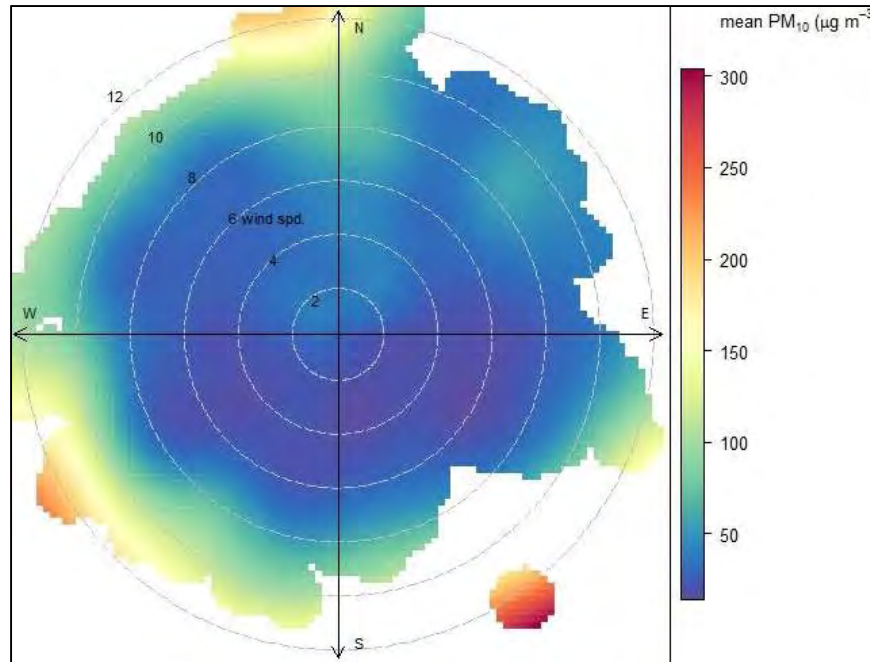
(b) NAAQS Highest Daily Limit Value = 40 $\mu\text{g}/\text{m}^3$ effective from Jan 2016

(c) NAAQS Frequency of Exceedances allowed = 4

Currently, the ambient air quality in the vicinity of Kolomela is in compliance with the NAAQS for PM_{2,5}.

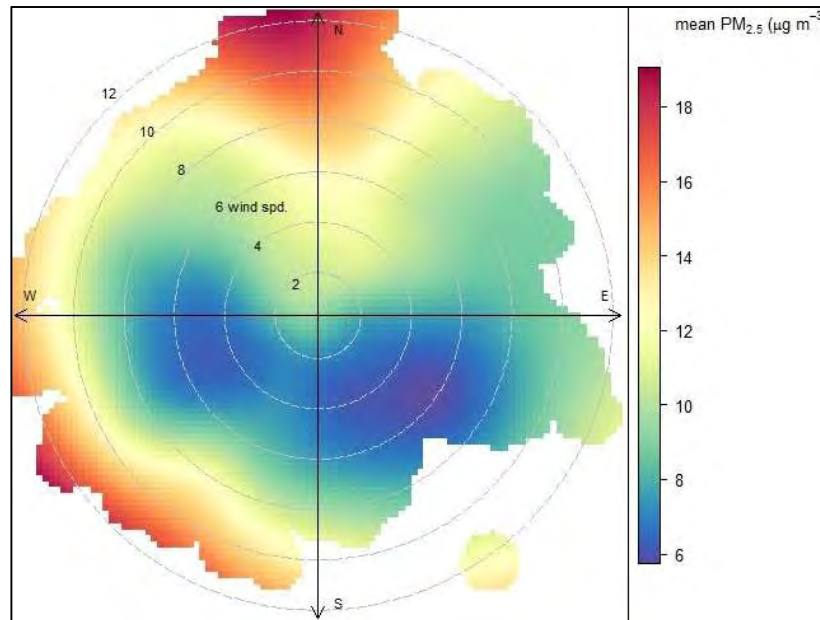
Concentration values were compared to wind speed and direction recorded. Polar plots are used to identify the source of the highest concentration of dust (see Figures 7.13 and 7.14). From both the polar plots it can be seen that there are two distinct sources of PM₁₀ and PM_{2,5} that result in relatively high concentrations under

higher wind speeds (i.e. are further away from the Kappieskaree station). These two sources are located north and south-west of the Kappieskaree station. Based on the fact that the Kolomela operation is also located directly north of the station, it can be inferred that under higher wind speeds the Kolomela operations are responsible for the higher concentrations recorded at the station. The source located south west of the station is unknown, but it can be inferred that agricultural activities/biomass burning are the potential sources.



Source: Airshed (2015)

FIGURE 7.11: PM₁₀ HOURLY AVERAGE POLAR PLOTS FOR THE KAPPIESKAREEBOOM STATION



Source: Airshed (2015)

FIGURE 7.12: PM_{2.5} HOURLY AVERAGE POLAR PLOTS FOR THE KAPPIESKAREEBOOM STATION

7.1.9.2 Fallout Dust

A sampling campaign for the capture of dustfall has been in operation since 2011, which includes 7 on-site single dust buckets (Figure 7.14) and 14 off-site single dust buckets.

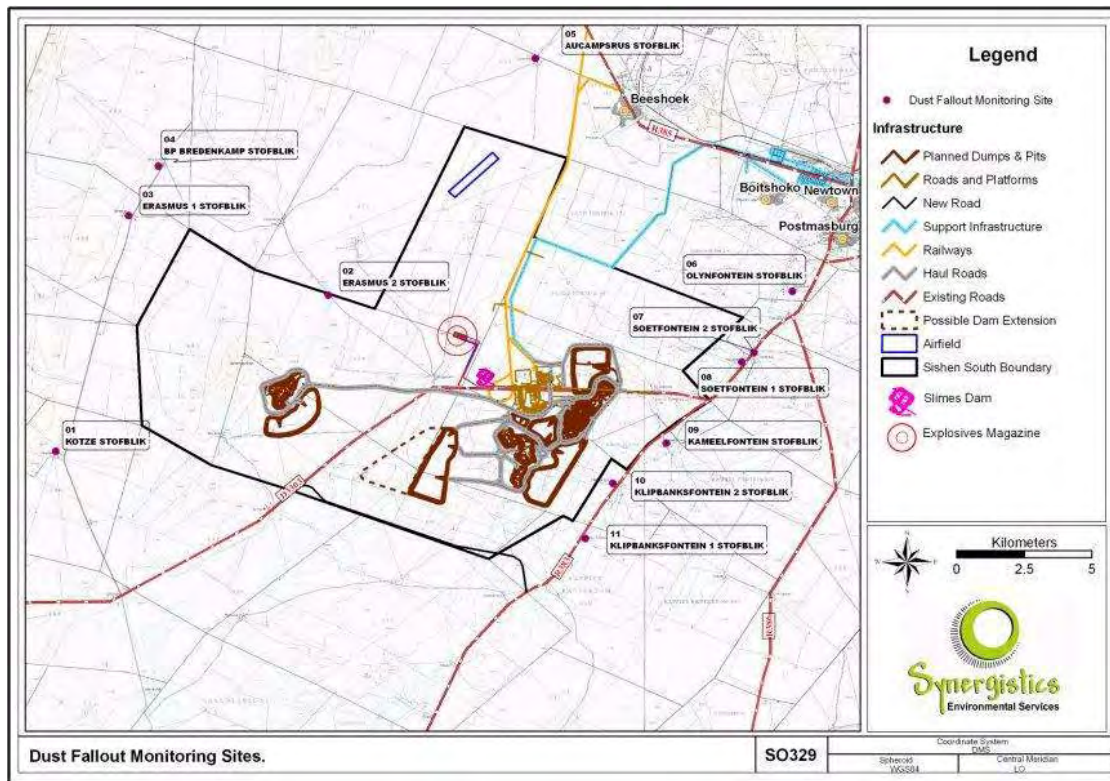


FIGURE 7.13: LOCATION OF DUST MONITORING SITES

From the results of the monitoring campaign, it can be seen that dustfall at the following on-site dust bucket locations are non-compliant with the National Dust Control Regulations (NDCR, GN. 827 of 1 November 2013) for non-residential areas (exceed 1200 mg/m²/day):

- 2012 – LWF (Leeuwfontein) Mining and Plant P Crusher units
- 2013 – LWF Mining, Plant P Crusher, Haul Road KAP (Kapstevél), Ploegfontein, Kapstevél and Plant Railway Line units
- 2014 – Haul Road KAP, LWF Single and Plant P Crusher units

From the results of the monitoring campaign, it can be seen that dustfall at the following off site dust bucket locations are non-compliant with the NDCR for residential areas (exceed 600 mg/m²/day);

- 2011 – BP Bredenkamp, Olynfontein, Soetfontein 1 & 2 and Klipbanksfontein units
- 2012 – All of the dust buckets exceed 600 mg/m²/day from August – December 2012
- 2013 – All of the dust buckets exceed 600 mg/m²/day from June – December 2013
- 2014 – All of the dust buckets exceed 600 mg/m²/day in both January and February 2014.

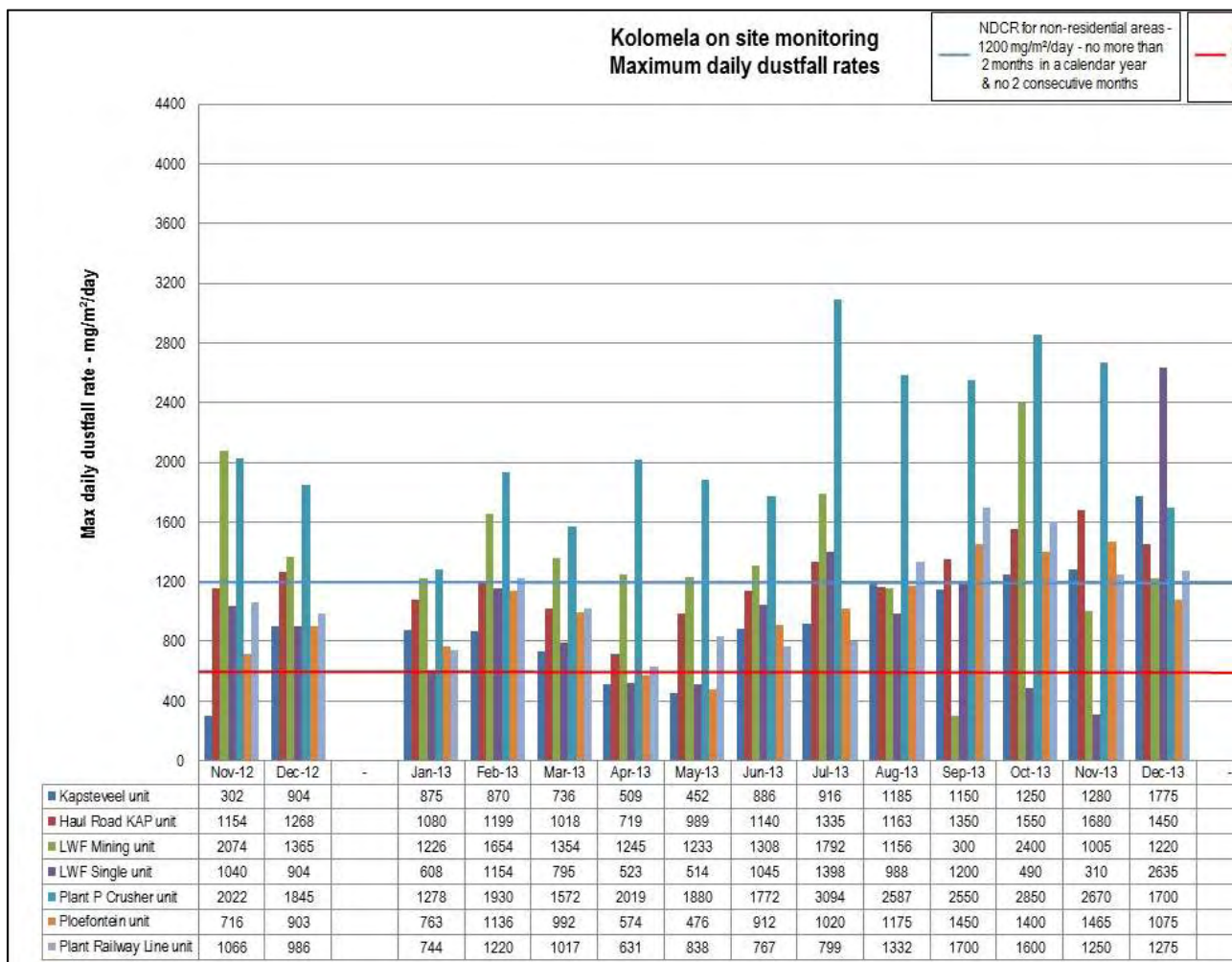
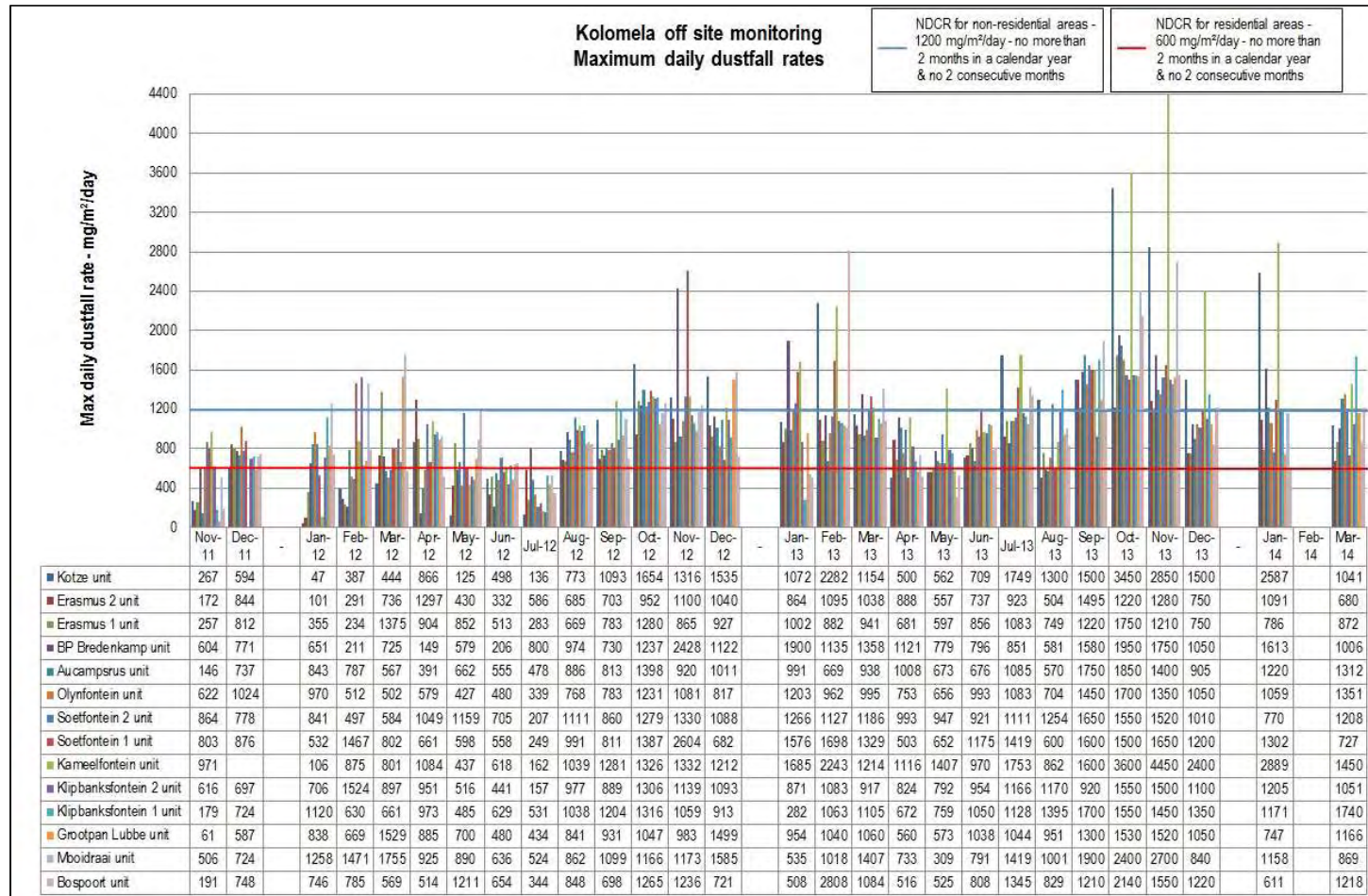


FIGURE 7.14: RESULTS OF THE SGS DUSTFALL MONITORING CAMPAIGN – ON-SITE DUST F



Source: Airshed (2015)

FIGURE 7.15: RESULTS OF THE SGS DUSTFALL MONITORING CAMPAIGN – OFF-SITE DUST BUCKETS

7.1.10 NOISE

A specialist Noise Impact Assessment was undertaken in support of the EIA (Airshed, 2015). A summary of the baseline noise environment as described by Airshed is provided below. For more information the reader is referred to the specialist report included as Part C – Report F.

A noise sampling campaign was conducted by Airshed Planning Professionals in June 2014. The survey was conducted in accordance with the guidelines as set out in SANS 10103 (2008). The survey consisted of attended 20 minute samples during the day and night (see Table 7.8) and four 24 hour samples (see Table 7.9). The locations of the noise monitoring points is provided in Figure 7.19.

The main findings of the survey are summarised below:

- Ambient noise levels are affected by traffic, farming (animals and farming equipment) and mining activities at Beeshoek Mine and Kolomela Mine.
- Mining activities at Kolomela are audible at receptors to the east and south, especially at night.
- Traffic along the gravel road that runs east of Kolomela Mine add notably to levels samples at receptors located along the road.
- Levels in exceedance of the IFC guidelines of 55 dBA during the day and 45 dBA during the night for areas of residence were recorded at Welgevonden (day and night), Soetfontein (day), Kameelfontein (day and night), Olynfontein (day), Leeuwfontein (day), Kappieskareeboom (day) and Klipbankfontein (day). Time series analysis indicated that exceedances are solely as result of traffic.
- Kolomela Mine is audible over longer distances at night.

In the estimation of baseline noise levels, where the baseline refers to noise levels in the area without any mining activities, reference was made to the 2003, 2005, 2010 and 2014 noise measurement data sets. A comparative summary of day- and night time noise levels sampled between 2003 and 2014 is given in Table 7.10.

To account for traffic noise along the R383 and R385 which form part of the baseline acoustic climate, use was made of traffic data reported by Jeffares and Green (Jeffares & Green, 2014) for 2015 and 2024. Traffic noise calculated using SANS 10210 (2008) was superimposed onto the levels reported above to obtain spatially representative baseline conditions. Note that traffic on these roads as a result of Kolomela operations specifically was not included in the determination of the baseline acoustic climate.

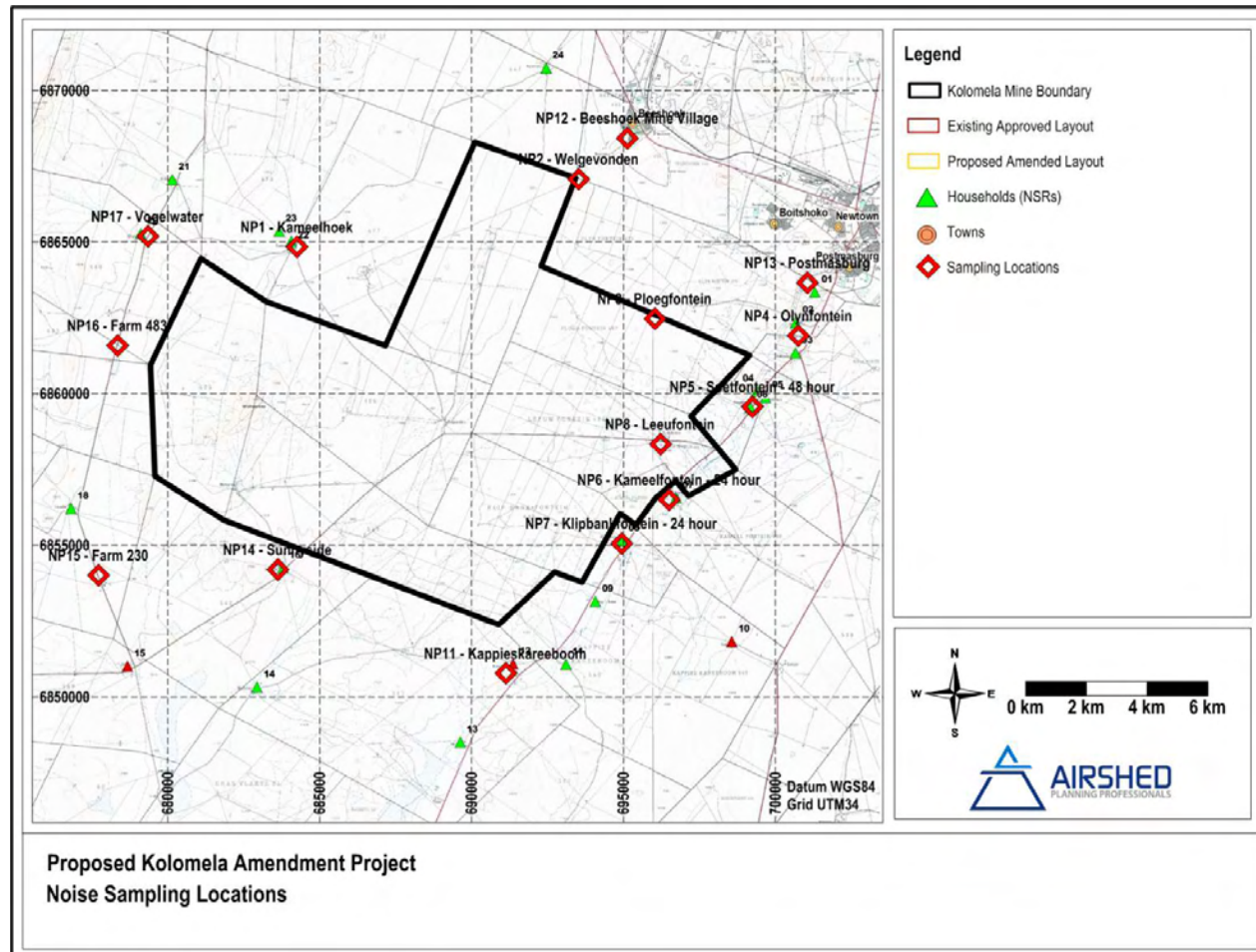


FIGURE 7.16: NOISE SAMPLING LOCATIONS

Source: Airshed (2015)

TABLE 7.8: SUMMARY OF ATTENDED 20 MINUTE SURVEY CONDUCTED BETWEEN 10 AND 12 JUNE 2014

Location	Attended 20 minute day-time samples					Attended 20 minute night-time samples				
	Date	Observations	Results			Date	Observations	Results		
			L _A eq (dBA)	L _A eq (dBA)	L _{A90} (dBA)			L _A eq (dBA)	L _A eq (dBA)	L _{A90} (dBA)
NP01 (Kameelhoek)	10/06/2014	Farm animals, farming activities, wind	37.0	30.2	21.3	10/06/2014	Mining, insects	37.9	26.8	21.3
NP02 (On-site, Welgevonden)	11/06/2014	Heavy vehicle traffic	66.3	63.0	22.4	11/06/2014	Traffic, railway	54.7	51.7	21.7
NP04 (Olynfontein)	11/06/2014	Traffic, farm animals, farming activities, wind	63.8	60.1	30.0	11/06/2014	Mining, possibly Beeshoek.	32.0	29.9	28.5
NP05 (Soetfontein)	12/06/2014	Significant traffic, blasting at Kolomela	56.6	53.0	23.1	12/06/2014	Mining audible, trucks, reverse warnings, waste rock handling etc.	37.9	36.3	33.5
NP06 (Kameelfontein)	12/06/2014	Traffic, mining	56.0	51.6	28.9	12/06/2014	Mining clearly audible including rumbling, trucks, reverse warnings, waste rock handling etc.	47.2	45.9	44.6
NP07 (Klipbankfontein)	12/06/2014	Mining (blast warning, trucks, reverse warnings), traffic	64.6	60.5	38.7	12/06/2014	Mining clearly audible, interference from farm workers, farm workers shouting.	51.9	49.9	40.6
NP08 (On-site, Leeufontein)	12/06/2014	Traffic and mining noise as rumble	59.8	55.9	26.3	12/06/2014	Mining clearly audible including rumbling, trucks, reverse warnings, waste rock handling etc.	42.0	40.4	38.0
NP11 (Kappieskareboom)	12/06/2014	Farm animals, mining i.e. reverse warnings	58.0	53.9	26.7	12/06/2014	Distant rumbling of mining activities.	27.5	23.6	21.4
NP12 (Beeshoek Mine Village)	11/06/2014	Public road traffic, barking dogs, community noise, Beeshoek mine	38.7	35.2	32.0	11/06/2014	Mining and Beeshoek facility clearly audible	36.4	35.2	32.5
NP13 (Postmasburg)	11/06/2014	Town traffic, chickens and barking dogs, community noise	33.5	30.4	23.7	11/06/2014	Barking dogs and very faint mining noise, possibly Beeshoek	41.6	37.6	34.9
NP14 (Sunnyside)	10/06/2014 13:40	Very quiet, mining activities faintly audible specifically reverse warnings.	49.4	43.9	23.6	10/06/2014	Vehicle door, quiet, mining activities i.e. trucks, off-loading.	36.0	30.3	19.3
NP15 (Farm 230)	10/06/2014	Very quiet with wind gusts. Faint rumbling of mining activities.	35.1	28.3	19.2	10/06/2014	Quiet, mining activities slightly more audible when wind changes direction.	29.6	23.2	17.4

Location	Attended 20 minute day-time samples					Attended 20 minute night-time samples				
	Date	Observations	Results			Date	Observations	Results		
			L _{Aeq} (dBA)	L _{Aeq} (dBA)	L _{A90} (dBA)			L _{Aeq} (dBA)	L _{Aeq} (dBA)	L _{A90} (dBA)
NP16 (Farm 483)	10/06/2014 12:38	Quiet, one passing motorcycle and gate	36.8	30.4	17.9	10/06/2014	Quiet, faint rumbling of mining activities	30.5	28.5	25.9
NP17 (Vogelwater)	10/06/2014 11:43	Barking dogs and farm animals, wind gusts	37.7	30.3	19.1	10/06/2014	Very quiet and cold	30.3	20.1	16.5

Source: Airshed (2015)

TABLE 7.9: SUMMARY OF UNATTENDED 24 HOUR SURVEY CONDUCTED BETWEEN 9 AND 12 JUNE 2014

Location	Unattended 24 hour day-time samples				
	Date	Observations	Results		
			L _{Aeq} (dBA)	L _{Aeq} (dBA)	L _{A90} (dBA)
NP05 (Soetfontein)	09/06/2014	Unattended, no observations	Not recorded ^(a)	39.8	34.6
NP05 (Soetfontein)	10/06/2014	Unattended, no observations	Not recorded ^(a)	39.6	34.6
NP06 (Kameelfontein)	11/06/2014	Unattended, no observations	Not recorded ^(a)	45.1	41.7
NP07 (Klipbankfontein)	12/06/2014	Unattended, no observations	Not recorded ^(a)	44.3	41.8

Source: Airshed (2015)

Notes:

(a) Equipment limitation, equivalent day and night-time rating levels estimated L_{Aeq} calculated by assuming impulsiveness recorded during 20 minute samples.**TABLE 7.10: SUMMARY OF SAMPLING CAMPAIGN RESULTS FROM 2003 TO 2014**

Measurement Point	Associated Household/NSR No.	Day-time A-Weighted Equivalent Rating Levels (dBA)				Night-time A-Weighted Equivalent Rating Levels (dBA)			
		2014 Survey ^(a)	2010 Survey ^(b)	2005 Survey ^(c)	2003 Survey ^(d)	2014 Survey ^(a)	2010 Survey ^(b)	2005 Survey ^(c)	2003 Survey ^(d)
NP01 (Kameelhoek)	22	37.0	39.7	not included	35.4	26.4	30.4	not included	30
NP02 (On-site, Welgevonden)	-	66.3	40.3	not included	35.6	54.7	26.6	not included	35
NP03 (On-site, Ploegfontein)	-	not included	40.5	not included	38.8	not included	23.7	not included	38
NP04 (Olyfontein)	2	63.8	35.2	42.4	39	32.0	50	43.7	23.8

Measurement Point	Associated Household/NSR No.	Day-time A-Weighted Equivalent Rating Levels (dBA)				Night-time A-Weighted Equivalent Rating Levels (dBA)			
		2014 Survey ^(a)	2010 Survey ^(b)	2005 Survey ^(c)	2003 Survey ^(d)	2014 Survey ^(a)	2010 Survey ^(b)	2005 Survey ^(c)	2003 Survey ^(d)
NP05 (Soetfontein)	4	56.6 46.2 and 45.0 ^(e)	61.4	47.1	35.6	37.9 35.1 and 40.2 ^(e)	32	46.9	36.6
NP06 (Kameelfontein)	7	56.0 45.6 ^(e)	42.6	46.2	26	47.2 46.4 ^(e)	37.6	43.1	32
NP07 (Klipbankfontein)	8	64.6 45.7 ^(e)	45.4	42.9	28	43.5 47.0 ^(e)	23.5	44.9	31.7
NP08 (On-site, Leeufontein)	-	59.8	44.1	not included	32.6	42.0	35.2	not included	33
NP09 (On-site, Geology Centre)	-	not included	41.2	not included	39	not included	29.4	not included	32.2
NP10 (On-site, Wolhaarkop/Kapsteviel)	-	not included	36.9	not included	32	not included	21.6	not included	29
NP11 (Kappieskareeboom)	12	58.0	42.1	42.4	33	25.3	36.2	40.2	30.7
NP12 (Beeshoek Mine Village)	-	38.6	36	58.9	38.3	36.4	37	46.2	47.2
NP13 (Postmasburg)	1	33.5	39.3	not included	37.6	41.6	33.6	not included	35
NP14 (Sunnyside)	16	33.9	40.2	42.1	not included	31.6	28	not included	not included
NP15 (Farm 230)	-	35.1	29.1	not included	not included	26.6	37.5	not included	not included
NP16 (Farm 483)	-	36.8	24.6	not included	not included	30.5	34.2	not included	not included
NP17 (Vogelwater)	20	36.2	24.1	not included	not included	22.9	27.7	not included	not included

Source: Airshed (2015)

Notes:

- (a) 2014 survey by Airshed
- (b) 2010 survey by Airshed
- (c) 2005 survey by Jongens Keet Associates
- (d) 2003 survey by Africon Engineering International (Pty) Ltd
- (e) Calculated from 24 hour measurement

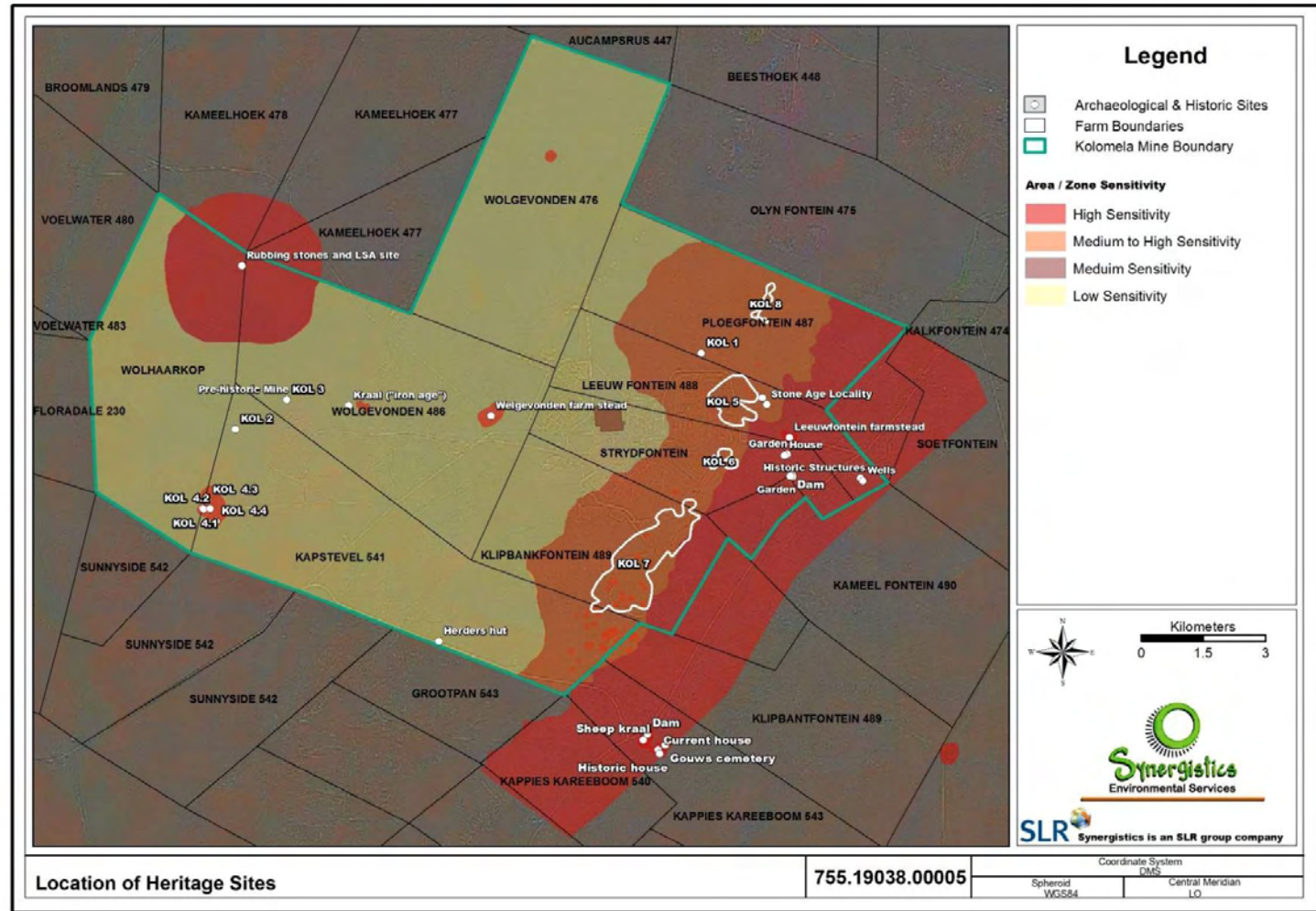
7.1.11 HERITAGE

PGS Heritage & Grave Relocation Consultants was appointed to undertake a Heritage Impact Assessment for the proposed Kolomela Mine Amendment. With the exception of a farm worker cemetery the heritage resources included in this report are based on information obtained from several previous heritage and archaeological impact assessment reports (Morris, 2005; African Heritage Consultants, 2011; Miller, 2011; van der Ryst, 2011). The description of heritage resources has been extracted from the Heritage Impact Assessment (PGS, 2015). The full Heritage Impact Assessment Report is included in Part C – Report E.

Eight heritage sites were identified within the footprint areas of the Kolomela Amendment inside the mining right area. No heritage sites were identified within the area proposed for the Aquifer Recharge on the Farms Floradale 230 & 484.

Previous heritage reports pointed to the fact that although the south-eastern part of the Kolomela Mine property consists of mainly calcrete-capped plains, numerous small shallow pans (of 100 to 200 m in diameter) as well as a couple of larger pans were all identified in this area. During the reassessment of heritage resources (van der Ryst, 2011), the patterning observance by Morris (2005) of a generally dispersed scatter of stone tools across the landscape, but with a major focus on the utilisation of raw materials used in the manufacture of stone tools and also the available plant and water resources provided by the numerous small pans settings, was substantiated. PGS (2015) has described groupings of these pans as having heritage significance (see Table 7.7).



A description of the eight heritage sites including the significance of such sites is provided in Table 7.11. The location the heritage sites are shown Figure 7.20.





Source: PGS (2015)



FIGURE 7.17: LOCATION OF HERITAGE SITES

TABLE 7.11: HERITAGE SITES

Site	Description	Significance	Plates
KOL 1	<p>This site is one of a number of shallow pans located on the farms Leeuwfontein and Ploegfontein. As indicated elsewhere, these pans are all roughly 100 to 200 m in diameter. During previous field surveys, a surface density of stone artefacts of up to 15 artefacts/m² could be identified. The stone artefacts are mainly of Middle Stone Age typology. During the heritage impact assessment undertaken by Van der Ryst in 2011, this pan yielded a representative collection of Middle Stone Age (MSA) and Late Stone Age (LSA) stone tool types, and also a few ceramic shards.</p>	<p>Both Morris (2005) and van der Ryst (2011) previously assigned Low-Medium Significance to this site in view of the relative densities of the lithics. In view of the presence of ceramics, it is recommended that Phase 2 mitigation in the form of archaeological sampling takes place here. This mitigation must be completed before the proposed amendment to the Kolomela Mine destroys the site.</p>	 <p>PLATE 7.4: CORES IDENTIFIED AT KOL 1</p>
KOL 2	<p>KOL 2 is a Stone Age site that was identified by Morris (2005) on the Remainder of the farm Kapstevél. The site comprises a scatter of possibly LSA artefacts observed on a colluvial fan in one of the valleys. The surface density of the site was assessed to be perhaps 3 or 4 artefacts per m². Van der Ryst's later survey (2011) confirmed that on the plains section of the study area mainly isolated specimens or dispersed clusters of stone tools were observed to be present.</p>	<p>Morris did not provide an assessment of significance of this site. Van der Ryst (2011) provided a general significance assessment for the low-density or isolated occurrences of stone tools on the plains. The areas were assessed to be of Low Significance.</p>	 <p>PLATE 7.5: MSA TOOLS FROM KOL 2</p>

Site	Description	Significance	Plates
KOL 3	<p>The site is situated within the prospecting area of an open-cast pit. The area surrounding the workings has been heavily prospected during the current mining activities. The open-mine workings of haematite consist of a narrow trench with two stopes on the highest section. It is similar to ancient open mining technologies that resulted in a narrow deep trench (Küsel, 1979) and was suited to rocks that dip steeply or are vertical (Hammer et al, 2000:51). The mine workings drain towards the east. It has been estimated that 3 000 to 4 000 tons of haematite ore could have been removed. The backfilling of the excavation obscures details such as possible tunnels (van der Ryst, 2011). Information provided by the last owner indicated that some groups worked two small outcrops of specularite during the twentieth century (Van der Ryst, 2011).</p>	<p>The recent assessment concurs with previous recommendations (African Heritage Consultants, 2011; van der Ryst, 2011). It is the only known historic mine on the Kolomela Mine and significantly larger than some of the other historic mines recorded in areas such as Daniëlskuil. The site is of High Significance. The open-air mine is an important feature that documents the history of mining and ore extraction within the study area as well as within the broader region.</p>	 <p>PLATE 7.6: VIEW ALONG THE OPEN EXCAVATION REPRESENTING THE HISTORIC MINE</p>
KOL 4	<p>A historical farmstead is situated on the farm Kapstevél. It comprises a farmyard containing several structures; together with associated landscape features; and two cemeteries. The site has been divided into four sub-categories described below to facilitate significance and mitigation requirements.</p>		

Site	Description	Significance	Plates
KOL 4.1	<p>The farmyard comprises a main dwelling, a wagon shed, kitchen with bakery extension, a school, a power generation shed, a cold room and various early 20th century farming tools. The original dwelling, barn and outer kitchen were built at the beginning of the 20th century. During the 1920s the main house was extended and it would appear that the school was added at this time. It is likely that the final alterations were made during the 1960s. Finally the whole site was refurbished for the occupation of the farm manager of the Kolomela mining operations, possibly during the late 1990s or early twenty-first century.</p>	<p>As it comprises structures older than 60 years, the farmyard enjoys general protection under the provision of Section 34 (1) of the National Heritage Resources Act, Act 25 of 1999. Furthermore, sections of the farmyard are also believed to be older than 100 years and as a result these buildings are defined as archaeological sites and as such are protected by Section 35 (4) of the same Act.</p> <p>Besides, the site is not only older than 60 years but represents a complete time capsule of a century of farming lifestyle in the Northern Cape. All elements of the site are well preserved, and collectively it qualifies to be declared as a provincial heritage site (African Heritage Consultants, 2011).</p>	 <p>PLATE 7.7: HISTORIC FARMHOUSE AT KOL 4.1.</p>
KOL 4.2	<p>A cemetery of the Bredenkamp family is located roughly 160 m east of the farmyard. The graves are divided into parallel rows and are all covered by formal dressings and all have inscribed headstones. The cemetery comprises the graves of 12 members of the Bredenkamp family. One of the oldest graves in the cemetery dates to 1893. Many of the graves from the cemetery are older than 60 years and some older than 100 years. As a result these graves are protected by Section 36 of the National Heritage Resources Act. The cemetery is associated with the Bredenkamp family who have lived on the Kapstevl farm for over 100 years and four generations (Miller, 2011).</p>	<p>All graves are automatically assigned a High Significance as they are protected by general legislation regarding human remains, as well as the National Heritage Resources Act. This High significance is emphasised by the fact that the cemetery is associated with the historical owners of the farm as well as the fact that graves inherently have high levels of emotional, historic, religious and scientific value.</p>	 <p>PLATE 7.8: GENERAL VIEW OF THE CEMETERY OF THE BREDEKAMP FAMILY AT KOL 4.2.</p>

Site	Description	Significance	Plates
KOL 4.3	The main landscape features associated with the farmyard are situated to the north-east of the dwelling and comprise two generations of valley dams that are typical of water storage in this region, together with associated irrigation fields. The farm road that used to be the communication link from Postmasburg over Leeufontein and Welgevonden also runs through the farmyard.	The significance of these features is related to the fact that they form part of a larger overall farmstead complex, the individual components of which have been retained from the nineteenth century to the present day. The significance is assessed as being Medium-High .	 <p>PLATE 7.9: GOOGLE EARTH IMAGE DEPICTING THE CONTEXT BETWEEN KAPSTEVEL FARMSTEAD AS WELL AS THE DAMS AND IRRIGATION STRUCTURES.</p>
KOL 4.4	A cemetery which can be associated with nearby farm worker accommodation was identified south-east of the farmyard. It is not fenced and consists of approximately 30 graves. The graves are placed in three unequal rows and all the graves are orientated from west to east. Most of the graves have elongated mounds of soil and packed rocks as grave dressings, with some of the graves only containing a single rock at the western end to indicate the grave position. The cemetery covers an area of approximately 10m x 25m in extent.	All graves are automatically assigned a High significance as they are protected by general legislation regarding human remains, as well as the National Heritage Resources Act. This High Significance is emphasised by the fact that the cemetery is associated with the historical farm workers on the farm and also because all graves inherently have high levels of emotional, historic, religious and scientific value.	 <p>PLATE 7.10: GENERAL VIEW OF CEMETRY AT KOL 4.4.</p>
KOL 5	The Heritage Management Plan compiled for the Kolomela Mine (African Heritage Consultants, 2011), a total of 165 small pans were identified along the eastern end of the mine property. A	These pans can be assumed to have similar significance to that noted by both Morris (2005) and van der Ryst (2011) for the pans that were investigated during the fieldwork for their	

Site	Description	Significance	Plates
	<p>cluster of 19 of these pans identified in 2011 will be impacted upon by the development of the Leeuwfontein North Waste Rock Dump. A comparison of the Google Earth images for the period between 2011 and the present day has indicated that seven of these 19 small pans have been destroyed by mining activities undertaken between 7 October 2013 and 2 December 2014. This means that 12 small pans remain here. These 12 pans represent the site known for the purposes of this report as KOL 5. The reports by both Morris (2005) and van der Ryst (2011) identified such pan sites as likely to have concentrations of Stone Age lithic material, with some also having ceramic material.</p>	<p>respective reports. All of these pan localities are assigned a Low to Medium Significance. Therefore, Phase 2 mitigation (sampling) of a significant number of these pans is proposed before they are destroyed by mining activities.</p>	
KOL 6	<p>In the Heritage Management Plan compiled for the Kolomela Mine (African Heritage Consultants, 2011), a total of 165 small pans were identified along the eastern end of the mine property. A cluster of six of these pans identified in 2011 will also be impacted upon by the development of the Leeuwfontein North Waste Rock Dump. A comparison of the Google Earth images for the period between 2011 and the present day has indicated that five of these six small pans had been destroyed by mining activities undertaken between 7 October 2013 and 2 December 2014. This means that a single small pan remains here. For the purposes of the report this pan is labelled KOL 6.</p> <p>Both Morris (2005) and van der Ryst (2011) identified such pan sites as likely to have concentrations of Stone Age lithic material</p>	<p>The pan can be assumed to have similar significance to that noted by Morris (2005) and van der Ryst (2011) who investigated the locality during the fieldwork for their respective reports. The pan is believed to be of Low to Medium Significance. Therefore, Phase 2 mitigation (sampling) of a significant number of these pans is proposed before they are destroyed by mining activities.</p>	

Site	Description	Significance	Plates
	and sometimes with ceramics as well.		
KOL 7	<p>In the Heritage Management Plan compiled for the Kolomela Mine (African Heritage Consultants, 2011), a total of 165 small pans were identified along the eastern end of the mine property. A cluster of 44 of these pans identified in 2011 will also be impacted upon by the development of the LFS Waste Rock Dump. A comparison of the Google Earth images for the period between 2011 and the present day has indicated that 17 of these 44 small pans had been destroyed by mining activities undertaken between 7 October 2013 and 2 December 2014. This means that 27 small pan remains here. These 27 pans represent the site known for the purposes of this report as KOL 7.</p> <p>Both Morris (2005) and van der Ryst (2011) identified such pan sites as likely to have concentrations of Stone Age lithics with ceramic fragments noted at several of these pan localities.</p>	<p>The pans can be assumed to have similar significance to that noted by both Morris (2005) and van der Ryst (2011) for the purposes of this report for the pans that were investigated during the fieldwork for their respective reports. The pans are believed to be of Low to Medium Significance. Therefore, Phase 2 mitigation (sampling) of a significant number of these pans is proposed before they are destroyed by mining activities.</p>	
KOL 8	<p>In the Heritage Management Plan compiled for the Kolomela Mine (African Heritage Consultants, 2011), a total of 165 small pans were identified along the eastern end of the mine property. A cluster of four of these pans identified in 2011 will also be impacted upon by the development of the Ploegfontein Pits. These four pans represent the site known for the purposes of this report as KOL 8.</p> <p>Both Morris (2005) and van der Ryst (2011) identified such pan</p>	<p>The pans can be assumed to have similar significance to that noted by both Morris (2005) and van der Ryst (2011), for the pans that were investigated during the fieldwork for their respective reports. The pans are believed to be of Low to Medium Significance. Therefore, Phase 2 mitigation (sampling) of a significant number of these pans is proposed before they are destroyed by mining activities.</p>	

Site	Description	Significance	Plates
	sites as likely to have concentrations of Stone Age lithic material, and sometimes with ceramics as well.		

7.1.12 SOCIAL ENVIRONMENT

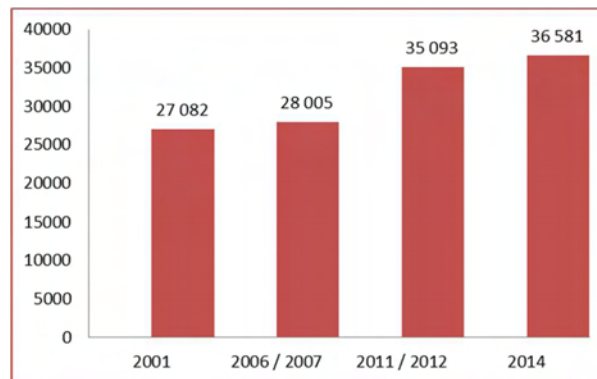
The baseline description of the social environment has been extracted from the specialist Social Impact Assessment (SIA) undertaken by G3 Business Solutions (Pty) Ltd (2015). The SIA is included as Part C – Report H. Demacon Market Studies have undertaken a specialist assessment of the economic impact of the proposed amendment to Kolomela Mine (Demacon, 2015). See Part C – Report N for the Economic Impact Assessment.

Kolomela Mine is situated in the Tsantsabane Local Municipality, within the ZF Mgcawu District Municipality. The social and demographic profile of the community therefore focuses on communities and residents within the Tsantsabane area and is aimed at providing an overview of the “as is” situation (as a baseline), as well as to indicate trends between 2001 and 2014 which demonstrates the social impact of the mine since its arrival.

7.1.12.1 Population Size

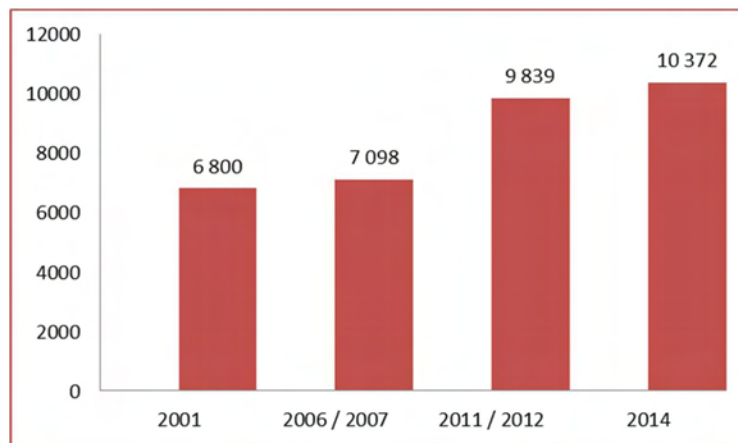
Postmasburg as the economical centre of the municipality, was known as a typical small rural town with a population growing only marginally over time. From 1996 to 2001 the annual population growth rate in the Tsantsabane municipal area was only 0.38%. However, the picture changed significantly between 2001 and 2011 with Census results indicating an annual population growth rate of seven times higher than during the preceding Census period, at 2.59%. The population increased by almost 30% from 2001 to 2011.

Figure 7.8 indicates a notable population growth spurt between 2006/7 and 2011/12 when Kolomela Mine was under construction. Between 2011/12 and 2014 population growth has stabilised somewhat, after Kolomela went from the construction phase to full production – but as a result of various other mining developments in and around the municipal area, the population continues to grow at a higher pace than before Kolomela’s arrival. As indicated in Figure 7.19 the population growth has resulted in 3 572 more households living in Tsantsabane in 2014 than in 2001.



Source: G3 Business Solutions (2015)

FIGURE 7.18: POPULATION GROWTH IN TSANTSABANE MUNICIPAL AREA



Source: G3 Business Solutions (2015)

FIGURE 7.19: GROWTH IN THE NUMBER OF HOUSEHOLDS IN THE TSANTSABANE MUNICIPAL AREA

7.1.12.2 Housing

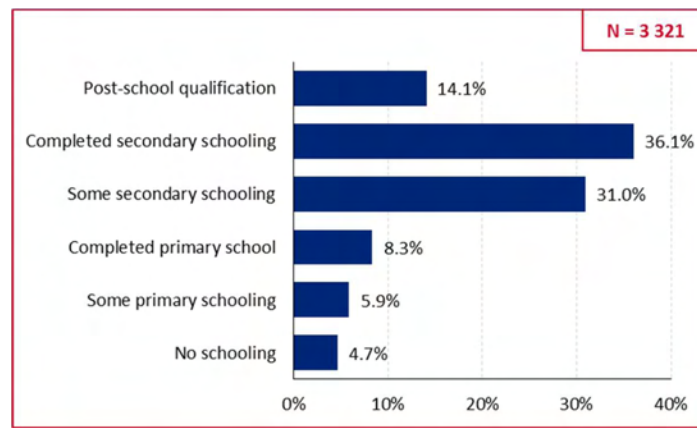
Between 2001 and 2011 there was a marked increase in the percentage of households living in informal dwellings in the Tsantsabane municipal area, from 14.8% in 2001 to 25.8% in 2011. This increase can likely be attributed to an influx of construction workers and job seekers during the mine's construction phase (and possibly to an extent also to Beeshoek mine's construction of a JIG plant which commenced in 2001).

The percentage of households living in informal dwellings dipped between 2011 and 2014 which coincides with the completion of the construction of Kolomela Mine in 2011. During this time pressure on housing availability was alleviated by the departure of contractor employees involved in Kolomela's construction and also by Kolomela Mine building 718 houses for employees in and around Postmasburg.

Despite an overall picture of improvement, an influx of people into the area continued and mostly concentrated in Newtown where 50% of households were living in informal dwellings in 2014. The increased population in Tsantsabane have resulted in a shortage of housing, but more specifically, a shortage of *affordable, proper* housing for lower and medium income households.

7.1.12.3 Education Levels

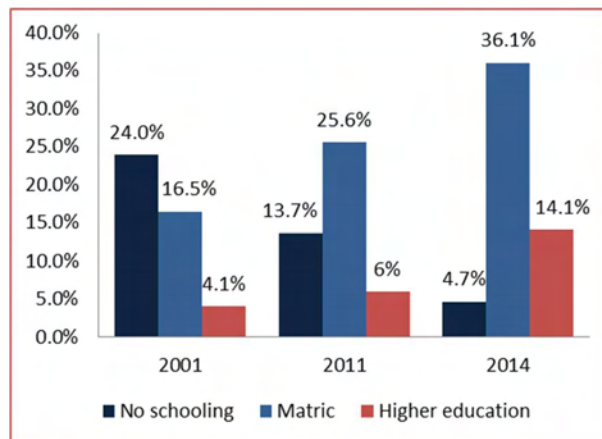
Education levels in Tsantsabane are low, with only 36% of adults who have completed matric, and a further 14.1% who have completed matric and have a post school qualification (total with matric = 50%). There is a notable disparity in education levels across the different sub-areas in Tsantsabane area. Residents in Postmasburg have the highest education level, compared to much lower levels in rural areas such as Groenwater, Jen Haven, and Skeyfontein. Compared to Postmasburg, significantly fewer adults in Boichoko, Newtown and Postdene have passed matric.



Source: G3 Business Solutions (2015)

FIGURE 7.20: EDUCATION LEVELS OF ADULTS IN TSANTSABANE MUNICIPAL AREA

Figure 7.21 illustrates that education levels in the Tsantsabane area have been improving over time. The improvement can be attributed partly to the need for scarce skills and subsequent importing of skills by Kolomela Mine and other mines, and possibly also to mining companies' investment in, and support of local schools.



Source: G3 Business Solutions (2015)

FIGURE 7.21: CHANGE IN EDUCATION LEVELS IN TSANTSABANE MUNICIPAL AREA WITH TIME

7.1.12.4 Schools

There are 18 early childhood development (ECD) centres in the Tsantsabane municipal area. Over the past three years Kolomela Mine focused its educational support programmes on enhancing access to ECD centres and Grade R facilities. The mine has built two ECD centres in Skeyfontein, a remote community who previously had no access to pre-school facilities. To enhance the quality of education at ECD centres the mine supported 23 ECD practitioners from various ECD centres in the municipal area, to obtain NQF Level 4 diplomas in early childhood development. The mine has also funded two Grade R facilities – at Asmandia Primary School in Postdene, and at Assmang Primary School in Newtown, each with an intake of 60 learners. Despite the support from Kolomela and other mines in the area, most ECD centres still have poor infrastructure and require support

with infrastructure maintenance and upgrades.

There are nine primary schools and three secondary schools in the Tsantsabane municipal area. The number of primary school learners spread over nine primary schools, indicates that pressure on the capacity of the three secondary schools will only intensify in the next few years. The influx of predominantly younger people into the area manifests in overcrowding at primary schools, which will become an issue for secondary schools in the next 3 – 5 years.

The overall matric pass rate was 79.2% in 2014 which means that, over and above those learners who dropped out of school before reaching Grade 12, another 50 learners finished school without matriculating in 2014, with no prospect of post school studies and little chance to find employment. As a result of the mining and renewable energy developments in the region, current and future employment opportunities will increasingly require either Grade 12 with maths and science, or post school qualifications in engineering or other technical areas.

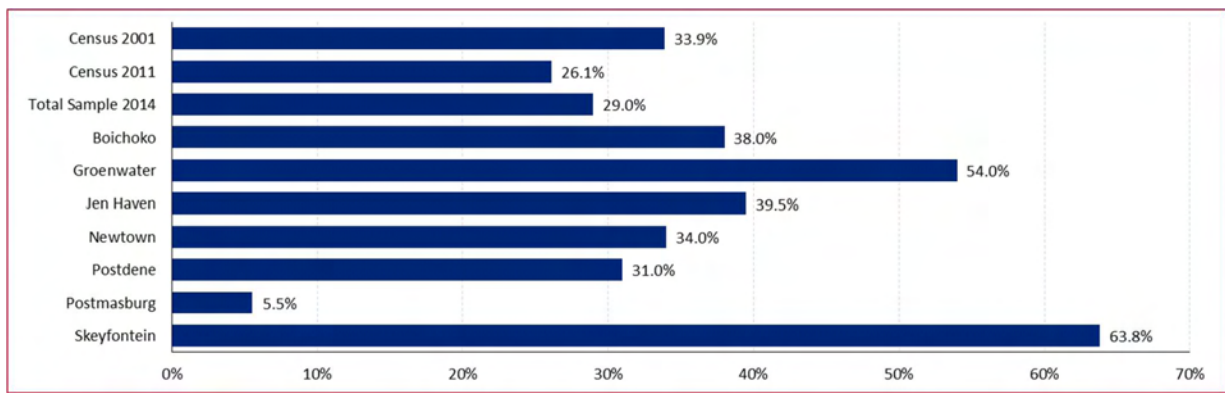
Kolomela Mine's skills training centre is the only post school training centre in and around Postmasburg. The closest alternatives are in Kathu or Kuruman where there are satellite campuses of the Northern Cape Rural Further Education Training College. In Kathu, Sishen Mine has also established the Tshipi skills training centre, as well as SIVOS, an artisan and apprentice training and testing centre. The closest university is Sol Plaatje University in Kimberley – which is still ramping up its available courses and does not yet offer a degree in engineering. Given the socio-economic conditions in the Tsantsabane municipal area, many parents cannot afford to send their children to training or educational institutions elsewhere.

7.1.12.5 Employment

The impact of Kolomela Mine's arrival can clearly be seen in the significant drop of the unemployment rate in the Tsantsabane area between 2001 and 2011 (see Figure 7.22). Postmasburg is the most privileged sub-area in terms of socio-economic benefit from employment, while remote areas such as Groenwater, Skeyfontein and Jen Haven have significantly higher levels of unemployment.

The 2011 unemployment rate of 26.1% can be associated with the peak of the construction phase of Kolomela Mine. The area experienced the typical boom-bust effect when construction ended, as illustrated by the subsequent increase in unemployment to 29% in 2014.

The increase in the unemployment rate can be ascribed to a combination of factors – firstly, the end of the construction period in 2011, with a significant number of contractor employees losing their jobs, as well as an adverse effect on induced employment in the area. Secondly, the influx of job seekers to the area, especially among the youth, has also contributed to a higher unemployment rate.

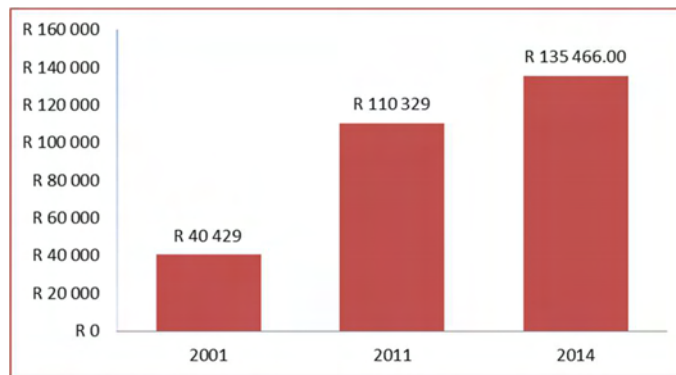


Source: G3 Business Solutions (2015)

FIGURE 7.22: CHANGE IN UNEMPLOYMENT RATE PER AREA WITHIN THE TSANTSABANE MUNICIPAL AREA

The economic benefits associated with the construction phase of Kolomela Mine brought hope to the unemployed youth between 2001 and 2011 – with a notable decrease in youth unemployment (43% to 32%). But the situation deteriorated significantly after Kolomela Mine moved on to full operational phase. The youth unemployment rate in 2014 is even worse than in 2001, at 46%. This is despite all the other mining companies arriving in the area in the recent past. The increase in youth unemployment can also be attributed to the influx of young people from other areas in the Northern Cape in search for employment and a better life. The pressure on Kolomela Mine to employ locals is increased by the presence of these youngsters who are not regarded as “true locals” by longstanding residents of the Tsantsabane municipal area.

The average annual household income improved significantly since 2001. It seems that those who have been employed have benefited from economic growth in the area, while the proportion of the population unable to find employment, has grown, especially among the youth.



Source: G3 Business Solutions (2015)

FIGURE 7.23: AVERAGE ANNUAL HOUSEHOLD INCOME

7.1.12.6 Services

There are significant inequalities in service delivery to different sub-areas. Postmasburg residents have the best access to basic services, with close to 100% of households fully serviced by the local municipality. In contrast, rural areas such as Skeyfontein and Groenwater have very limited access to basic services. Boichoko and Postdene also lag behind Postmasburg in service delivery. Newtown, with its high proportion of informal dwellings, has poor access to service delivery. A significant percentage of the households in Newtown who

indicated access to electricity, may possibly make use of illegal connections.

7.1.12.7 Health Care Facilities

Public healthcare facilities in the Tsantsabane municipal area are limited in number and capacity and have increased in capacity to coincide with the population growth experienced since 2008. In 2014, the following public healthcare facilities were available in the Tsantsabane municipal area:

- Postmasburg District Hospital
- Primary healthcare clinics
- Two mobile clinic units, intermittently serving remote communities

Private healthcare facilities are limited to the following:

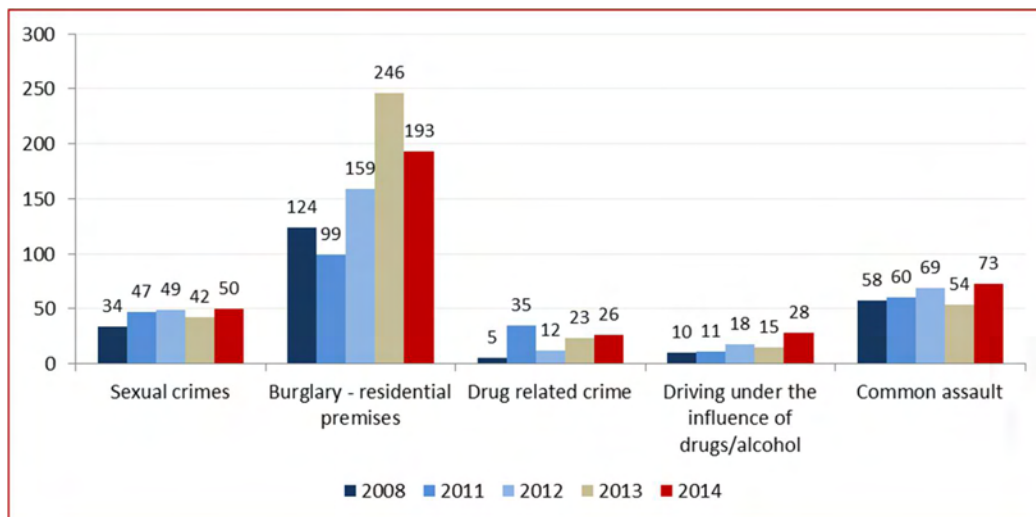
- Four medical doctors
- UGM Wellness clinic at Kolomela Mine – only serving mine employees and contractor employees
- Life Clinic at Kolomela Mine and in Postmasburg – specialising in occupational health
- Netcare 911 Emergency response with one ambulance at the Kolomela Mine site which is also available for community members, free of charge

The closest provincial hospital is situated in Kuruman, however, this hospital was temporarily closed down early in 2015 due to its poor state and mismanagement. The closest alternative is in Upington, 215 km away from Postmasburg.

During stakeholder consultation as part of this social impact assessment, public healthcare officials explained that attracting and retaining professional healthcare staff was one of their key challenges. This was mostly due to the cost of accommodation suitable for professional staff, in Postmasburg. Kolomela Mine has responded to this challenge by funding the construction of nurses' accommodation in the form of four family units of two bedrooms each – currently under construction. There are also negotiations between Kolomela Mine and the Department of Health to expand the Postmasburg District Hospital from its current 45 beds, to 69 beds with various upgrades to existing facilities at the hospital.

7.1.12.8 Crime

Crime is one of the social ills on the rise in the area, as illustrated in Graph 30. There has been a steady increase in crimes reported since 2008, more specifically burglaries on residential properties, sexual crimes, drug related crimes, driving under the influence, and common assault (see Figure 7.23). During stakeholder consultation, the Postmasburg Station Commander indicated that the local police station is under-resourced and cannot effectively deal with the increase in crime. Collaboration between the SAPS and local mines has been formalised with the formation of a Mining Crime Combating Forum (MCCF), which is functioning effectively and has the support of the SAPS.



Source: G3 Business Solutions (2015)

FIGURE 7.24: NUMBER OF CRIMES (BY TYPE) REPORTED IN THE POSTMASBURG PRECINCT OVER TIME

7.2 DESCRIPTION OF THE CURRENT LAND USES

7.2.1 CURRENT LAND USE

The current land uses as well as future land use which have already received environmental authorisation on the properties included in the application area are indicated in Table 7.12 and illustrated in Figure 7.27.

TABLE 7.12: DESCRIPTION OF CURRENT & AUTHORISED LAND USES ON THE APPLICATION AREA

Property	Owner	Current Land Use
Mining Right Area		
Ploegfontein 487	SIOC	Livestock Farming, Game Farming, Dewatering Pipeline, Railway, Access Road, Power Line (supplying Kolomela), Prospecting Laydown Area, Prospecting.
Rem Leeuwfontein 488	SIOC	Leeuwfontein Pit, Tierbult DMS Plant, Leeuwfontein North Waste Rock Dump, Haul Roads, Access Road, Dewatering Pipeline, Power Line, Railway Line, Stormwater Management Infrastructure, Groenwaterspruit Aquifer Recharge, Game Farming.
Strydfontein 614	SIOC	Leeuwfontein Pit, Leeuwfontein North WRD, DSO Processing Plant, Workshops, Offices, Parking, Fuel Storage, Product Stockpile Area, Pollution Control Dams, Water Supply Dams, Construction Village, Sewage Treatment Works, Bioremediation Facility, Waste Disposal Site, Waste Storage Site, Slimes Dam, Borrow Pits, Haul Roads, Internal Roads, Stormwater Management Infrastructure, Game Farming.
Rem Klipbankfontein 489	SIOC	Klipbankfontein Pit, Leeuwfontein Pit, Leeuwfontein South WRD, Haul Roads, Klipbankfontein WRD, Prospecting, Stormwater Management Infrastructure, Excess Water Discharge, Game Farming.
Kapsteveld 541	SIOC	Kapsteveld Pit, Kapsteveld WRD, Haul Roads, Stormwater Management Infrastructure, Prospecting, Livestock Farming, Game Farming, Residence (land manager), Access Roads.
Wolhaarkop 476	SIOC	Livestock Farming, Game Farming.
Welgevonden 486	SIOC	Explosives Magazine, Haul Roads, Kapsteveld Pit, Borrow Pits, Game Farming.
Welgevonden 476	SIOC	Borrow Pits, Livestock Farming, Game Farming.
Aquifer Recharge Area		
Floradale 230	Coenraad Kotze	Livestock & Game Farming.
Floradale 484	Coenraad	Livestock & Game Farming a

Property	Owner	Current Land Use
Mining Right Area		
	Kotze	

7.2.2 SURROUNDING LAND USE

The neighbouring households are indicated in Figure 7.25. Persons residing in the occupied houses are largely involved in agricultural activities. See Table 7.13 for a description of land uses on each of the neighbouring properties. Surrounding Land Uses are also illustrated in Figure 7.28.

TABLE 7.13: DESCRIPTION OF LAND USES ON NEIGHBOURING PROPERTIES

Property	Local Name	Residences	Owner	Land Use
Olyfontein 475	Beeshoek Mine	none	Assmang	Iron Ore Mine
Olyfontein 475	Koiespeen	01	Me Malie Karsten	Livestock & Game Farming, Health Care Services (Netcare 911)
Olyfontein 475	Olienfontein	02	Charl Viljoen	Livestock & Game Farming
Kalkfontein 474	Kalkfontein	03	Dries van der Walt	Livestock & Game Farming
Soetfontein 491	Soetfontein	04 & 06	Albertus Viljoen	Dairy, Livestock & Game Farming
Soetfontein 491	Soetfontein	05	Johan Viljoen	Bed and Breakfast, Livestock & Game Farming
Kameelfontein 490	Kameelfontein	07	Johan van Zyl	Livestock & Game Farming
Klipbankfontein 489	Klipbankfontein	08	Mev Baby Bredenkamp	Livestock & Game Farming
Unknown	Wag 'n Bietjie	09	Chris Bredenkamp	Livestock & Game Farming
Kappies Kareeboom 540	Kappies Kareeboom	10 & 11	SIOC	Groenwaterspruit Aquifer Recharge, Prospecting, Livestock & Game Farming
Grootpan 543 RE	Vleiput	12	De Klerk Family	Regional Road 383, Prospecting, Livestock & Game Farming
Grootpan 543 Portion 1	Unknown	none		Prospecting, Livestock Farming
Grootpan 543 Portion 4	Witboom	13	De Klerk Family	Regional Road 383, Prospecting, Livestock Farming
Sunnyside 542 Portion 2	Grasvlakte	14	Tjaart Snyman	Prospecting, Livestock Farming
Bermolli 583	Bermolli	15	SIOC	Prospecting, Livestock Farming
Sunnyside 542 Portion 2	Sunnyside	16	SIOC	District Road DD3303, Livestock Farming
Floradale 230	Floradale	18	Coenraad Kotze	Livestock Farming
Voelwater 480	Voelwater	20	Francois Cloete	Livestock Farming
Broomlands 479	Broomlands	21	Bennie Bredenkamp	Livestock Farming
Kameelhoek 477	Kameelhoek	22	Rassie Erasmus	Livestock Farming
Kameelhoek 477	Kameelhoek	23	Rudi Erasmus	Livestock Farming
Aucampsrus 447	Aucampsrus	24	Van Wyk	Regional Road Small-scale Iron Ore Mining, Livestock Farming

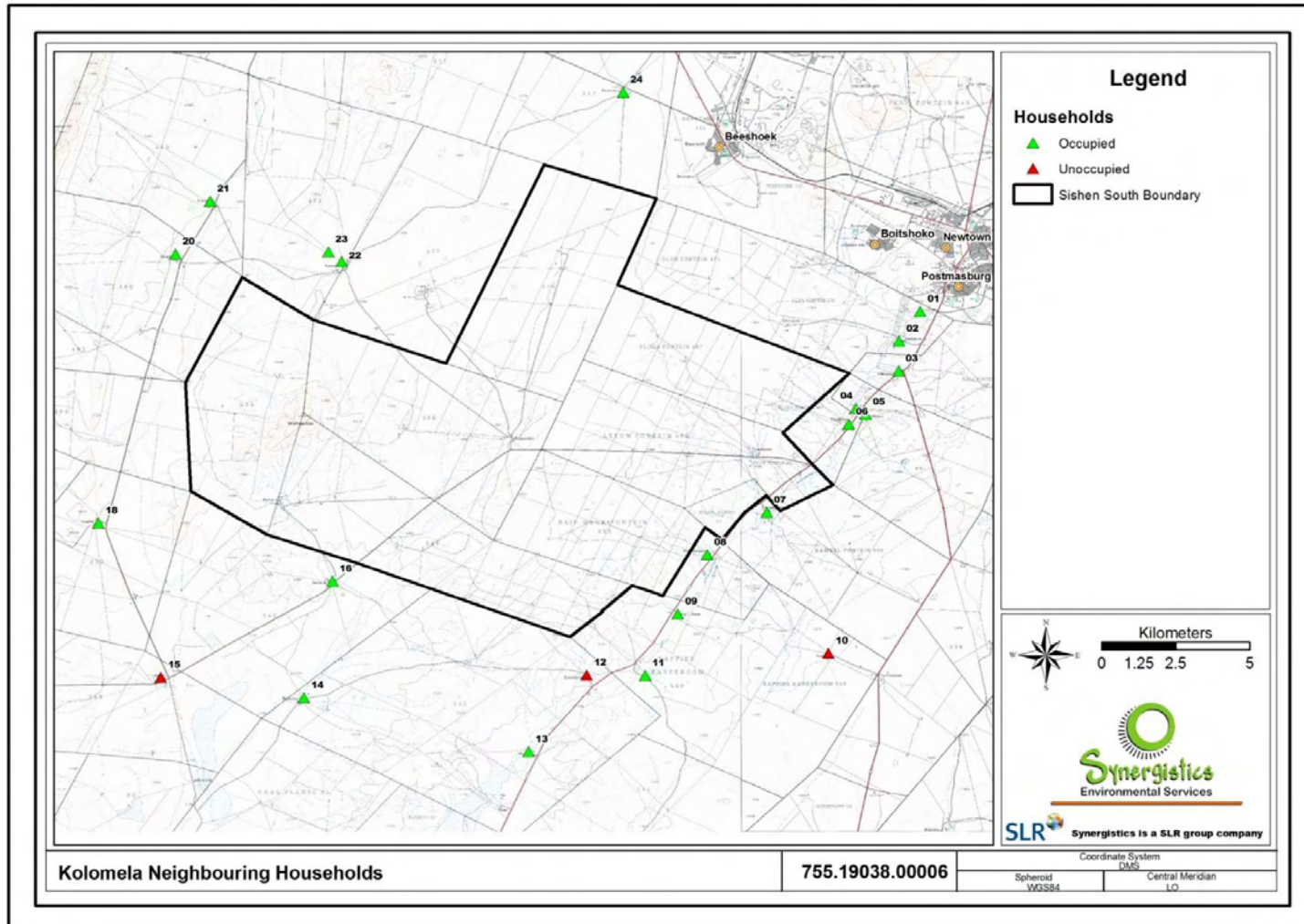


FIGURE 7.25: KOLOMELA NEIGHBOURING HOUSEHOLDS

7.3 DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURES AND INFRASTRUCTURE ON THE SITE

The environmental sensitivities at Kolomela Mine are provided in Figure 7.26. Current land uses within the mining area are shown in Figure 7.27. The land use within the surrounding area is shown in Figure 7.28.

7.4 ENVIRONMENT AND CURRENT LAND USE MAP

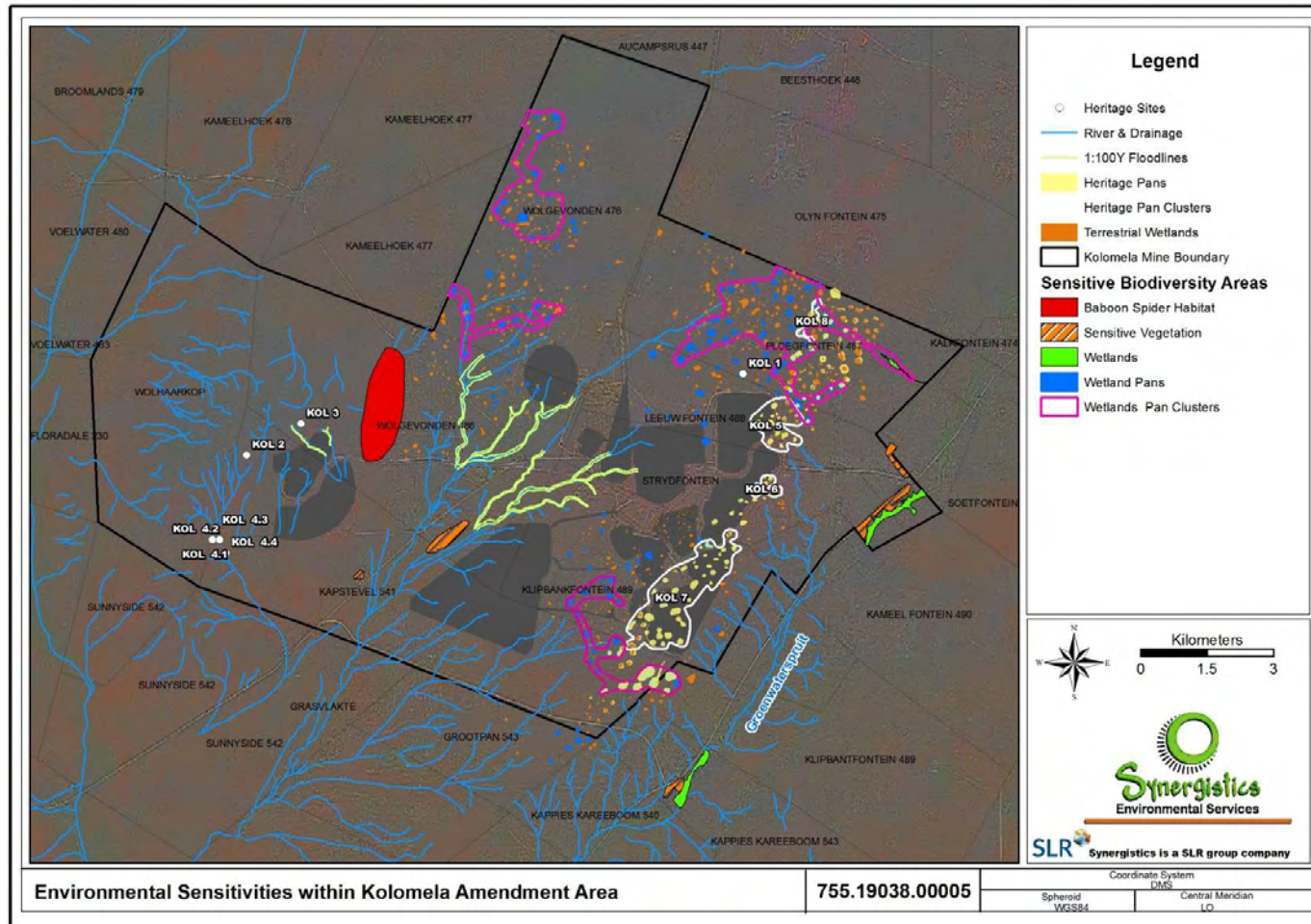


FIGURE 7.26: ENVIRONMENTAL SENSITIVITIES WITHIN THE KOLOMELA AMENDMENT AREA

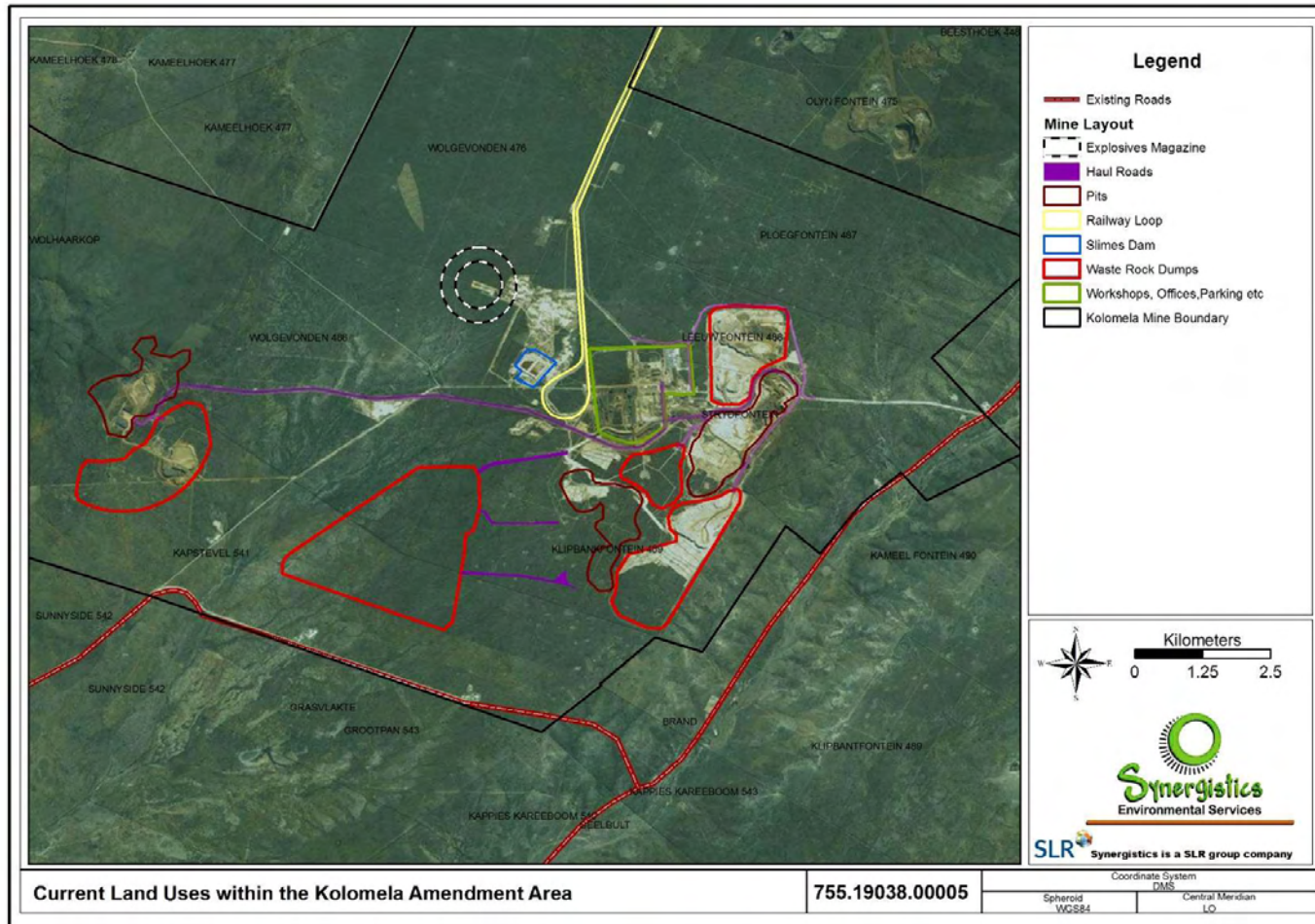


FIGURE 7.27: CURRENT LAND USES WITHIN THE KOLOMELA AMENDMENT AREA (SHOWING EXISTING DISTURBANCE AND APPROVED LAYOUT)

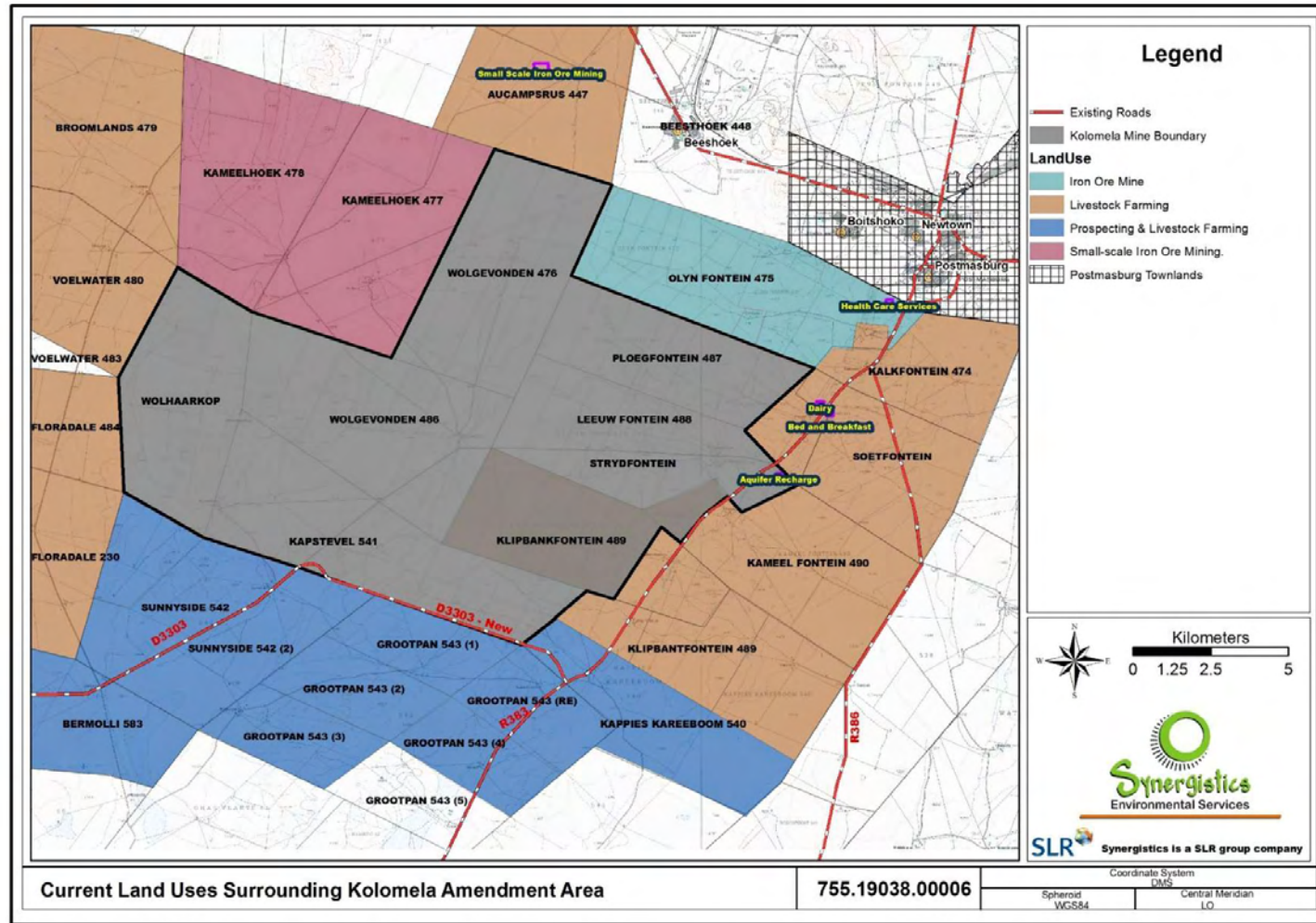


FIGURE 7.28: CURRENT LAND USES SURROUNDING KOLOMELA AMENDMENT AREA

8 IMPACTS AND RISKS IDENTIFIED INCLUDING THE NATURE, SIGNIFICANCE, CONSEQUENCE, EXTENT, DURATION IN AND PROBABILITY OF THE IMPACTS, INCLUDING THE DEGREE TO WHICH THESE IMPACTS CAN BE REVERSED, AVOIDED, MANAGED, MITIGATED AND EXTENT TO WHICH THEY MAY CAUSE IRREPLACEABLE LOSS OF RESOURCES

8.1 LIST OF IMPACTS OF ACTIVITIES IN INITIAL SITE LAYOUT

The list of the potential impacts of the activities that will be undertaken, as described in the initial site layout are included below. This list of impacts has been informed by both the typical known impacts of such activities and as informed by the consultation with interested and affected parties.

8.2 METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

8.2.1 IMPACT RANKING CRITERIA

The impact assessment method used in this assessment takes into account the current environment, the details of the proposed amendment activities and the findings of the specialist studies. Cognisance has been given to both positive and negative impacts that may result from the developments. 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 below. Although the criteria used for the assessment of impacts attempts to quantify the significance, it is important to note that the assessment is generally a qualitative process and therefore the application of this criteria is open to interpretation. The process adopted will therefore include the application of scientific measurements and professional judgement to determine the significance of environmental impacts associated with the project. The assessment thus largely relies on experience of the environmental assessment practitioner (EAP) and the information provided by the specialists appointed to undertake studies for the EIA.

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

Consideration will be given to the phase of the project during which the impact occurs. The phase of the

development during which the impact will occur will be noted to assist with the scheduling and implementation of management measures.

CRITERIA FOR ASSESSING THE IMPACT SIGNIFICANCE

Severity Criteria

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

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

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

Probability

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

Impact Significance

NEGATIVE IMPACTS

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

>4≤5	Very High	Impact is of the highest order possible. Mitigation is required to lower impacts to acceptable levels. Potential Fatal Flaw.
------	-----------	--

POSITIVE IMPACTS

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

DEVELOPMENT PHASE

C	Impact is applicable to the CONSTRUCTION PHASE ONLY
O	Impact is applicable to the OPERATIONAL PHASE ONLY
C&O	Impact is applicable to the CONSTRUCTION AND OPERATIONAL PHASE

8.3 THE POSITIVE AND NEGATIVE IMPACTS THAT THE PROPOSED ACTIVITY (IN TERMS OF THE INITIAL SITE LAYOUT) AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND THE COMMUNITY THAT MAY BE AFFECTED

NOTE: A COMPREHENSIVE ASSESSMENT OF ALL IMPACTS IS GIVEN IN SECTION 8.8. A SHORT DESCRIPTION OF KEY IMPACTS IS PROVIDED IN BELOW. THE IMPACT ASSESSMENT WAS CONDUCTED ON THE PROPOSED SITE LAYOUT PLAN 2 (FIGURE 6.2). THE MITIGATED LAYOUT IS PROVIDED IN SITE LAYOUT PLAN 3 (FIGURE 3.1 & 6.3).

8.3.1 GROUNDWATER

8.3.1.1 Lowering of Groundwater Levels

The impact prediction is based on the dewatering model by Itasca 2015 (Part C – Report D2). It should be noted that the dewatering simulations have not been determined for the increased dewatering scenario at 3 990 m³/hr which is required to maintain dry working conditions in the pits.

The simulated drawdown from pre-mining levels for the Kolomela life-of-mine (including cumulative impacts of dewatering impacts at Beeshoek) at a dewatering rate of 3 990 m³/hr is shown in Figures 8.1 – 8.6 indicating the drawdown levels from 2020 to 2070.

A draw down of the natural groundwater levels by up to 50 m can be expected outside of the mining area in the years 2050 and 2060, impacting on the immediately neighbouring farms up to 5 km east of the mine.

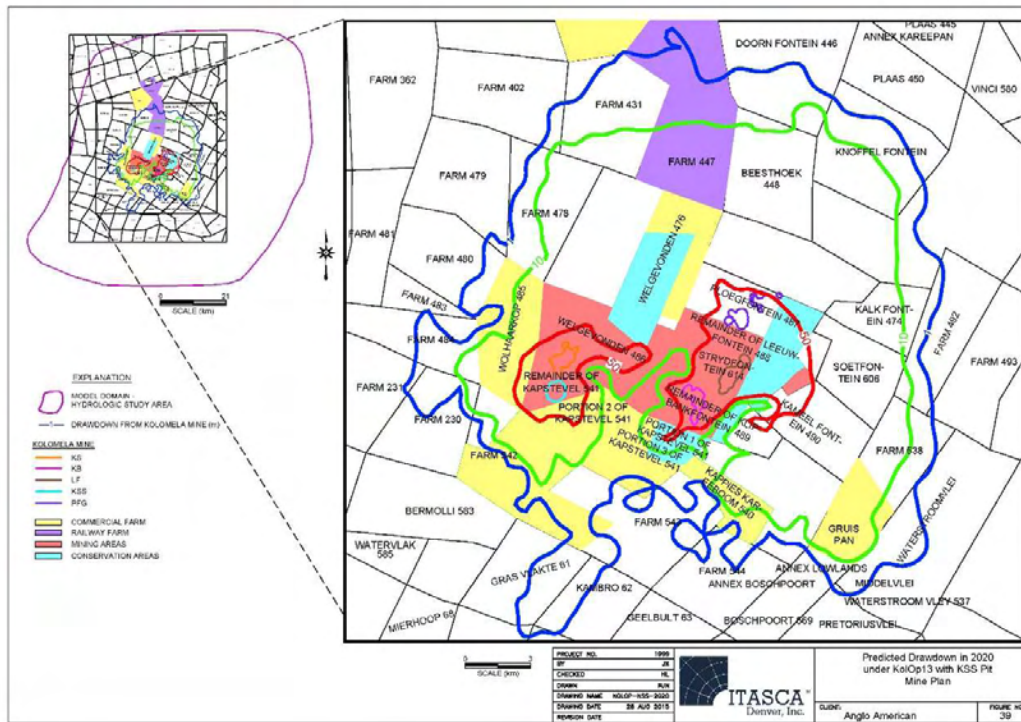


FIGURE 8.1: SIMULATED DEWATERING CONES FOR YEAR 2020 DEWATERING AT 3990 m³/hr

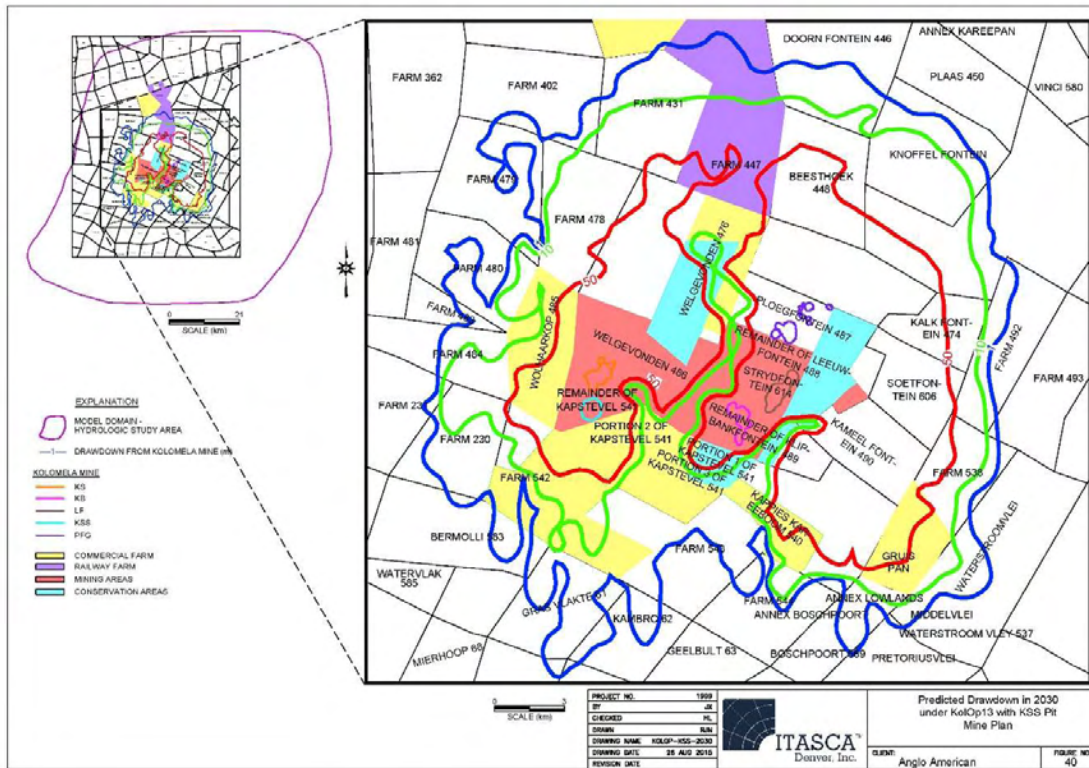


FIGURE 8.2: SIMULATED DEWATERING CONES FOR YEAR 2030 DEWATERING AT 3990 m³/hr

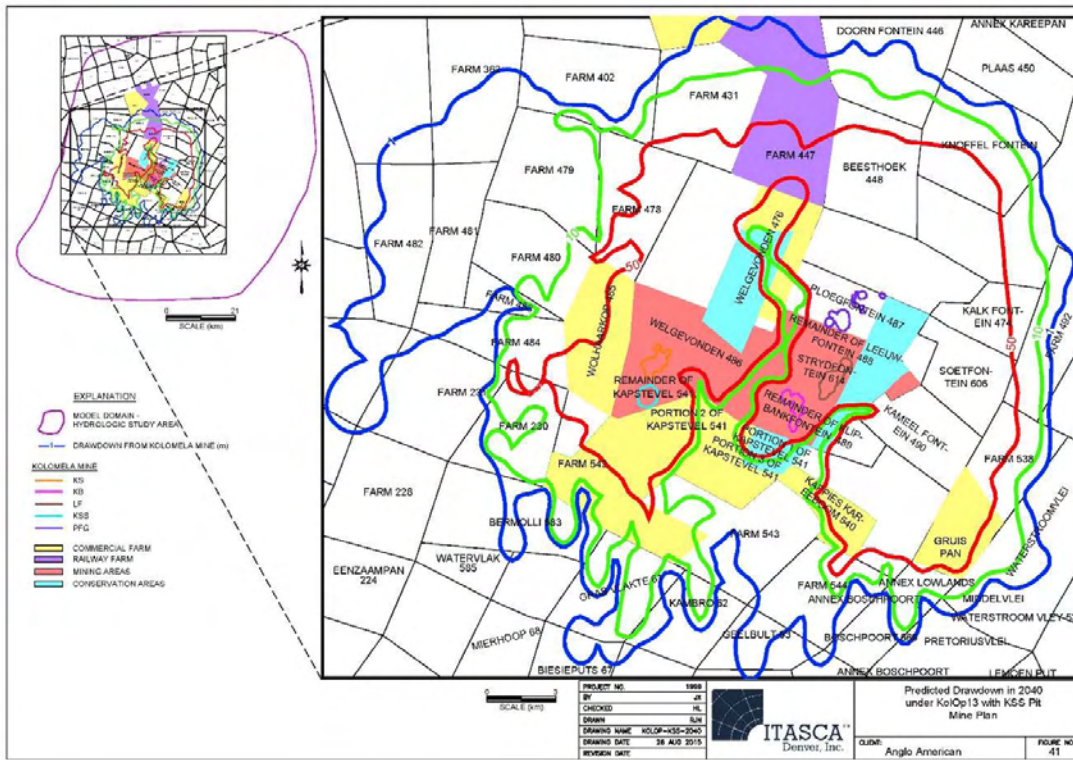


FIGURE 8.3: SIMULATED DEWATERING CONES FOR YEAR 2040 DEWATERING AT 3990 m³/hr

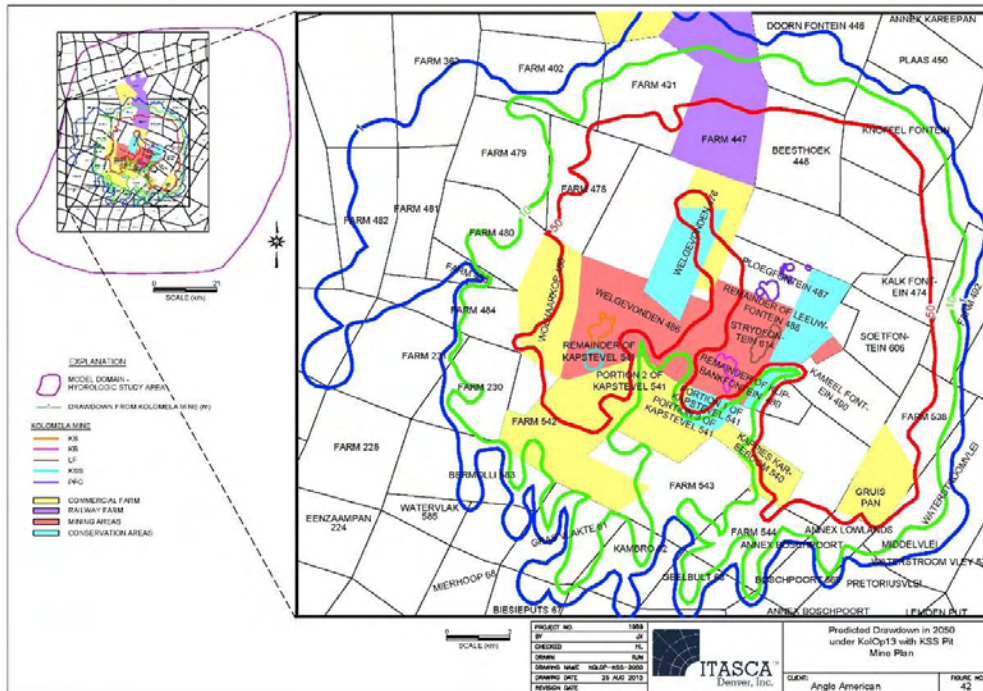


FIGURE 8.4: SIMULATED DEWATERING CONES FOR YEAR 2050 DEWATERING AT 3990 m³/hr

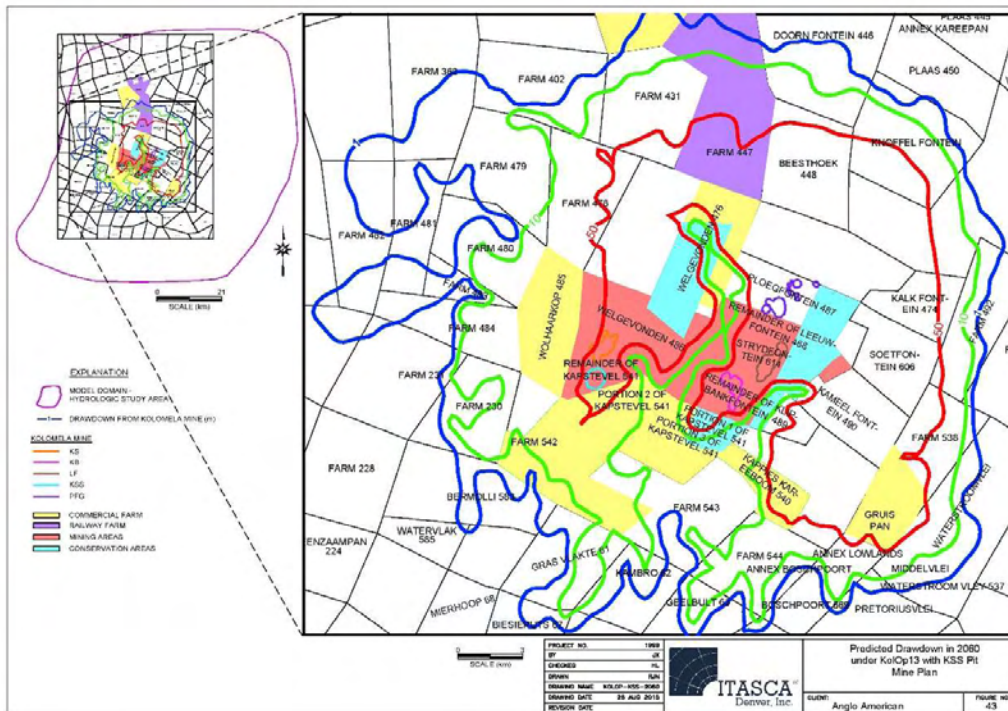


FIGURE 8.5: SIMULATED DEWATERING CONES FOR YEAR 2060 DEWATERING AT 3990 m³/hr

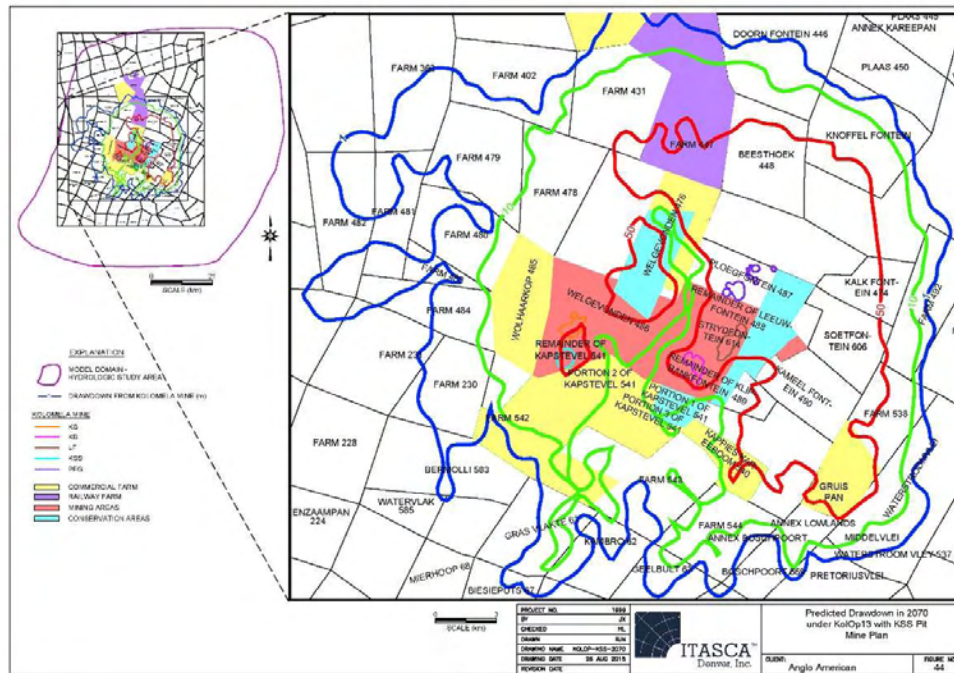


FIGURE 8.6: SIMULATED DEWATERING CONES FOR YEAR 2070 DEWATERING AT 3990 m³/hr

Source: ITASCA Denver (2015)

The impact of groundwater recharge into the tributary of the Soutloop River to the west of the mine has also not been modelled. The recharge of water into the local aquifer at a maximum of 50 litres/second (or 180m³/h) can be expected to have a positive but very local impact in groundwater levels, the impact on groundwater levels however remains high.

The impact is considered to be VERY HIGH and could be reduced to HIGH through continuous updated and calibration of the model and communication of these results to surrounding landowners. Impacted landowners will be compensated in accordance with the agreement entered into with surrounding landowners (already in place).

8.3.1.2 Contamination of Underlying Aquifers

The impact prediction is based on the findings of the Kolomela Mine Waste Streams Assessment and Mining Residues Impact Report (Golder, 2016, Part C – Report A).

Of concern is the risk that seepage from the waste rock dumps to the underlying aquifer. According to Golder (2016):

- The waste rock is almost entirely non-acid generating.
- Leachate from the waste rock dumps is predicted to be neutral mine drainage with low metal content.
- All of the waste rock dumps and ore stockpiles place a low leachability risk under all conditions in terms of the National Norms and Standards for the Assessment for Landfill Disposal (GN. 635 of 23 August 2013).
- There is a low potential risk placed by the waste rock and stockpiled ore to any aquatic environment.
- The impact of waste rock and ore material on water resources and biodiversity is likely to be low to minimal without a barrier system.
- All of the mineral waste streams produced at Kolomela Mine are not hazardous according to SANS 10234 as per the Waste Classification and Management Regulations (GN. 634 of 23 August 2013).

The predicted impact of the expansion of waste rock dumps is thus expected to be LOW. It is also motivated that due to the low risk to groundwater that no barrier system is required.

8.3.2 SURFACE WATER

8.3.2.1 Disturbance of Drainage Lines/Watercourses

The originally proposed layout of the Kapstevl At Pit Facility (including the DMS Plant), as indicated in Proposed Site Layout 2 (Figure 6.2.) would result in the crossing of drainage to the tributary of the Soutloop River to the east of the site (see Figure 8.7). The layout has been changed to reduce the impact on drainage where practical.

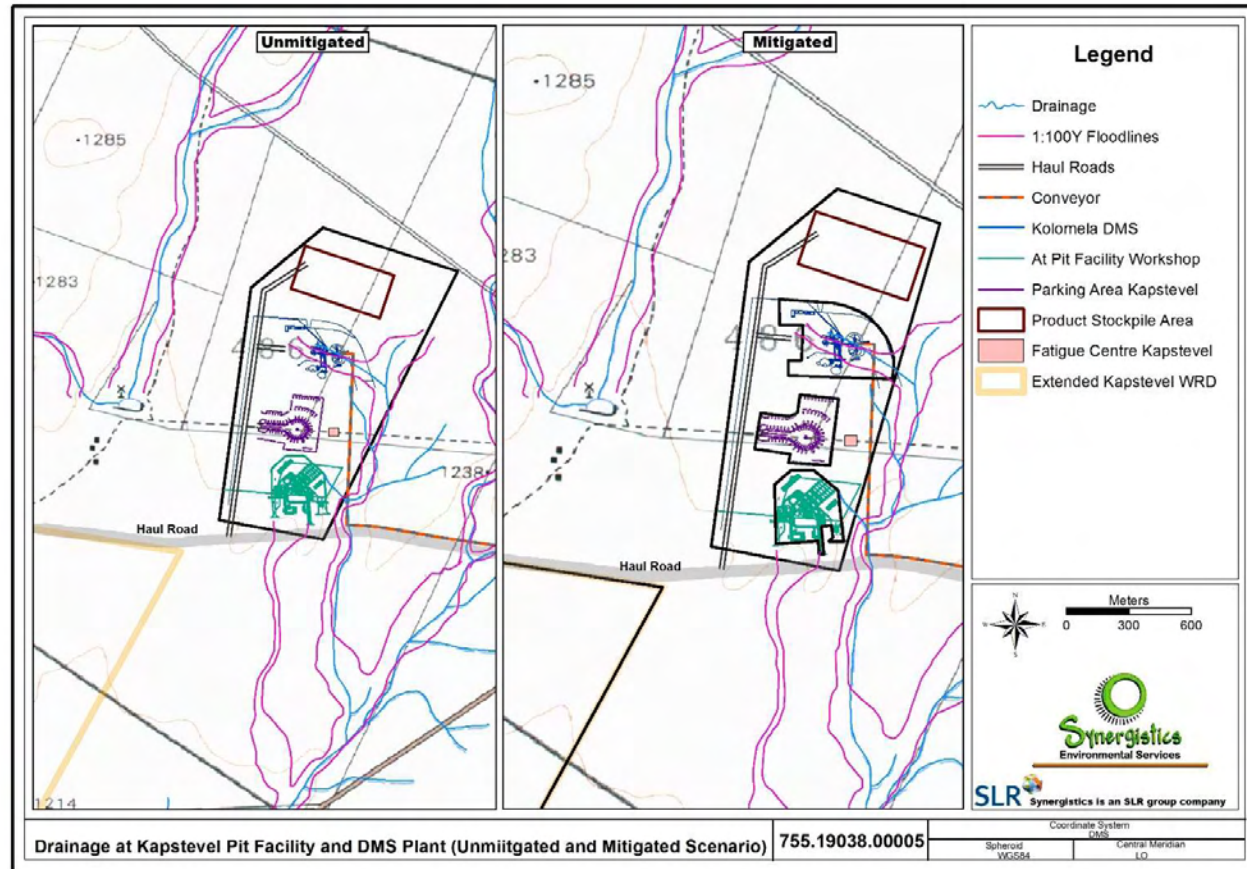
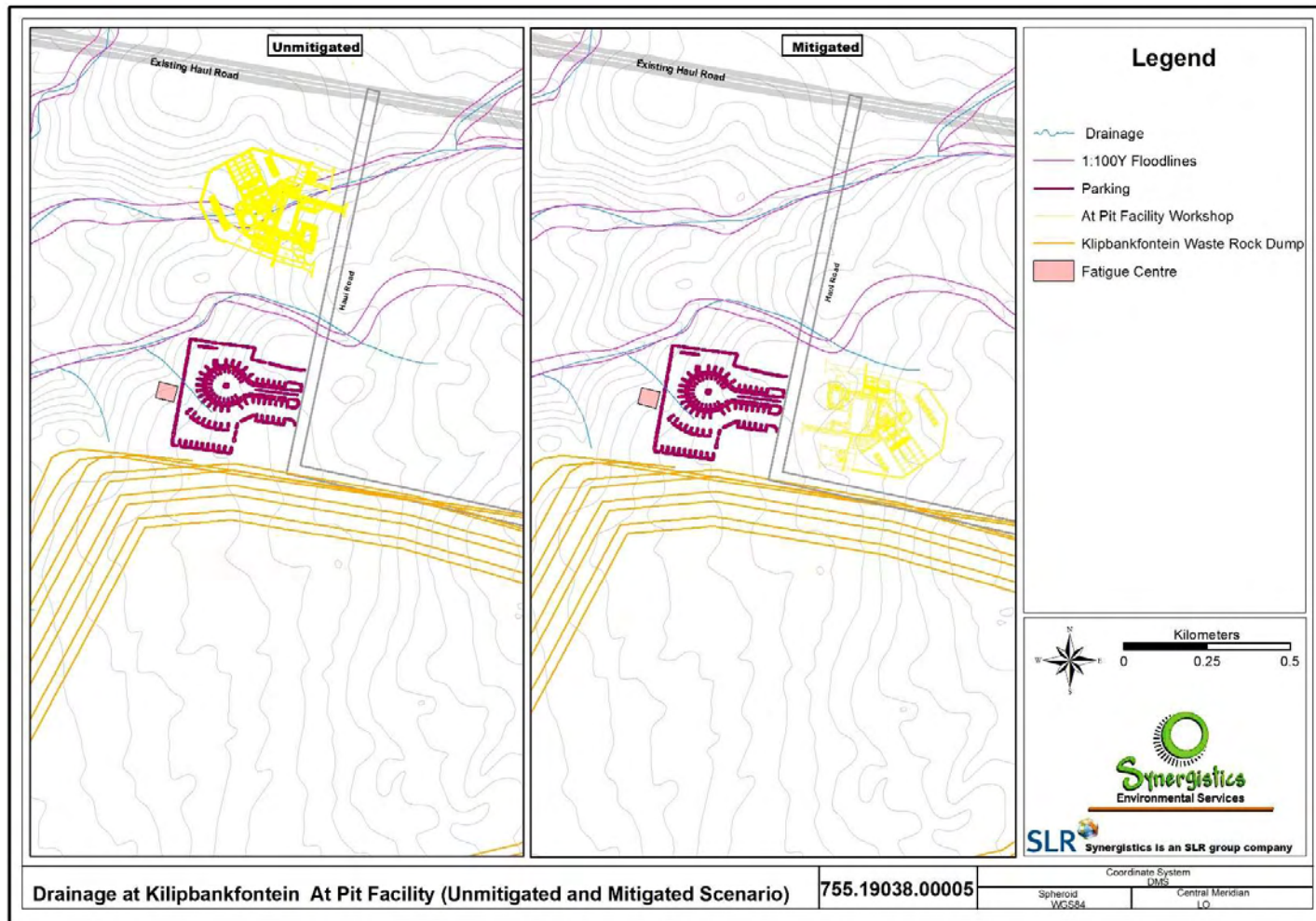


FIGURE 8.7: DRAINAGE AT KAPSTEVEL AT PIT FACILITY AND DMS PLANT (UNMITIGATED AND MITIGATED SCENARIO)



**FIGURE 8.8: DRAINAGE AT KLIPBANKFONTEIN AT PIT FACILITY
(UNMITIGATED AND MITIGATED SCENARIO)**

The impact of the Kapstevl At Pit Facility on drainage has been reduced from Moderate to Low and the Kapstevl At Pit Facility has been reduced from HIGH to MODERATE.

The originally proposed layout of the Klipbankfontein At Pit Facility, as indicated in the Proposed Site Layout 2 (Figure 6.2) would result in the disturbance of 2 drainage lines due to the positioning of the workshops, as shown in Figure 8.8. In the revised Site Layout Plant 3 (Figure 6.3), the workshop has been relocated to the east of the haul truck parking facility to eliminate this impact.

The predicted impact of the infrastructure at the Klipbankfontein At Pit Facility has been reduced from HIGH to VERY LOW.

The Aquifer Recharge Facility is to be constructed within the tributary of the Soutloop River on the Farms Floradale 230 and Floradale 230. The nature of the activity will result in the disturbance of the beds and banks of the river and the disturbance of the flow.

Some mitigation can be carried out to reduce the impact, but the impact will remain as MODERATE to HIGH.

8.3.2.2 Change in Natural Hydrology

Aquifer Recharge may result in a change in the natural hydrology of the watercourse, should recharging exceed the storage/recharge capacity of the underlying aquifer. Unnatural surface flow needs to be prevented by monitoring the water levels within the gravels.

The impact on the natural hydrology can be reduced from HIGH to MODERATE with proper monitoring and feedback on volumes and water levels within the underlying aquifer.

8.3.3 WETLANDS

The impact prediction is based on the findings of the Wetland Assessment undertaken by Scientific Aquatic Services (SAS, 2015, Part C – Report K).

There are also several Wetland Pans in the area to be affected by the development of the Ploegfontein and Tierbult Pit areas, Leeuwfontein North WRD, Leeuwfontein South WRD and the Klipbankfontein WRD. According to SAS (2015) none of the features encountered are regarded to be of exceptional importance in terms of function and service provision except for biodiversity maintenance. This is mainly a result of lack of surface water for extended periods of time limiting the ability to support any aquatic communities or the formation of seasonal and permanent wetland zones that could support a more diverse wetland floral community, that would increase the wetland features assimilation capacity as well as sediment trapping ability. Impacts in terms of changes in terms of ecological and socio-cultural services and hydrological function are thus low. The impact of the Aquifer Recharge Project, which will take place in a Valley Bottom Wetland Area on the tributary of the Soutloop River are not considered to be of major significance.

However, mining and associated infrastructure will result in either a direct loss in Wetland Pans or a disturbance of the catchment of pans, which will result in a high impact with respect to loss of habitat and ecological function, particular in the Ploegfontein and Tierbult Pit areas and the Leeuwfontein South Pit area where there are a large number of Wetland Pans to be affected.

Jones & Wagener (2015, see Part C – Report C) has delineated the catchments of the wetland pans, it has thus been possible to reduce the impact of mining on wetland pans, by doing some alteration of the proposed layout (Site Layout 2) to avoid the catchments of pans where practicable (see Site Layout Plan 3). Cognisance has been given to the protection of Wetland Pan Clusters in order that pans can be managed as units and not individually.

For this reason, the impact can be reduced from HIGH to MODERATE, assuming secondary impacts on pans can also be avoided. Buffer zones around pans need to give attention to pan catchments.

The details in the changes in the layout in the key area of impact are given in Figure 8.9 and 8.10.

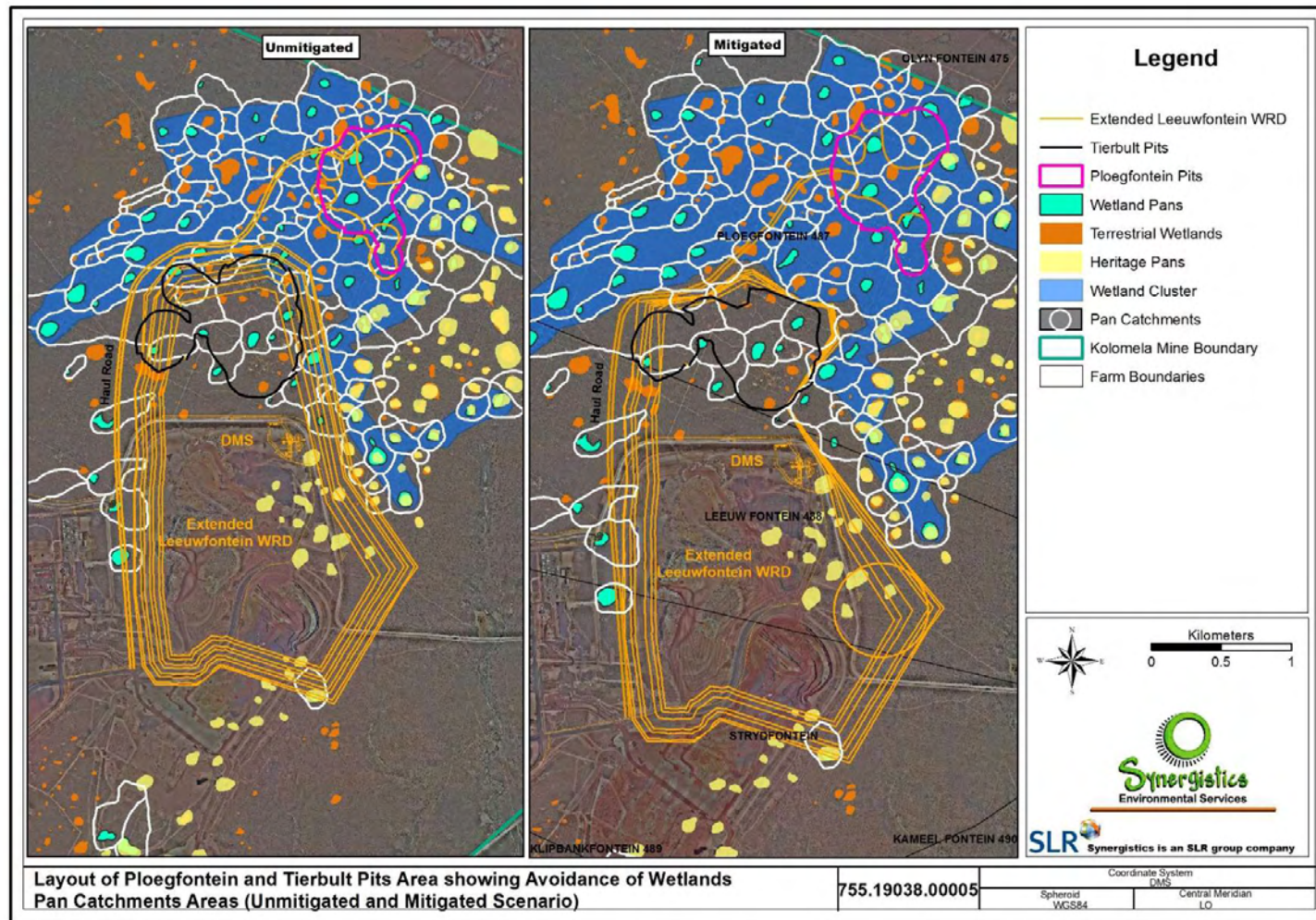


FIGURE 8.9: LAYOUT OF PLOEGFONTEIN & TIERBULT PITS AREA SHOWING AVOIDANCE OF WETLAND PAN CATCHMENT AREAS (UNMITIGATED AND MITIGATED SCENARIO)

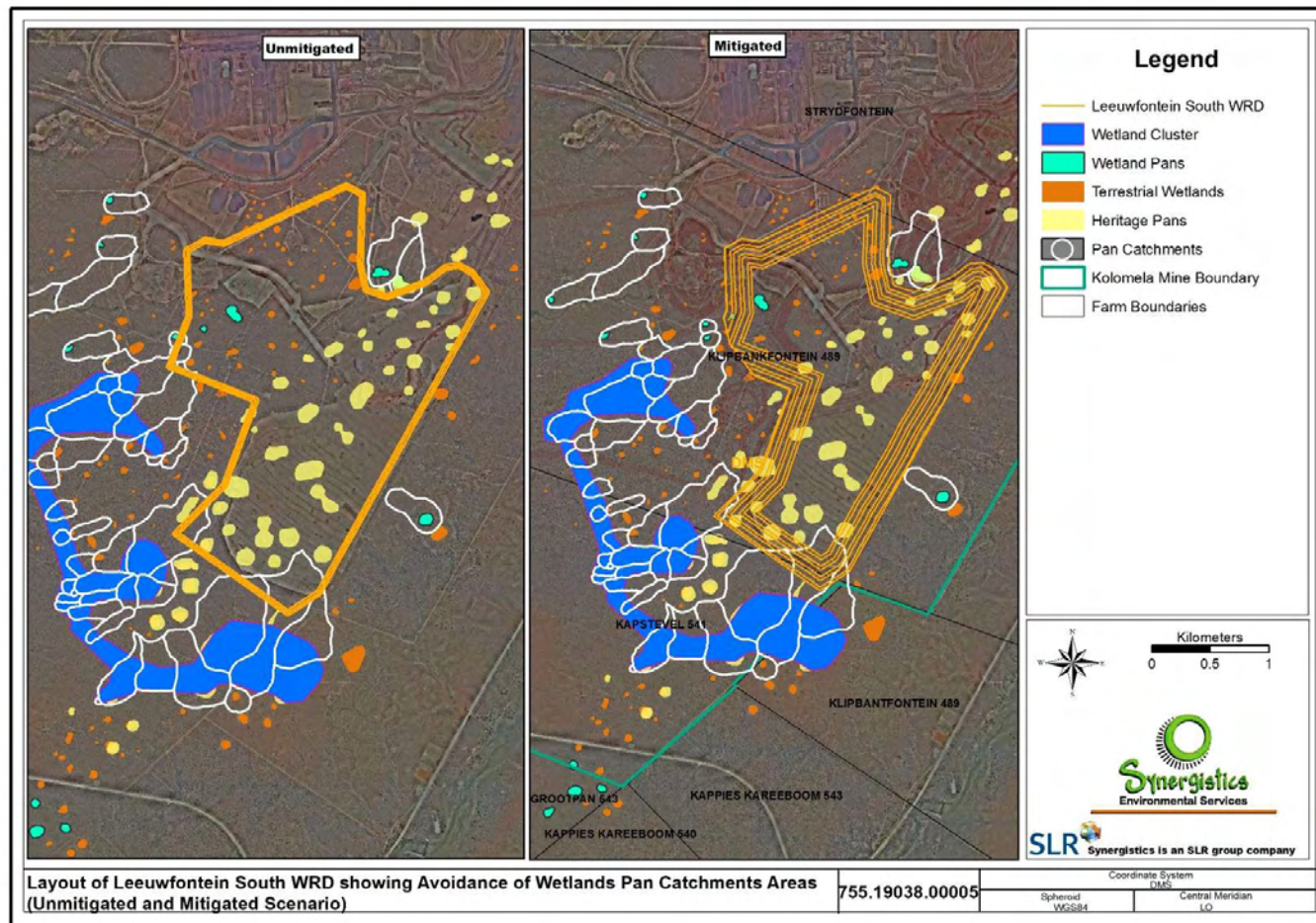


FIGURE 8.10: LAYOUT OF LEEUWFFONTEIN SOUTH WRD SHOWING AVOIDANCE OF WETLAND PAN CATCHMENT AREAS (UNMITIGATED AND MITIGATED SCENARIO)

8.3.4 BIODIVERSITY

The impact prediction is based on the findings of the Fauna & Flora Report by OmniEko (2015, Part C – Report G).

No sensitive habitats will be impacted on by the proposed expansions at Kolomela Mine. However, it is expected that large number of the Nationally Protected Trees *Vachellia erioloba* (Camel Thorn) and *Boscia albitrunca* (Shepherd's tree) will be disturbed, particularly in the area to be covered by the Kapstevl Waste Rock Dump extension.

The protected geophytes observed during the Biomonitoring programme, *Boophone distycha*, *Ammocharis corranica* and *Harpagophytum procumbens*, are all medicinal plants. As many of these plants as possible should be removed and replanted in safe areas.

The impact on sensitive species is MODERATE.

8.3.5 AIR QUALITY

The impact prediction is based on the findings of the Air Quality Impact Assessment undertaken by Airshed Planning Professionals (2015, Part C – Report B).

Airshed modelled the dispersion of pollutants under 3 conditions based on the predicted mine plan:

- Scenario 1: 2015 (to represent current mining rates of approximately 14.4 Mtpa of ore and 43 Mtpa of waste from the Leeuwfontein, Klipbankfontein and Kapstevl Pits, with the majority of ore (79.5%) and waste (56%) coming from the Leeuwfontein pit)
- Scenario 2: 2018 (year with maximum quantities of ore – 16 Mtpa and waste - 60.3 Mtpa to be handled and transported, with the majority of ore (54%) and waste (58%) coming from the Leeuwfontein pit)
- Scenario 3: 2030 (year with maximum rates handled at the south of the mine, 16 Mtpa ore and 60 % of the 40 Mtpa of waste from the Kapstevl South pit)

Scenario 2 and 3 present the predicted impacts of the proposed amendment and are thus discussed below.

8.3.5.1 Predicted PM 10 and PM 2,5 Levels

Simulated ambient PM10 and PM2,5 concentrations as a result of the operational phase of Kolomela Mine are within **annual** NAAQS at surrounding receptors during all scenarios. However, at a few of the air quality receptors in the surrounds, simulated results show non-compliance for the **daily** NAAQS. Exceedances of criteria are also expected in close proximity to areas of operation. For Scenario 3, with mining of ore occurring only at the Kapstevl South pit, higher impacts occur at receptors within 1 km from the southern boundary (see Figure 8.11 to Figure 8.18).

As expected, dust generated by vehicles travelling on unpaved haul roads and vehicle exhaust emissions are the most notable contributors to ground level PM₁₀ and PM_{2,5} concentrations.

Note the predicted dust levels have considered mitigation including chemical suppression on permanent haul roads and wet suppression on roads in pit. It is thus not expected that the impacts can be reduced significantly and they remain HIGH.

8.3.5.2 Predicted Dust Fallout

Simulated dustfall rates as a result of the operational phases at Kolomela Mine are low and within the NDCR for residential areas at all receptor points during all scenarios. Exceedances of criteria are expected in close proximity to areas of operation (**Error! Reference source not found..19** and **Error! Reference source not found..20**).

As expected, dust generated by vehicles travelling on unpaved haul roads and windblown dust emissions are the most notable contributors to dust fallout.

Note the predicted dust levels have considered mitigation including chemical suppression on permanent haul roads and wet suppression on roads in pit. It is thus not expected that the impacts can be reduced significantly and they remain HIGH.

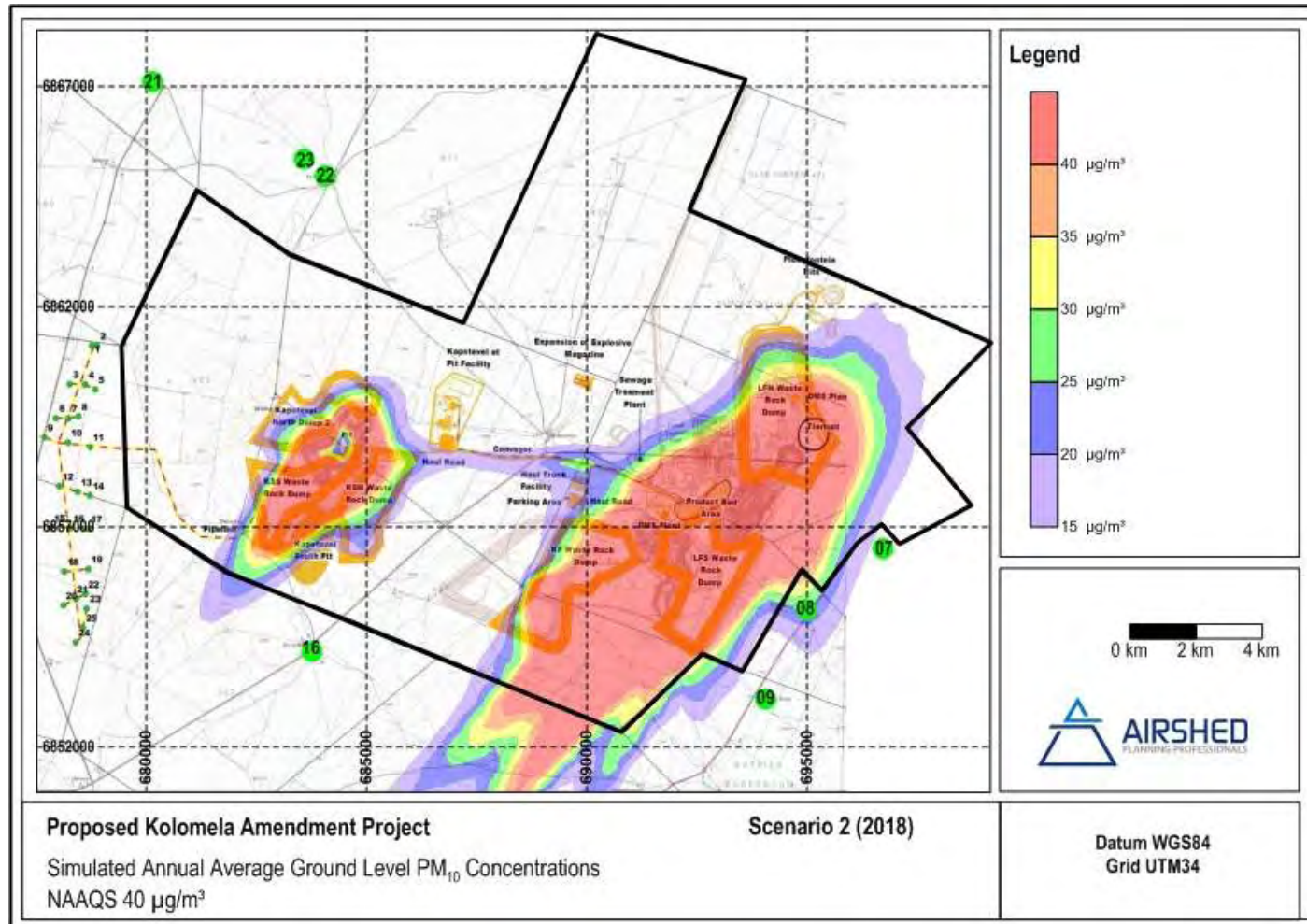


FIGURE 8.11: PREDICTED ANNUAL AVERAGE PM₁₀ GROUND LEVEL CONCENTRATIONS FOR SCENARIO 2

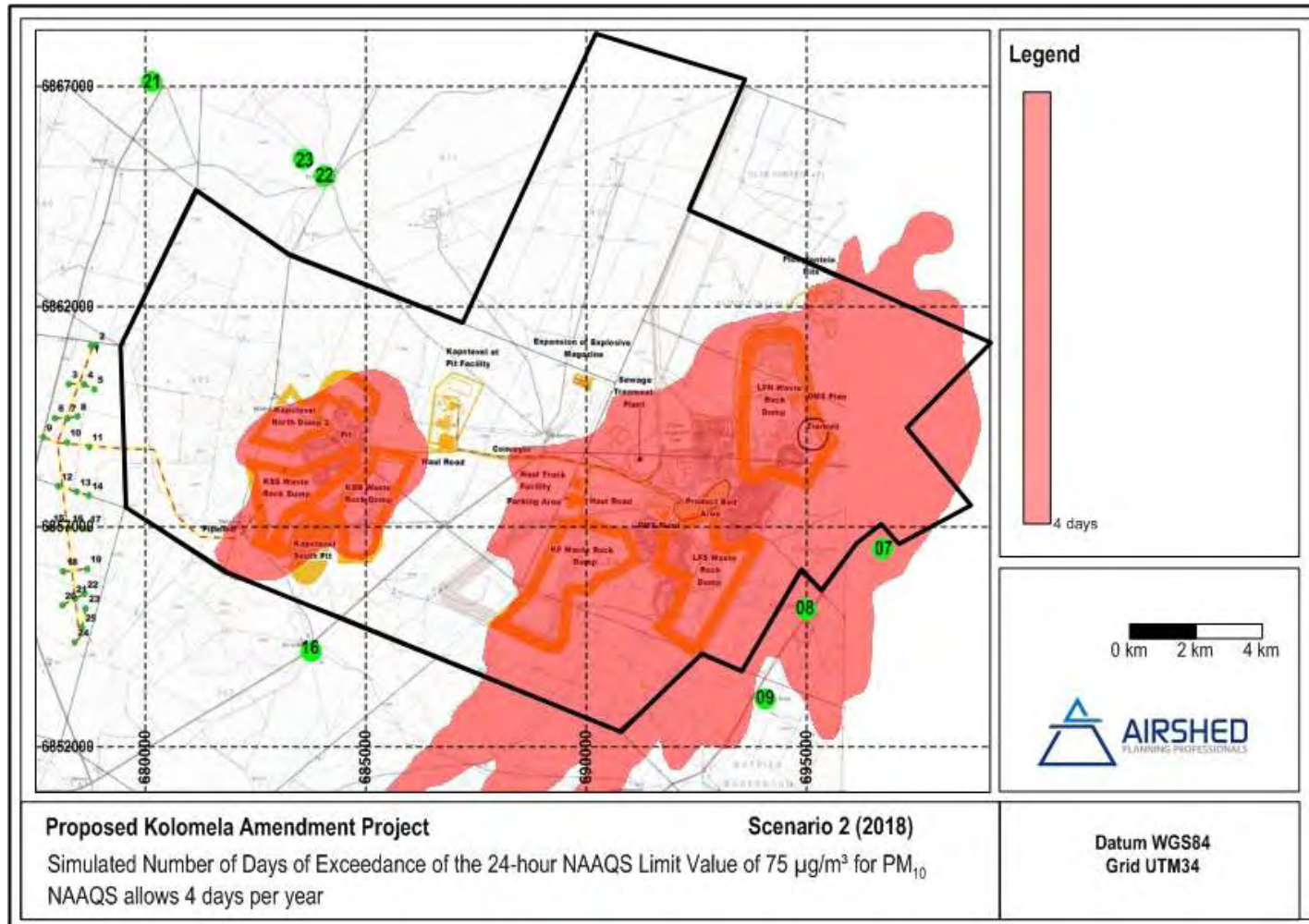


FIGURE 8.12: PREDICTED AREAS EXCEEDING THE NUMBER OF DAYS AS REQUIRED BY THE 24-HOUR NAAQS LIMITS FOR PM_{10} FOR SCENARIO 2

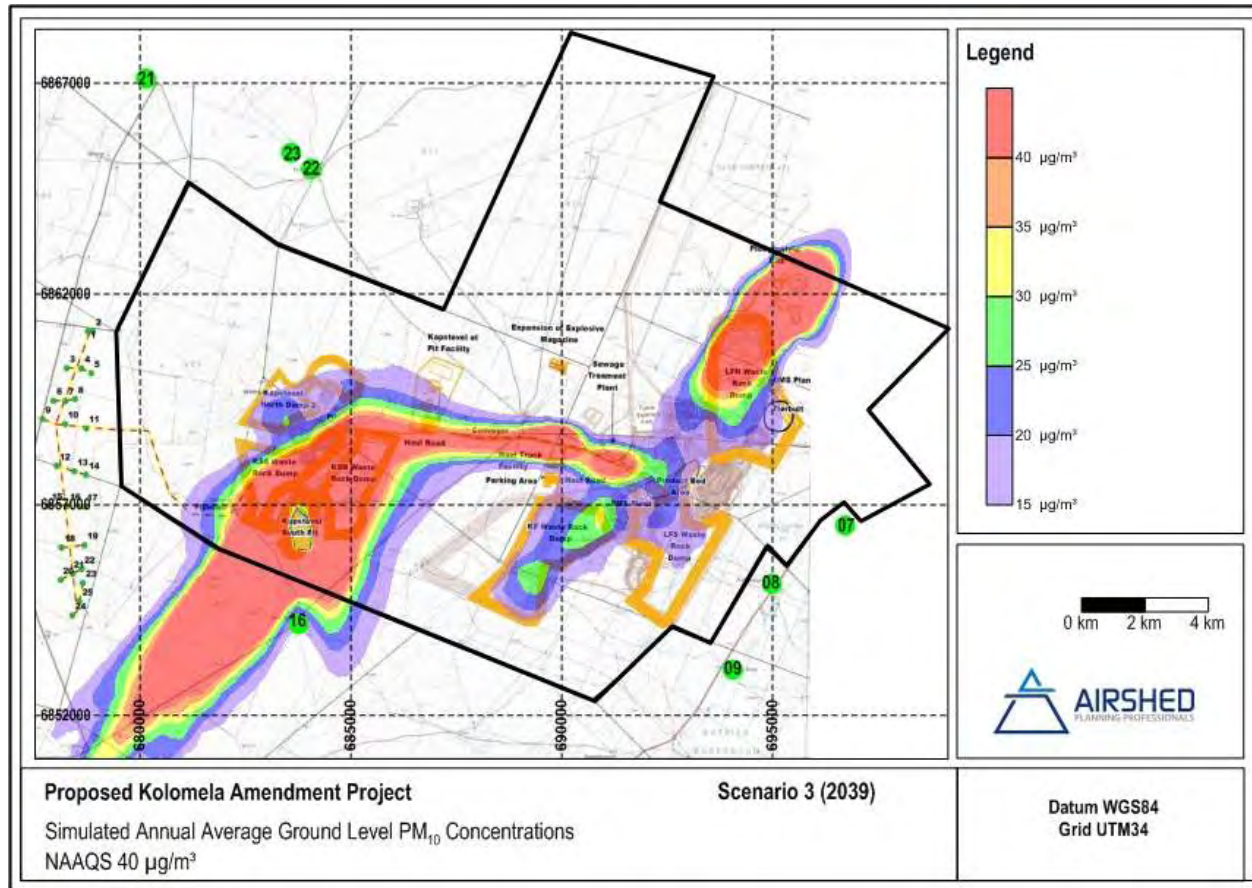


FIGURE 8.13: PREDICTED ANNUAL AVERAGE PM₁₀ GROUND LEVEL CONCENTRATIONS FOR SCENARIO 3

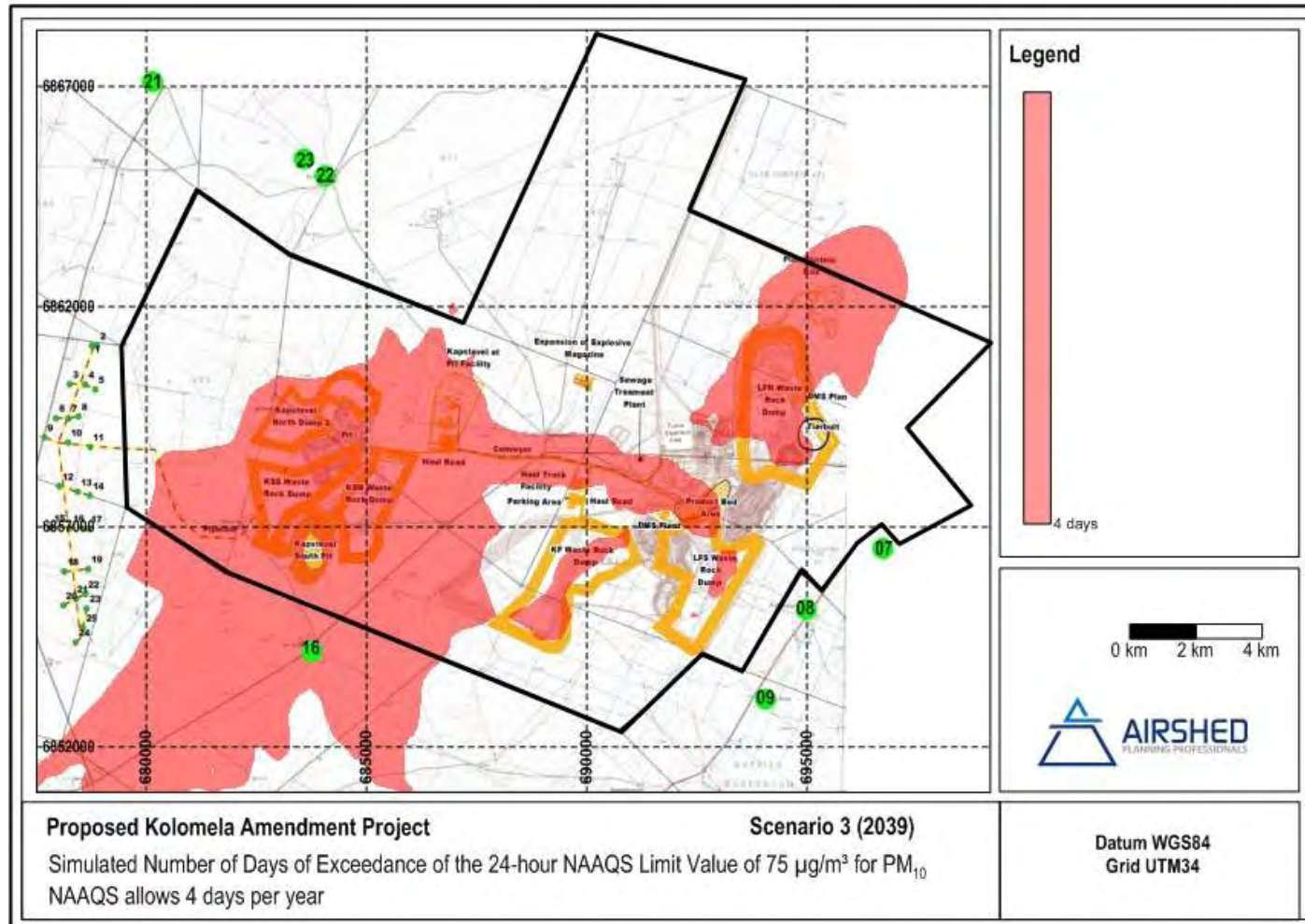


FIGURE 8.14: PREDICTED AREAS EXCEEDING THE NUMBER OF DAYS AS REQUIRED BY THE 24-HOUR NAAQS LIMITS FOR PM_{10} FOR SCENARIO 3

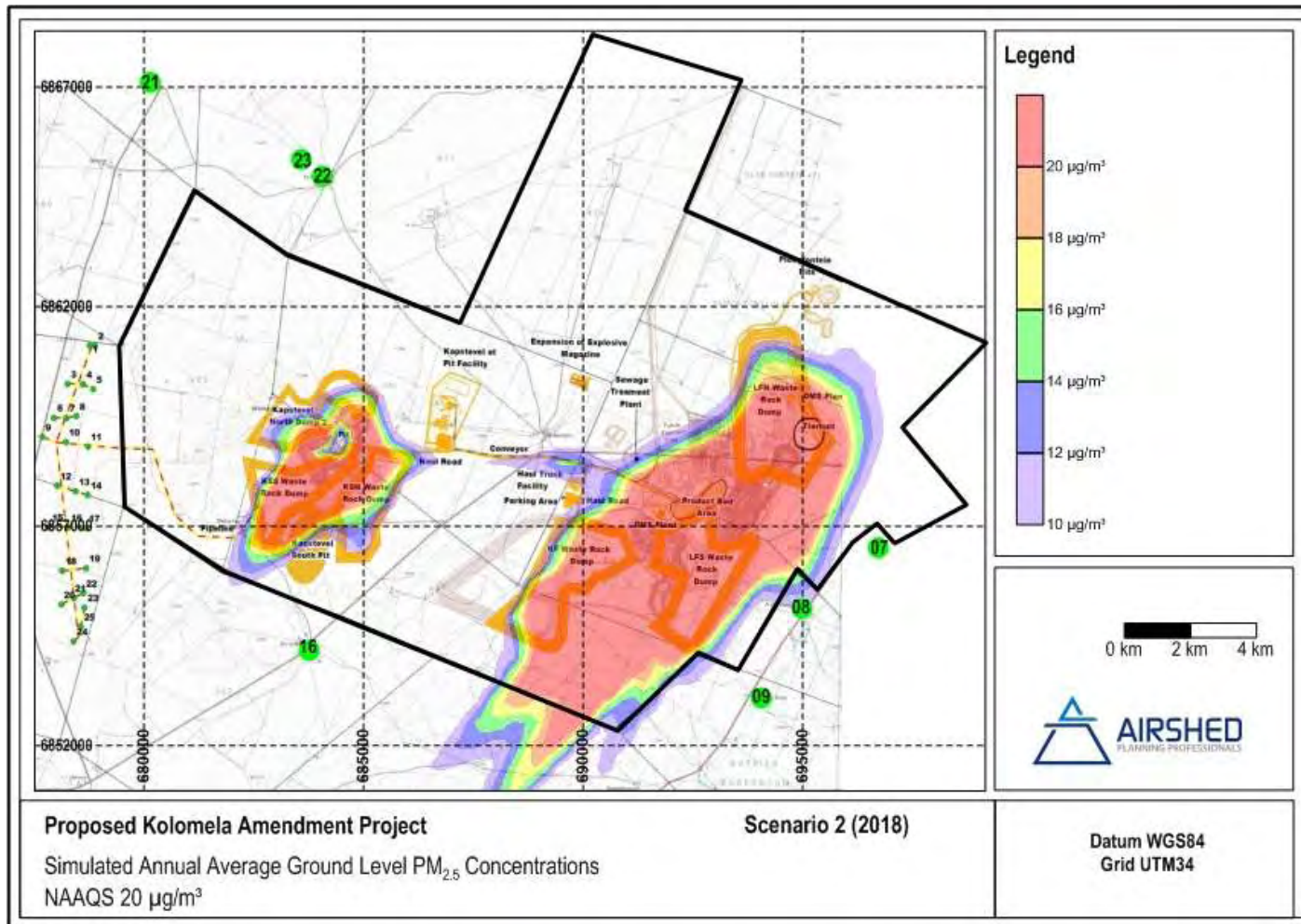


FIGURE 8.15: PREDICTED ANNUAL AVERAGE GROUND LEVEL PM_{2.5} CONCENTRATIONS FOR SCENARIO 2

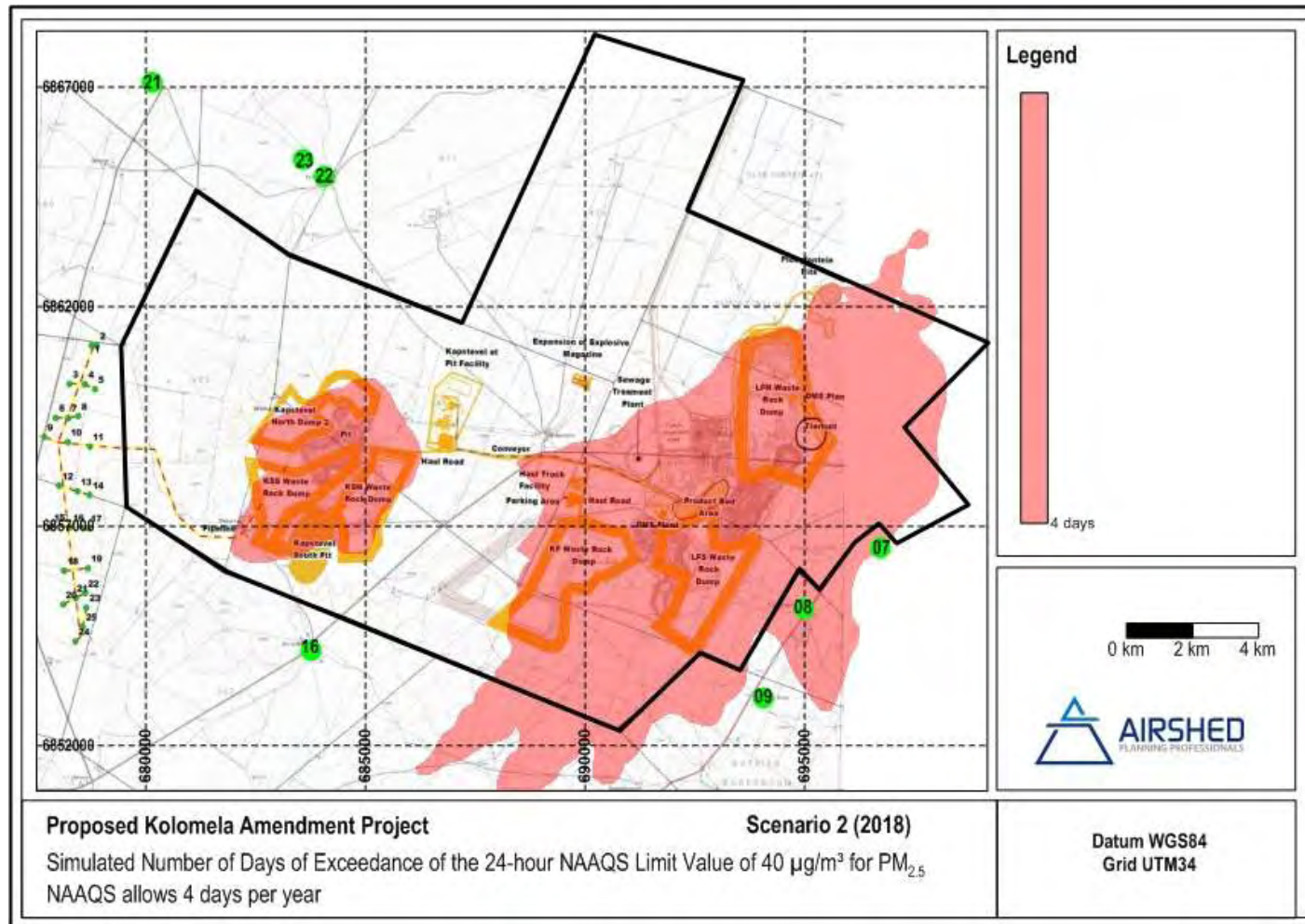


FIGURE 8.16: PREDICTED AREAS EXCEEDING THE NUMBER OF DAYS AS REQUIRED BY THE 24-HOUR NAAQS LIMITS FOR PM_{2.5} FOR SCENARIO 2

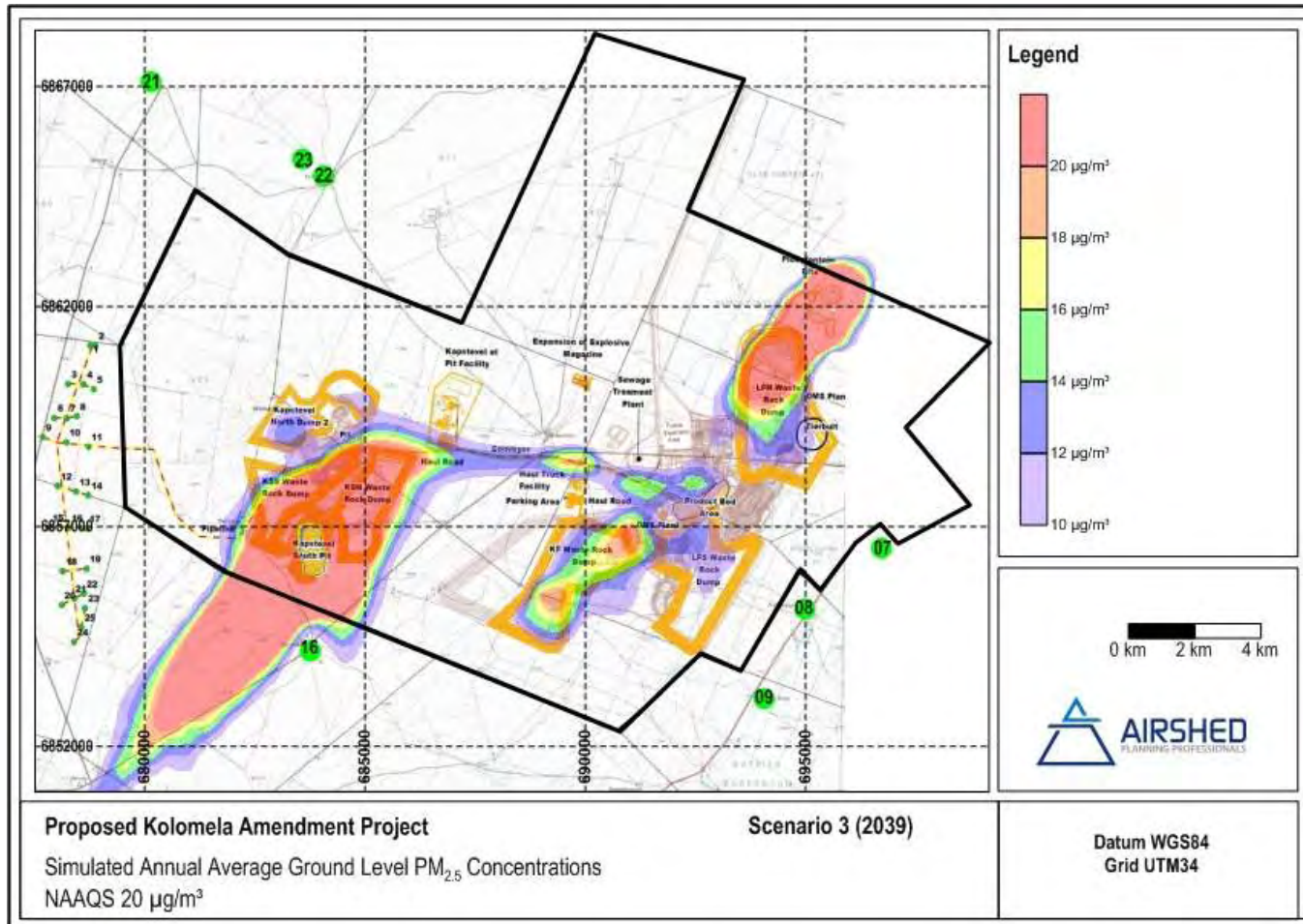


FIGURE 8.17: PREDICTED ANNUAL AVERAGE PM_{2.5} GROUNDLEVEL CONCENTRATIONS FOR SCENARIO 3

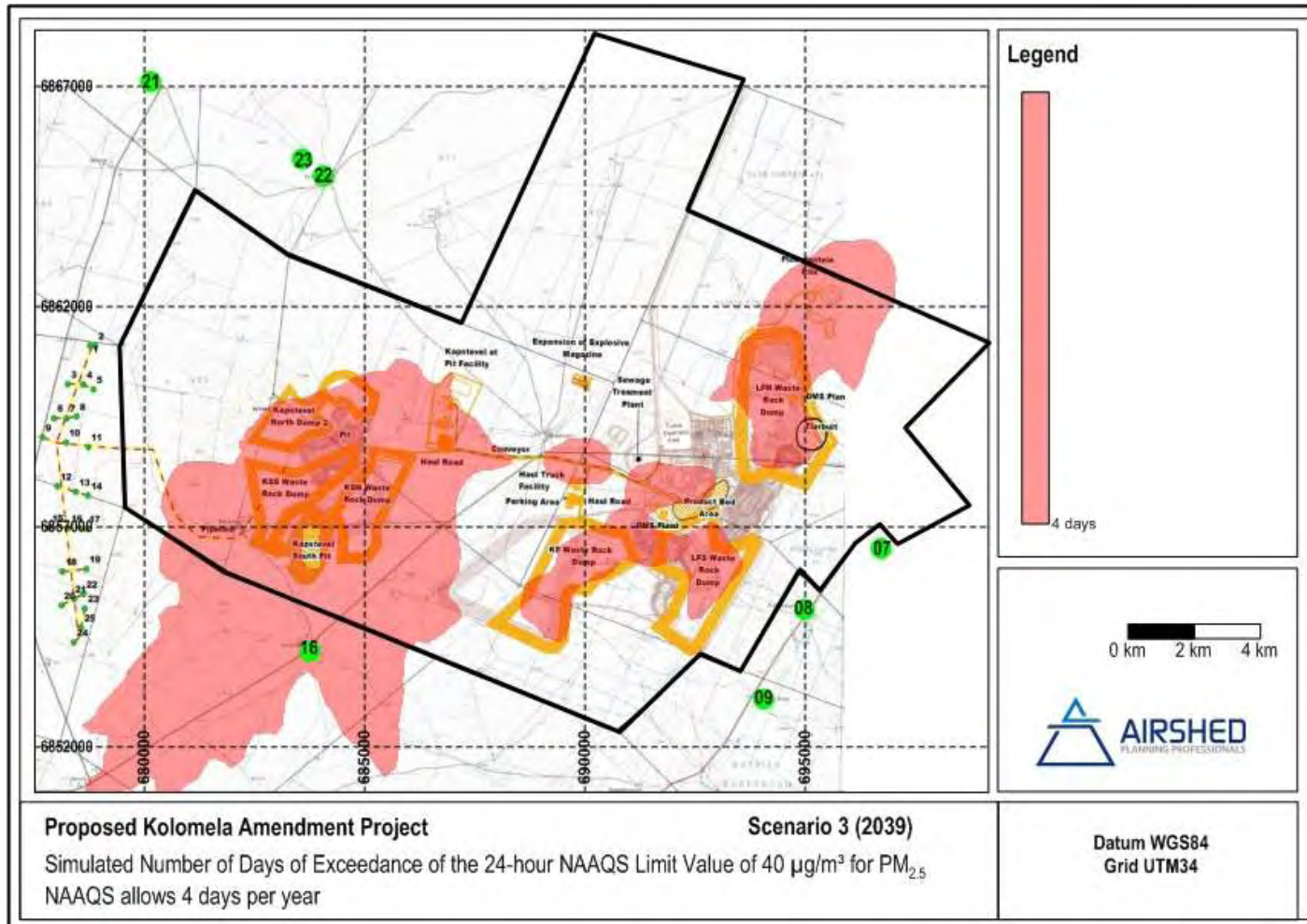


FIGURE 8.18: PREDICTED AREAS EXCEEDING THE NUMBER OF DAYS AS REQUIRED BY THE 24-HOUR NAAQS LIMITS FOR $\text{PM}_{2.5}$ FOR SCENARIO 3

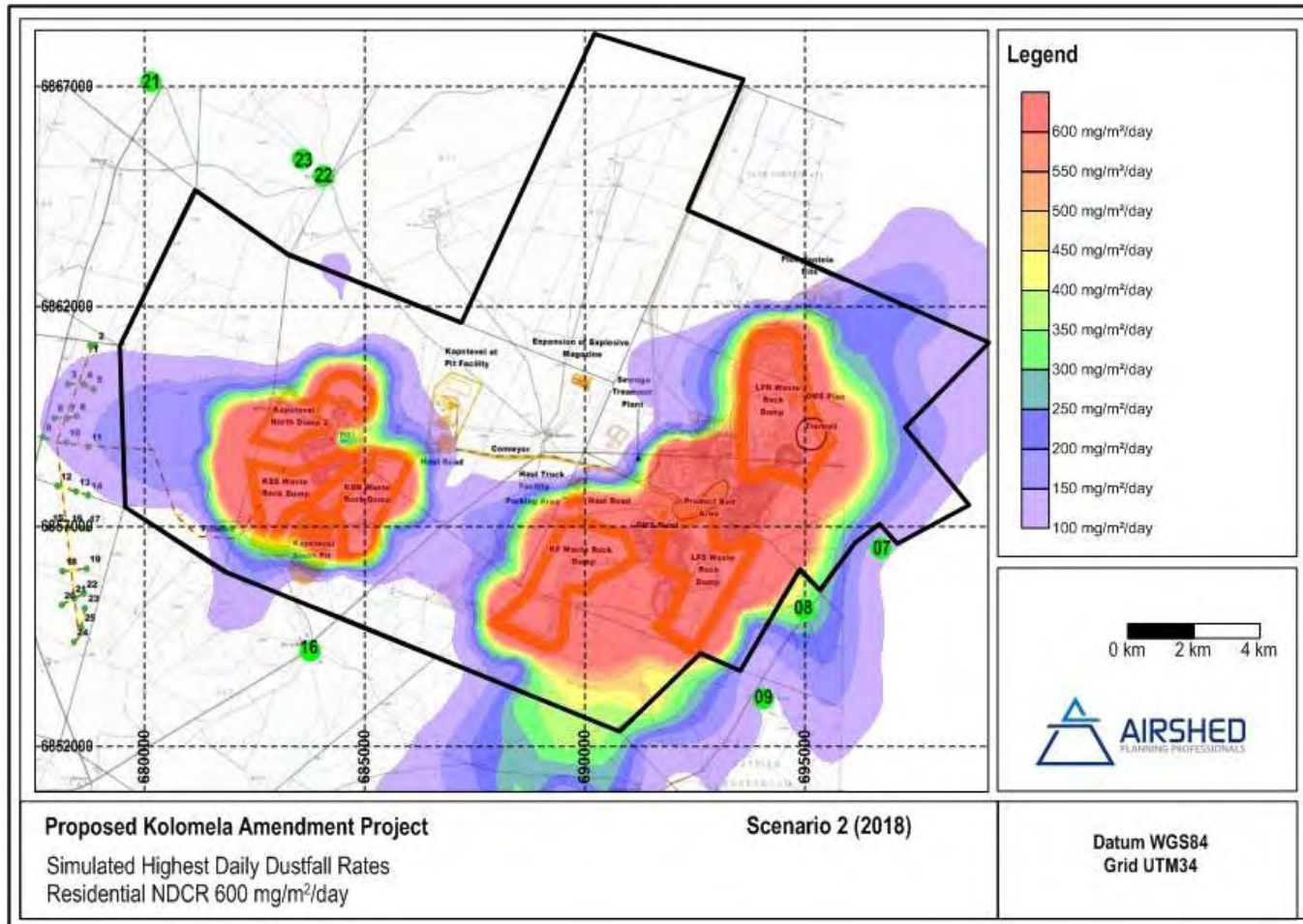


FIGURE 8.19: PREDICTED DAILY DUST FALLOUT RATES FOR SCENARIO 2

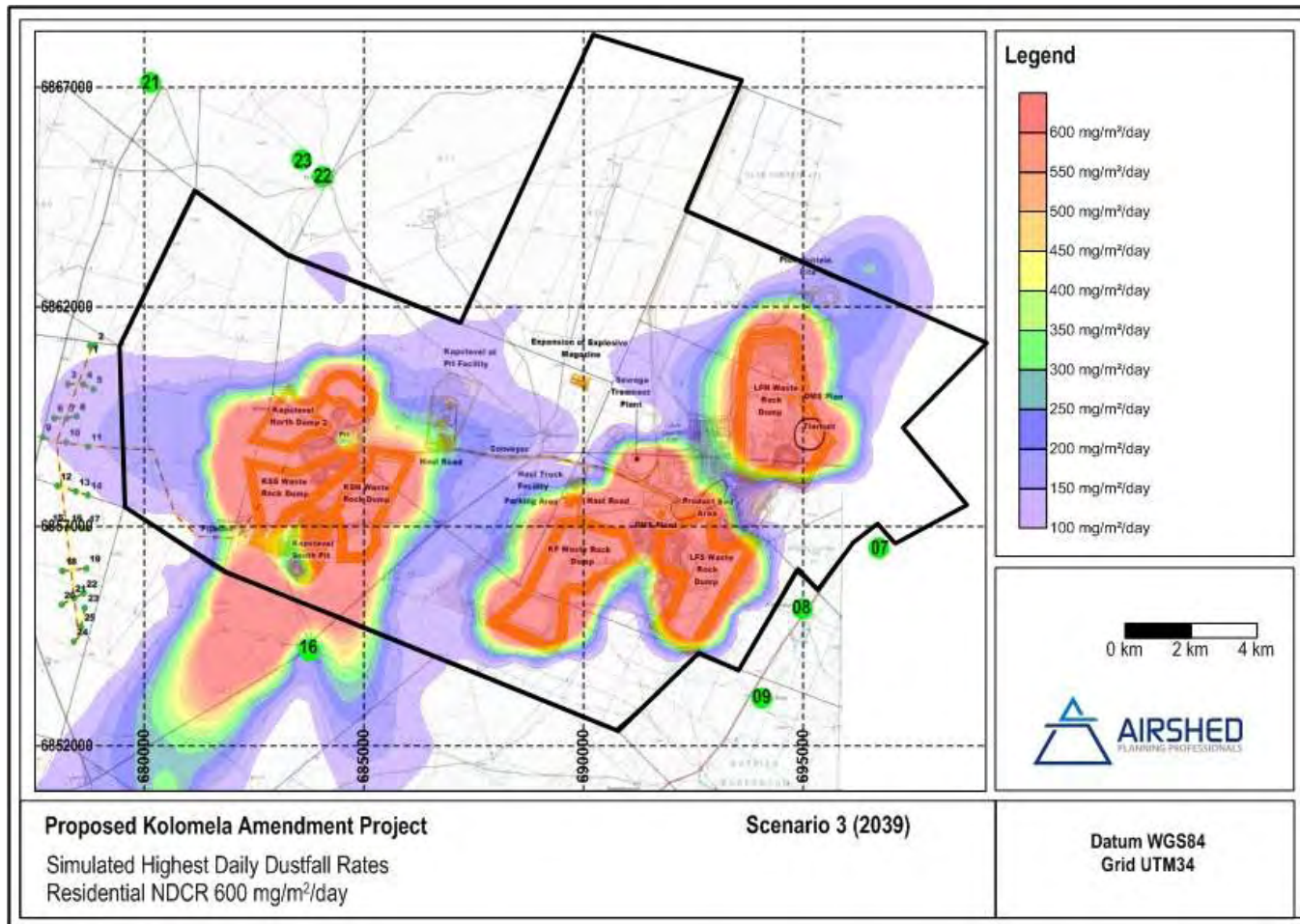


FIGURE 8.20: PREDICTED DAILY DUST FALLOUT RATES FOR SCENARIO 3

Source: Airshed (2015)

8.3.6 NOISE IMPACTS

The impact prediction is based on the findings of the Noise Impact Assessment undertaken by Airshed Planning Professionals (Part C – Report F).

It was determined that activities at Kolomela in 2024 (year of maximum impact footprint) may increase night time noise levels at some receptor points Soetfontein (6), Kameelfontein (7), Klipbankfontein (9) and Sunnyside (16) to above the IFC guideline for residences. The most notable increase in noise levels is expected to be at Sunnyside which lies south of Kapstevél South Pit especially at night. It should be noted that this property is owned by SIOC with no private persons residing there. The property thus serves as a buffer for the mine impacts to the south of Kolomela.

According to SANS 10103 (2008), community response will vary from 'little' to 'medium' reaction with 'sporadic' to 'widespread' complaints. It should be noted that the predicted noise impacts of pits are conservative as it is assumed operations will be at surface, however, noise from pit mining will be reduced as mining proceeds below surface.

Mitigation of noise impacts are expected to be difficult, especially as it requires operational control – which is not deemed feasible and has not been considered.

The predicted day-time and night-time noise levels (cumulative) at the year of highest activity are given in Figures 8.21 and 8.22.

The impacts of the proposed development on certain receptors is thus expected to be HIGH.

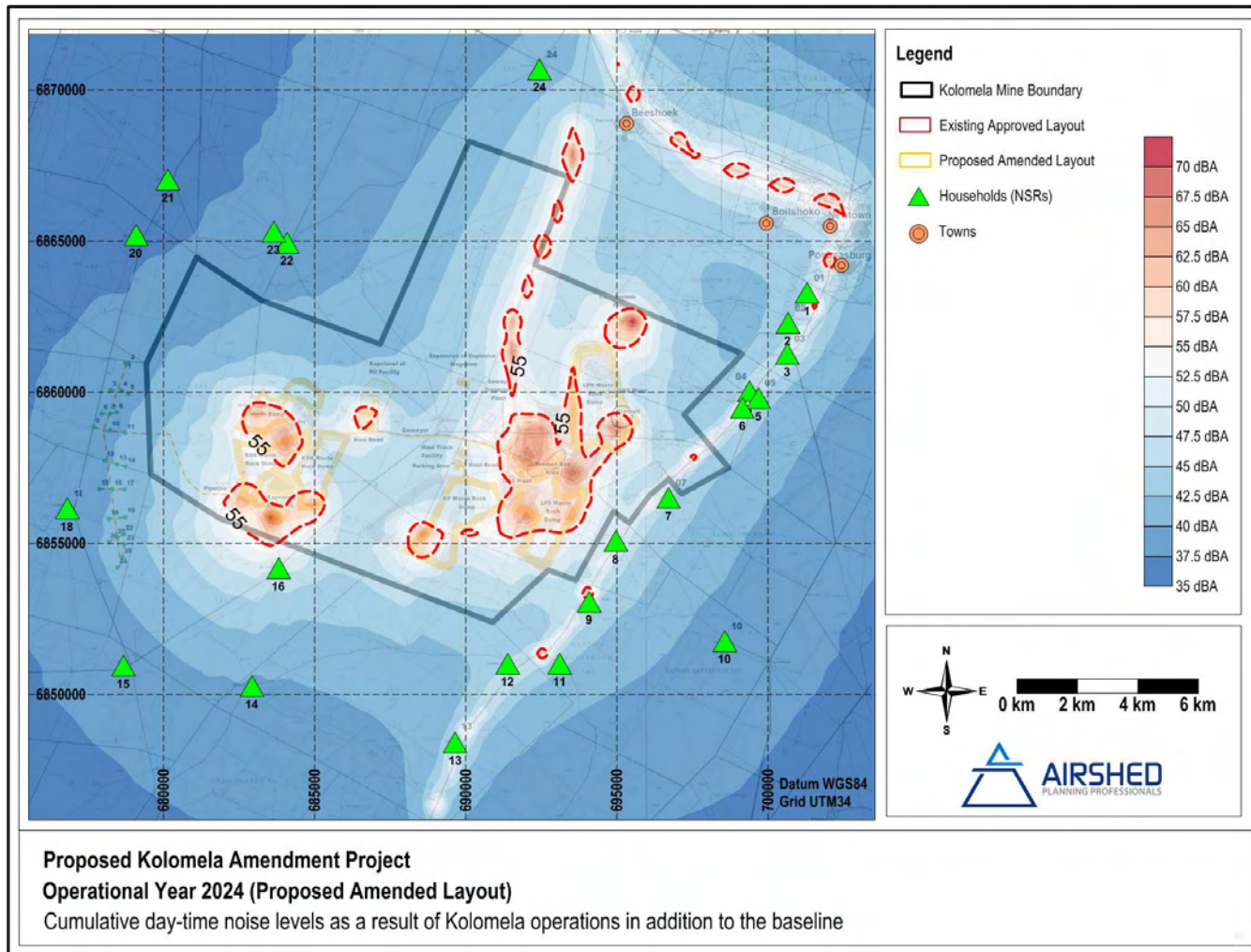


FIGURE 8.21: PREDICTED CUMULATIVE DAY-TIME NOISE LEVELS (YEAR 2024)

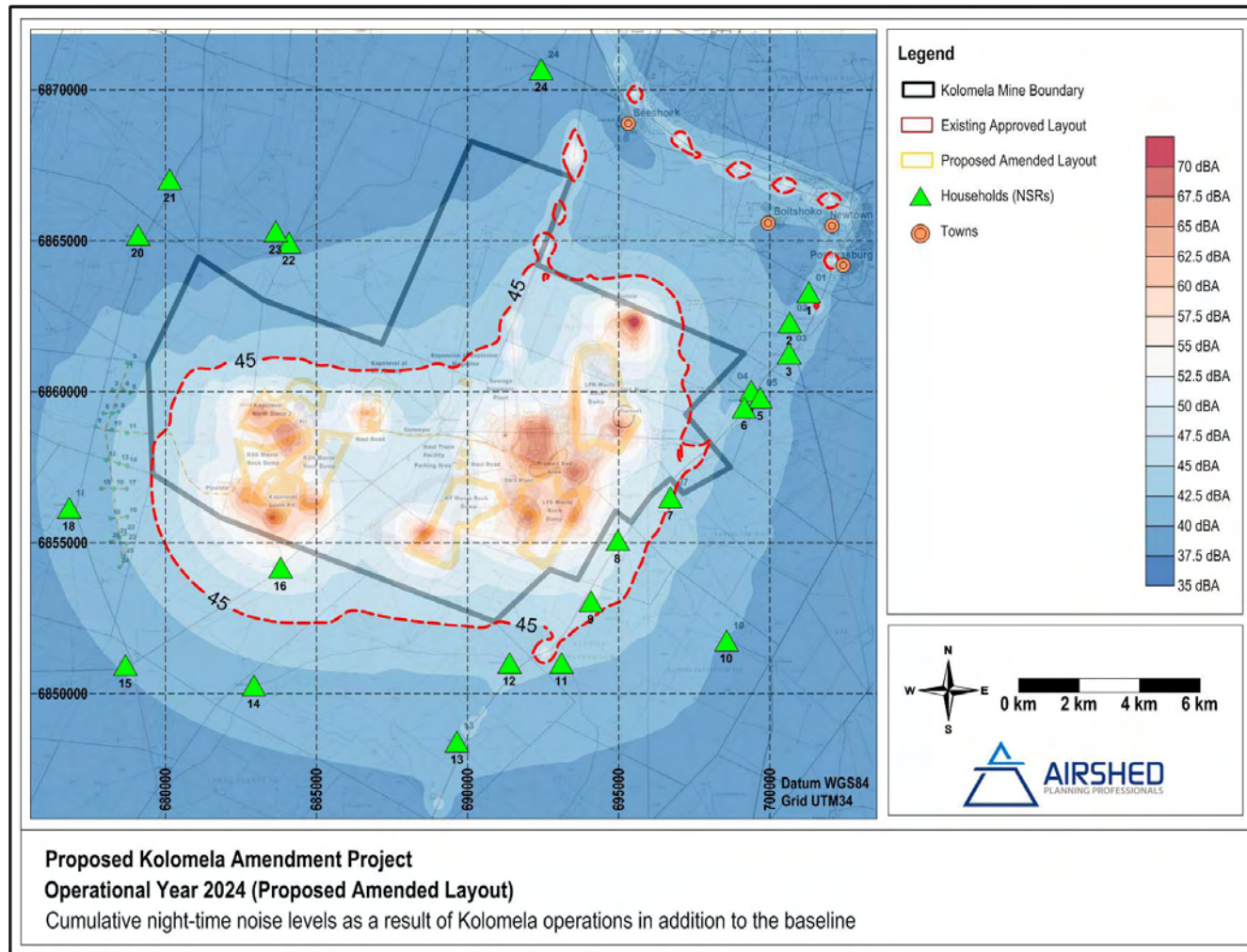


FIGURE 8.22: PREDICTED CUMULATIVE NIGHT-TIME NOISE LEVELS (YEAR 2024)

Source: Airshed (2015)

8.3.7 VISUAL IMPACTS

The impact prediction is based on the findings of the Visual Impact Assessment undertaken by Synergistics Environmental Services (Part C – Report XX).

Based on Synergistics (2015) it is evident that the mine infrastructure will be visible from nearby receptors including residences. The presence of large trees (up to 12 m) in the lines of site will reduce the impact marginally for some houses. However, it is predicted that infrastructure that extends above a height of 12 m will be clearly visible. It is expected that any residences located further than 10 km from the site are unlikely to have disturbance of views during the day. The waste rock dumps will reach 70 m above ground level.

Optimisation of backfilling, ongoing rehabilitation including shaping and vegetation of waste rock dumps will serve to assist in amelioration of visual intrusion, but the impact will remain HIGH.

There will be a definite impact on neighbouring residences at night with lighting masts of above 10 m being clearly visible to persons in residences at close by receptors 7, 14, and 21. The night glow resulting from the mine lighting can be expected to be visible for residences as far as 50 km from the site.

Lighting should be focussed in the direction of areas of work and light spill can be reduced by the inclusion of lighting hoods to reduce light spill. Sodium vapour lights should also be considered as the light spill for such lights is less and the lights also have lower potential to attract insects.

8.3.8 HERITAGE IMPACTS

The impact prediction is based on the findings of the Heritage Impact Assessment undertaken by PGS Heritage (2015, Part C – Report E).

The Heritage Impact Assessment revealed that based on Site Layout Plan 2 (Figure 6.2, Heritage Site KOL 2 is located within the south-by-southwestern end of Kapsteveld WRD. The development of this dump will have a direct and permanent impact on the site in that it will be destroyed. The impact was considered to be moderate due to the low heritage significance of the site (Stone Age Artefacts). However, in keeping with the Kolomela Heritage Management Plan (African Heritage Consultants, 2011), the site has been excluded in the mitigated Site Layout Plan 3 (Figure 6.3) and a buffer of 400 m around the site implemented.

The proposed Kapsteveld North WRD as proposed in Site Layout Plan 2 would not extend to KOL 3 (a historic mine), but would be placed on its northern (210 m away), western and (170 m away) and southern (150 m away) ends. As a result the impact on the site will be peripheral and not direct. The site is of high heritage significance and the impact has been reduced by ensuring that a 400 m buffer is maintained around the site in Site Layout Plan 3 (Figure 6.3).

The southern end of the Kapsteveld WRD as originally planned in Site Layout Plan 2 (Figure 6.2) would result in the destruction of the farm worker cemetery (KOL 4.4) and accommodation at the historical farmstead (KOL 4). The Kapsteveld WRD has been moved in Site Layout Plan 3 (Figure 6.3) to protect the cemetery and also provide a buffer area around the homestead as per the requirements of the Kolomela Heritage Management Plan (African Heritage Consultants, 2011).

The revised Layout Plan 3 results in the reduction of the heritage impact due to the Kapsteveld WRD from VERY HIGH to MODERATE.

The proposed development of the pipeline to the Aquifer Recharge Project on Floradale would pass right next to the northern end of the Bredenkamp family cemetery. As a result, a direct negative impact on the cemetery was expected. This would mean that the cemetery will be damaged or destroyed if the development of the Aquifer Recharge pipeline continues unmitigated. The pipeline route has been relocated in the mitigated Layout Plan 3 (Figure 6.3) to protect the cemetery.

The impact of the Aquifer Recharge Project on heritage has been reduced from HIGH to VERY LOW.

The unmitigated and mitigated layout of the Kapsteveld WRD and Aquifer Recharge Pipeline are given in Figure 8.23.

Several pans along the eastern portions of the Kolomela Mine have been identified as having lithics of Stone Age Material (Sites KOL5, 6, 7 and 8). These sites are considered to be of Low to Medium heritage significance. Where possible the WRDs layouts have been revised to avoid these clusters as far as practicable (see Site Layout Plan 3, Figure 6.3). It is not possible to avoid these sites completely and a Phase 2 Assessment will be required of representative sites.

The impact of the Ploegfontein Pit, Leeuwfontein North WRD and Leeuwfontein South WRD have been reduced from MODERATE to VERY LOW.

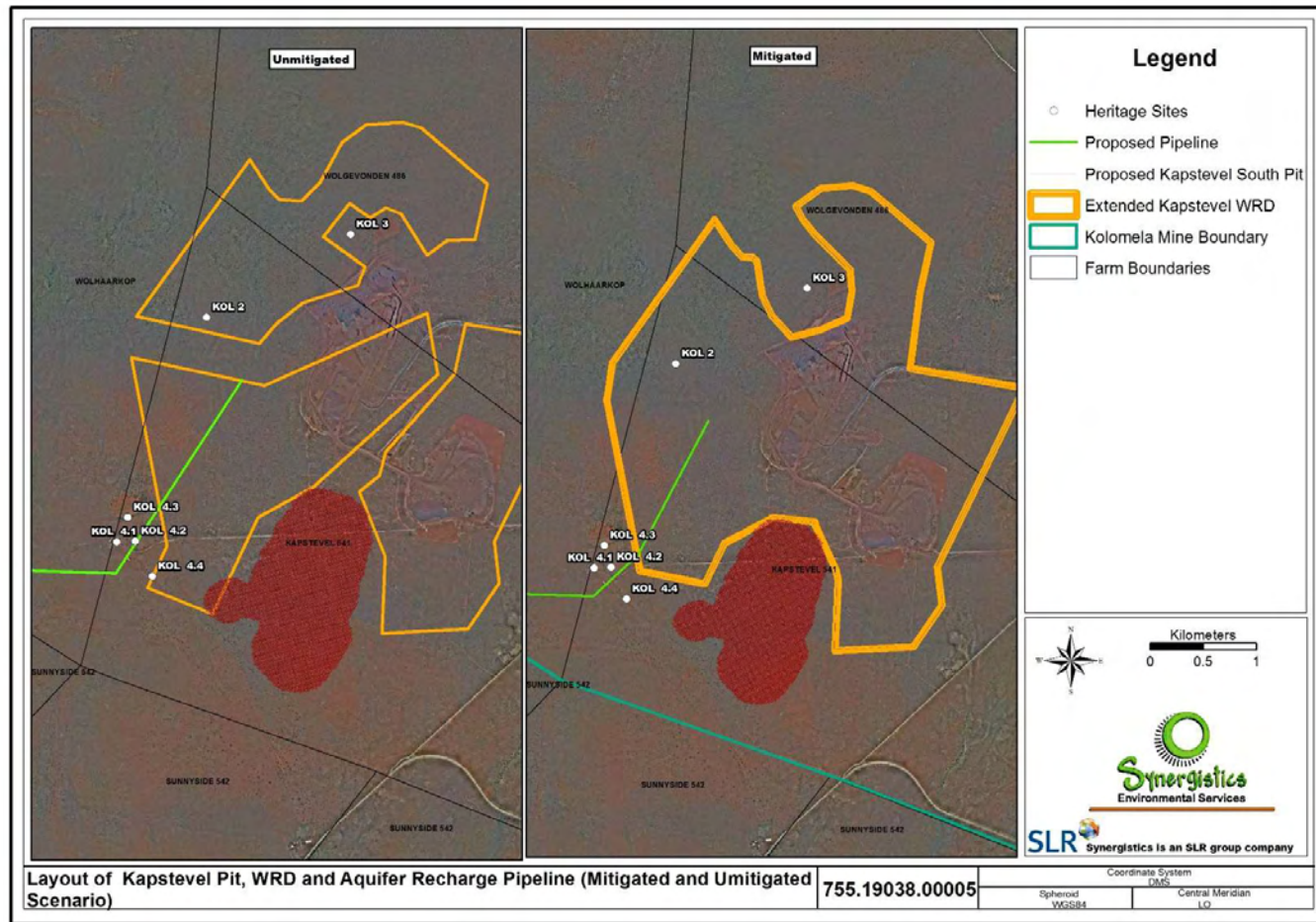


FIGURE 8.23: LAYOUT OF KAPSTEVEL PIT, WRD AND AQUIFER RECHARGE PIPELINE (MITIGATED AND MITIGATED SCENARIO)

8.3.9 SOCIO-ECONOMIC IMPACTS

The impact prediction is based on the findings of the Social Impact Assessment Report by G3 Business Solutions (2015, Part C – Report H).

It should be noted that the impacts are based on information available at the time of writing. Constant changes in economic circumstances may mean that these impacts may be different, but unpredictable at this stage.

8.3.9.1 Unemployment due to Kumba Cost Cutting

The restructuring and cost cutting process currently underway at Kumba operations will result in unemployment. At the time of the Social Impact Assessment (G3, Business Solutions, 2015), a number of projects had been terminated, 872 contractor employees are no longer involved in mine project on or off-site since the beginning of 2015. This expansion caters for all the potential expansion going forward and the current “cost cutting measures” and the actual expansion are therefore not aligned. There is also no indication or guarantee that the additional permanent employees needed for the expansions, will fit the skills profile of the contractor employees who will lose their jobs. Since the proposed expansion and the cost-cutting measures will occur they have been included as an impact at Kolomela Mine.

The impact of unemployment is difficult to mitigate and is regarded as HIGH.

8.3.9.2 Pressure on Municipal Services and Capacity due to Rapidly Growing Population

There has been a rapid growth of the population in Tsantsabane, mostly as a result of Kolomela Mine’s arrival. The local municipality was not prepared for the increased demands for services and did not have the financial and other resources to expand its capacity in time. Basic service delivery is under pressure, with the limited capacity of the existing waste water treatment works the most concerning aspect. Increasing informal settlements, illegal electricity and water connections, and non-payment for municipal services are contributing to the pressure on service delivery. Expansions at Kolomela Mine can amplify this negative impact directly as well as indirectly. The additional permanent employees and contractor employees required from outside of Tsantsabane over the ramp-up period, will increase pressure on service delivery. An increased influx of job seekers into the area due to the job opportunities created by the project, will further put pressure on service delivery, especially servicing the growing informal settlements. Potential non-payment of services by contractor employees who lose their jobs when contracts come to an end is another negative impact.

The impact is difficult to mitigate but could possibly be reduced from HIGH to MODERATE through capacity building and pressure on contractors to employ locally.

8.3.9.3 Shortage of Proper and Affordable Housing

Despite Kolomela constructing houses for most of its employees, a shortage of affordable and proper housing has emerged due to the demand for accommodation, brought about by indirect and induced effects of the mine’s presence in the area. The demand has seen renting and buying prices surge to a level that the public service sector is struggling to attract and retain professional employees. It is expected that approximately 478 additional permanent employees will be recruited due to expansion and that these employees will come from outside the area to fill skilled and semi-skilled positions at the mine. These new households coming to the area will struggle to find decent housing at an affordable price. In addition, the permanent employees who are

expected to be recruited locally, might struggle to improve their living conditions if they would want to move to better housing once permanently employed. It is therefore expected that the current shortage of affordable, proper housing will be increased because of the project.

Mitigation opportunities include:

- Housing policy and building of additional houses (including rental stock) for employees.
- Project to provide accommodation for public service health professionals.

If successfully implemented the impact could be reduced from HIGH to MODERATE.

8.3.10 TRAFFIC IMPACTS

The impact prediction is based on the findings of the Traffic Impact Assessment undertaken by Jeffares and Green (2014, Part C – Report I).

The current network was analysed over a period of 15 years with respect to anticipated developments proposed for Kolomela Mine. It was found that the total traffic will increase by 10% by the year 2028. This will affect user experience. In addition, there may be structural damage to local roads. It is proposed that upgrades be undertaken to alleviate the impact. These include geometric and structural upgrades of selected links. Some gravel roads may require surfacing and ones affected for short periods may require a more comprehensive maintenance plan including dust suppression. Responsibility should be shared between the developers and the road owners (provincial, municipal and private). Alternative routes can also be investigated.

The predicted HIGH impact on traffic could be reduced to MODERATE with successful mitigation.

8.4 THE POSSIBLE MITIGATION MEASURES THAT COULD BE APPLIED AND THE LEVEL OF RISK

The mitigation measures for each of the identified impacts are included in **Table 8.1 of Section 8.8**. Mitigation of key impacts and risks are also discussed in detail in Section 8.3.

The significance of the impact with mitigation has been weighted by multiplying the significance rating without significance by the following depending on the confidence placed in the successful implementation of the mitigation measures or the effectiveness of those measures in reducing the impact.

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

8.5 MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

Not applicable as alternatives layouts have been considered based on the mitigation of impacts (See Section 6.1.1 and Section 8.3).

8.6 STATEMENT MOTIVATING THE ALTERNATIVE DEVELOPMENT LOCATION WITHIN THE OVERALL SITE

The layout for the development has been revised in order to avoid and/or reduce impacts as far as possible. **Site Layout 3 (Figure 6.3) presents the mitigated scenario which is motivated as the preferred alternative development location.**

Impacts on drainage/watercourses has been reduced from HIGH to VERY LOW by changing the layout of the Klipbankfontein At Pit Facility. Impact on drainage at the Kapsteveld DMS Plant has also been reduced from HIGH to LOW.

Impacts on wetland pans has been substantially reduced by revising the layout of the Leeuwfontein North WRD, the Leeuwfontein South WRD as well as the haul road to the Ploegfontein Pits. The revised layout takes into account the avoidance of wetland pan catchments as far as practicable. The revision has resulted in the reduction of the impact from HIGH to MODERATE at the Ploegfontein Pit and Leeuwfontein South WRD areas.

A change in the layout of the Kapsteveld WRD in Site Layout 3 has also reduced the impact on heritage sites, from VERY HIGH to MODERATE by avoiding sensitive sites.

THE CHANGE IN THE LAYOUT TO LAYOUT PLAN 3 PRESENTS A SUBSTANTIAL REDUCTION ENVIRONMENTAL RISKS/IMPACTS

8.7 FULL DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY, ASSESS AND RANK THE IMPACTS AND RISKS THE ACTIVITY WILL IMPOSE ON THE PREFERRED SITE (IN RESPECT OF THE FINAL SITE LAYOUT PLAN) THROUGH THE LIFE OF THE ACTIVITY

Please refer to Section 8.2 for the methodology used in the ranking of impacts. Please refer to Section 8.4 for the methodology used for the application of a mitigation confidence ranking to the impact ranking.

8.8 ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT RISK

KEY TO IMPACT SIGNIFICANCE

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

TABLE 8.1: IMPACT RISK ASSESSMENT

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
KAPSTEVEL SOUTH PIT AND EVAPORATION POND	Geology	Removal of mineral resources	O	4	5	4.5	1	2.75	1	2.75	None Possible	1	2.75
		Sinkhole development due to dewatering activities	O	3	5	4	1	2.5	0.6	1.5	A dolomite stability study has been conducted and from that a dolomite stability management plan has been developed and is currently being implemented.	1	1.5
	Soil	Loss of available soil	O	4	5	4.5	1	2.75	1	2.75	Strip available topsoil. Protect stockpiles from erosion. Amelioration, tilling and aeration of soils prior to revegetation to restore soil fertility. Concurrent rehabilitation to ensure soil is used as soon as practicable.	0.5	1.375
		Contamination of soils	O	3	5	4	1	2.5	0.6	1.5	Protection of soils for spillages and leaks originating from the handling and storage of hazardous substances. Treatment of contaminated soils (bioremediation).	0.2	0.3
	Topography	Creation of open pit	O	3	5	4	1	2.5	1	2.5	Additional backfilling	1	2.5
		Creation of hazardous or unstable slopes.	O	3	5	4	1	2.5	0.8	2	Stabilisation of pit slopes	0.5	1
	Groundwater	Lowering of groundwater levels	O	5	5	5	4	4.5	1	4.5	Confirm spatial extent of dewatering cone and update dewatering requirements on an ongoing basis. Aquifer recharge.	0.8	3.6
		Contamination of underlying aquifers	O&C	1	5	3	5	4	0.2	0.8	Reduce ingress into underlying aquifers.	1	0.8
	Surface Water	Disturbance of drainage lines/watercourses	O	5	5	5	3	4	0.2	0.8	None required	0.8	0.8
		Contamination of surface water	O	4	4	4	2	3	0.6	1.8	Divert clean water around dirty water areas. Dirty run-off collecting in pit to be pumped to the Kapstevl South Evaporation Pond	0.2	0.36
	Wetlands	No wetlands in the proximity of the Kapstevl South Pit and Evaporation Pond											
	Biodiversity	Destruction of sensitive habitats	O	3	5	4	1	2.5	0.2	0.5	No sites of conservation importance identified in the footprint area.	0	0
		Loss of vegetation and habitat	O	5	5	5	1	3	1	3	Permits to be in place of removal of vegetation. Rehabilitation of evaporation dam footprint on closure.	0.5	1.5
		Loss of sensitive species	O	4	5	4.5	1	2.75	1	2.75	Permits to be in place for removal of protected species.	1	2.75
		Proliferation of alien species	O	2	5	3.5	1	2.25	0.6	1.35	Implementation of invasive vegetation monitoring and control programme. Remove existing populations of legislated weeds to reduce source populations	0.5	0.675

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
	Air Quality	Increase in fallout dust levels	O	3	3	3	3	3	1	3	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	1	3
		Increase in particulate dust levels (PM10 and PM 2.5)	O	3	3	3	3	3	1	3	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	1	3
		Increase in concentration of gaseous emissions	O	2	3	2.5	3	2.75	1	2.75	Routine maintenance of vehicles, equipment and generators. Optimisation of vehicle movement and haul distances.	1	2.75
	Noise	Increase of noise levels due to mining activities	O	5	3	4	3	3.5	1	3.5	Ongoing monitoring and community consultation	1	3.5
		Blasting	O	5	1	3	3	3	1	3	Ongoing monitoring and community consultation	1	3
	Visual Environment	Disturbance of views	O&C	1	5	3	3	3	0.4	1.2	Optimise backfilling into pit. Rehabilitation of evaporation pond on closure.	0.5	0.6
	Heritage	Loss of sites of heritage importance	O	3	5	4	4	4	0.2	0.8	Contact heritage specialist should sites become apparent during operations and implement mitigation as necessary.	0.2	0.16
	Land Capability	Loss of grazing land	O	3	5	4	1	2.5	1	2.5	Optimise backfilling into pits. Rehabilitation of evaporation pond on closure.	0.5	1.25
	Land Use	Change in land use from agriculture to mining	O	3	5	4	1	2.5	1	2.5	Optimise backfilling into pit. Rehabilitation of evaporation pond on closure.	0.5	1.25

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
EXPANSION OF KAPSTEVEL WASTE ROCK DUMP	Geology	Sterilisation of mineral resources	0	4	5	4.5	1	2.75	0.6	1.65	Kolomela to consult with Kumba geology as to final layout of the WRD. Sterilisation drilling to be undertaken prior to disposal, if required.	0.5	0.825
	Soil	Loss of available soil	0	3	5	4	1	2.5	1	2.5	Strip available topsoil. Protect stockpiles from erosion. Amelioration, tilling and aeration of soils prior to revegetation to restore soil fertility. Concurrent rehabilitation to ensure soil is used as soon as practicable.	0.5	1.25
		Contamination of soils	0	3	5	4	1	2.5	0.6	1.5	Protection of soils for spillages and leaks originating from the handling and storage of hazardous substances. Treatment of contaminated soils (bioremediation).	0.2	0.3
	Topography	Development of WRD	0	5	5	5	1	3	1	3	Maximise backfilling potential. Reshape and rehabilitate side slopes as part of ongoing rehabilitation.	1	3
	Groundwater	Contamination of underlying aquifers	0	3	5	4	5	4.5	0.4	1.8	Divert clean water around dumps. Dewatering result in low risk of contamination.	0.5	0.9
	Surface Water	Disturbance of drainage lines/watercourses	0	5	5	5	3	4	0.2	0.8	None required		0.8
		Contamination of surface water	0	4	4	4	2	3	0.6	1.8	Divert clean water around dirty water areas.	0.2	0.36
	Wetlands	No wetlands in the proximity of the Kapstevael South Waste Rock Dump											
	Biodiversity	Destruction of sensitive habitats	0	3	5	4	1	2.5	0.2	0.5	No sites of conservation importance identified in the footprint area.	0	0
		Loss of vegetation and habitat	0	5	5	5	1	3	1	3	Permits to be in place of removal of vegetation. Rehabilitation of evaporation dam footprint on closure.	0.5	1.5
		Loss of sensitive species	0	5	5	5	1	3	1	3	Permits to be in place for removal of protected species.	1	3
		Proliferation of alien species	0	2	5	3.5	1	2.25	0.6	1.35	Implementation of invasive vegetation monitoring and control programme. Remove existing populations of legislated weeds to reduce source populations	0.5	0.675
	Air Quality	Increase in fallout dust levels	0	3	5	4	3	3.5	1	3.5	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	1	3.5

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
		Increase in particulate dust levels (PM10 and PM 2.5)	O	3	5	4	3	3.5	1	3.5	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	1	3.5
		Increase in concentration of gaseous emissions	O	2	3	2.5	3	2.75	1	2.75	Routine maintenance of vehicles, equipment and generators. Optimisation of vehicle movement and haul distances.	1	2.75
	Noise	Increase of noise levels due to mining activities	O	5	3	4	3	3.5	1	3.5	Ongoing monitoring and community consultation	1	3.5
	Visual Environment	Disturbance of views	O&C	5	5	5	3	4	1	4	Optimise backfilling into pit. Reshaping and concurrent rehabilitation of slopes to reduce visual intrusion.	0.8	3.2
	Heritage	Loss of sites of heritage importance	O	5	5	5	4	4.5	1	4.5	Revise layout plan to reduce impact on heritage resources (particularly graves and other sites of high significance) - see final layout alternative.	0.5	2.25
	Land Capability	Loss of grazing land	O	3	5	4	1	2.5	1	2.5	Optimise backfilling into pits. Rehabilitation of side slopes to allow grazing after closure.	0.8	2
	Land Use	Change in land use from agriculture to mining	O	4	5	4.5	1	2.75	1	2.75	Optimise backfilling into pits. Rehabilitation of side slopes to allow grazing after closure.	0.8	2.2

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
PLOEGFONTEIN AND TIERBULT PITS INCLUDING HAUL ROAD AND EVAPORATION POND	Geology	Removal of mineral resources	O	4	5	4.5	1	2.75	1	2.75	None Possible	1	2.75
		Sinkhole development due to dewatering activities	O	3	5	4	1	2.5	0.6	1.5	Undertake risk assessment to understand potential for sinkhole development. Implement mitigation measures as appropriate and depending on risks.	1	1.5
	Soil	Loss of available soil	O	3	5	4	1	2.5	1	2.5	Strip available topsoil. Protect stockpiles from erosion. Amelioration, tilling and aeration of soils prior to revegetation to restore soil fertility. Concurrent rehabilitation to ensure soil is used as soon as practicable.	0.5	1.25
		Contamination of soils	O	3	5	4	1	2.5	0.6	1.5	Protection of soils for spillages and leaks originating from the handling and storage of hazardous substances. Treatment of contaminated soils (bioremediation).	0.2	0.3
	Topography	Creation of open pit	O	3	5	4	1	2.5	1	2.5	Optimise backfilling.	1	2.5
		Creation of hazardous or unstable slopes.	O	3	5	4	1	2.5	0.8	2	Stabilisation of pit slopes	0.5	1
	Groundwater	Lowering of groundwater levels	O	5	5	5	4	4.5	1	4.5	Confirm spatial extent of dewatering cone and update dewatering requirements on an ongoing basis. Aquifer Recharge.	0.8	3.6
		Contamination of underlying aquifers	O&C	2	5	3.5	5	4.25	0.4	1.7	Reduce ingress into underlying aquifers.	1	1.7
	Surface Water	Disturbance of drainage lines/watercourses	O	5	5	5	3	4	0.2	0.8	None required	0.8	0.8
		Contamination of surface water	O	4	4	4	2	3	0.6	1.8	Divert clean water around dirty water areas. Dirty run-off collecting in pit to be pumped to the Ploegfontein Evaporation Pond	0.2	0.36
	Wetlands	Loss of wetland pan habitat and ecological structure	O	4	5	4.5	2	3.25	1	3.25	Minimise/alter mining footprint to reduce extent of impact. Buffer zones to include pan catchments (see Jones & Wagener, 2015). Minimise secondary impacts.	0.8	2.6
		Changes to wetland ecological and sociocultural service provision	O	2	5	3.5	1	2.25	1	2.25	Minimise/alter mining footprint to reduce extent of impact. Buffer zones to include pan catchments (see Jones & Wagener, 2015). Minimise secondary impacts.	0.8	1.8
		Change to wetland hydrological function	O	3	5	4	2	3	1	3	Minimise/alter mining footprint to reduce extent of impact. Buffer zones to include pan catchments (see Jones & Wagener, 2015). Minimise secondary impacts.	0.8	2.4
	Biodiversity	Destruction of sensitive habitats	O	2	5	3.5	1	2.25	0.2	0.45	No sites of conservation importance (other than wetlands) identified in the footprint area.	1	0.45
		Loss of vegetation and habitat	O	3	5	4	1	2.5	1	2.5	Permits to be in place of removal of vegetation. Rehabilitation of evaporation dam footprint on closure.	0.5	1.25

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
		Loss of sensitive species	O	3	5	4	1	2.5	1	2.5	Permits to be in place for removal of protected species.	1	2.5
		Proliferation of alien species	O	2	5	3.5	1	2.25	0.6	1.35	Implementation of invasive vegetation monitoring and control programme. Remove existing populations of legislated weeds to reduce source populations	0.5	0.675
Air Quality		Increase in fallout dust levels	O	3	3	3	3	3	1	3	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	1	3
		Increase in particulate dust levels (PM10 and PM 2.5)	O	3	3	3	3	3	1	3	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	1	3
		Increase in concentration of gaseous emissions	O	2	3	2.5	3	2.75	1	2.75	Routine maintenance of vehicles, equipment and generators. Optimisation of vehicle movement and haul distances.	1	2.75
Noise		Increase of noise levels due to mining activities	O	5	3	4	3	3.5	1	3.5	Ongoing monitoring and community consultation	1	3.5
		Blasting	O	5	1	3	3	3	1	3	Ongoing monitoring and community consultation	1	3
Visual Environment		Disturbance of views	O&C	1	5	3	3	3	0.4	1.2	Optimise backfilling into pit. Rehabilitation of evaporation pond on closure.	0.5	0.6
Heritage		Loss of sites of heritage importance	O	3	5	4	1	2.5	1	2.5	Revise layout to reduce impact on heritage site where practicable. Phase 2 assessment to be undertaken on disturbed sites.	0.2	0.5
Land Capability		Loss of grazing land	O	2	5	3.5	1	2.25	1	2.25	Optimise backfilling into pits. Rehabilitation of evaporation pond on closure.	0.5	1.125
Land Use		Change in land use from agriculture to mining	O	2	5	3.5	1	2.25	1	2.25	Optimise backfilling into pit. Rehabilitation of evaporation pond on closure.	0.5	1.125

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
EXPANSION OF LEEUWFOONTEIN NORTH WASTE ROCK DUMP	Geology	Sterilisation of mineral resources	O	4	5	4.5	1	2.75	0.6	1.65	Kolomela to consult with Kumba geology as to final layout of the WRD. Sterilisation drilling to be undertaken prior to disposal, if required.	0.5	0.825
	Soil	Loss of available soil	O	3	5	4	1	2.5	1	2.5	Strip available topsoil. Protect stockpiles from erosion. Amelioration, tilling and aeration of soils prior to revegetation to restore soil fertility. Concurrent rehabilitation to ensure soil is used as soon as practicable.	0.5	1.25
		Contamination of soils	O	3	5	4	1	2.5	0.6	1.5	Protection of soils for spillages and leaks originating from the handling and storage of hazardous substances. Treatment of contaminated soils (bioremediation).	0.2	0.3
	Topography	Development of WRD	O	5	5	5	1	3	1	3	Optimise backfilling.	1	3
	Groundwater	Contamination of underlying aquifers	O	3	5	4	5	4.5	0.4	1.8	Divert clean water around dumps. Dewatering result in low risk of contamination.	0.5	0.9
	Surface Water	Disturbance of drainage lines/watercourses	O	5	5	5	3	4	0.2	0.8	None required	0.8	0.8
		Contamination of surface water	O	4	4	4	2	3	0.6	1.8	Divert clean water around dirty water areas.	0.2	0.36
	Wetlands	Loss of wetland pan habitat and ecological structure	O	3	5	4	2	3	1	3	Minimise/alter mining footprint to reduce extent of impact. Buffer zones to include pan catchments (see Jones & Wagener, 2015). Minimise secondary impacts.	0.5	1.5
		Changes to wetland ecological and sociocultural service provision	O	1	5	3	1	2	1	2	Minimise/alter mining footprint to reduce extent of impact. Buffer zones to include pan catchments (see Jones & Wagener, 2015). Minimise secondary impacts.	0.5	1
		Change to wetland hydrological function	O	2	5	3.5	2	2.75	1	2.75	Minimise/alter mining footprint to reduce extent of impact. Buffer zones to include pan catchments (see Jones & Wagener, 2015). Minimise secondary impacts.	0.5	1.375
	Biodiversity	Destruction of sensitive habitats	O	2	5	3.5	1	2.25	0.2	0.45	No sites of conservation importance (other than wetlands) identified in the footprint area.	1	0.45
		Loss of vegetation and habitat	O	2	5	3.5	1	2.25	1	2.25	Permits to be in place of removal of vegetation. Rehabilitation of evaporation dam footprint on closure.	0.5	1.125
		Loss of sensitive species	O	2	5	3.5	1	2.25	1	2.25	Permits to be in place for removal of protected species.	1	2.25
	Proliferation of alien species	O	2	5	3.5	1	2.25	0.6	1.35	Implementation of invasive vegetation monitoring and control programme. Remove existing populations of legislated weeds to reduce source populations	0.5	0.675	

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
	Air Quality	Increase in fallout dust levels	O	3	5	4	3	3.5	1	3.5	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	1	3.5
		Increase in particulate dust levels (PM10 and PM 2.5)	O	3	5	4	3	3.5	1	3.5	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	1	3.5
		Increase in concentration of gaseous emissions	O	2	3	2.5	3	2.75	1	2.75	Routine maintenance of vehicles, equipment and generators. Optimisation of vehicle movement and haul distances.	1	2.75
	Noise	Increase of noise levels due to mining activities	O	5	3	4	3	3.5	1	3.5	Ongoing monitoring and community consultation	1	3.5
		Blasting	O	5	1	3	3	3	1	3	Ongoing monitoring and community consultation	1	3
	Visual Environment	Disturbance of views	O&C	5	5	5	3	4	1	4	Optimise backfilling into pit. Reshaping and concurrent rehabilitation of slopes to reduce visual intrusion.	0.8	3.2
	Heritage	Loss of sites of heritage importance	O	3	5	4	1	2.5	1	2.5	Revise layout to reduce impact on heritage site where practicable. Phase 2 assessment to be undertaken on disturbed sites.	0.2	0.5
	Land Capability	Loss of grazing land	O	2	5	3.5	1	2.25	1	2.25	Optimise backfilling into pits. Rehabilitation of evaporation pond on closure.	0.5	1.125
	Land Use	Change in land use from agriculture to mining	O	2	5	3.5	1	2.25	1	2.25	Optimise backfilling into pit. Rehabilitation of evaporation pond on closure.	0.5	1.125

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
EXPANSION OF LEEUWFontein SOUTH WASTE ROCK DUMP	Geology	Sterilisation of mineral resources	0	4	5	4.5	1	2.75	0.6	1.65	Kolomela to consult with Kumba geology as to final layout of the WRD. Sterilisation drilling to be undertaken prior to disposal, if required.	0.5	0.825
	Soil	Loss of available soil	0	3	5	4	1	2.5	1	2.5	Strip available topsoil. Protect stockpiles from erosion. Amelioration, tilling and aeration of soils prior to revegetation to restore soil fertility. Concurrent rehabilitation to ensure soil is used as soon as practicable.	0.5	1.25
		Contamination of soils	0	3	5	4	1	2.5	0.6	1.5	Protection of soils for spillages and leaks originating from the handling and storage of hazardous substances. Treatment of contaminated soils (bioremediation).	0.2	0.3
	Topography	Development of WRD	0	5	5	5	1	3	1	3	Optimise backfilling.	1	3
	Groundwater	Contamination of underlying aquifers	0	2	5	3.5	5	4.25	0.4	1.7	Divert clean water around dumps. Dewatering result in low risk of contamination.	0.5	0.85
	Surface Water	Disturbance of drainage lines/watercourses	0	5	5	5	3	4	0.2	0.8	None required		0.8
		Contamination of surface water	0	4	4	4	2	3	0.6	1.8	Divert clean water around dirty water areas.	0.2	0.36
	Wetlands	Loss of wetland pan habitat and ecological structure	0	4	5	4.5	2	3.25	1	3.25	Minimise/alter mining footprint to reduce extent of impact. Buffer zones to include pan catchments (see Jones & Wagener, 2015). Minimise secondary impacts.	0.8	2.6
		Changes to wetland ecological and sociocultural service provision	0	2	5	3.5	1	2.25	1	2.25	Minimise/alter mining footprint to reduce extent of impact. Buffer zones to include pan catchments (see Jones & Wagener, 2015). Minimise secondary impacts.	0.8	1.8
		Change to wetland hydrological function	0	3	5	4	2	3	1	3	Minimise/alter mining footprint to reduce extent of impact. Buffer zones to include pan catchments (see Jones & Wagener, 2015). Minimise secondary impacts.	0.8	2.4
	Biodiversity	Destruction of sensitive habitats	0	3	5	4	1	2.5	0.2	0.5	No sites of conservation importance (other than wetlands) identified in the footprint area.	1	0.5
		Loss of vegetation and habitat	0	3	5	4	1	2.5	1	2.5	Permits to be in place of removal of vegetation. Rehabilitation of evaporation dam footprint on closure.	0.5	1.25
		Loss of sensitive species	0	3	5	4	1	2.5	1	2.5	Permits to be in place for removal of protected species.	1	2.5
	Proliferation of alien species	0	2	5	3.5	1	2.25	0.6	1.35	Implementation of invasive vegetation monitoring and control programme. Remove existing populations of legislated weeds to reduce source populations	0.5	0.675	

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
	Air Quality	Increase in fallout dust levels	O	3	5	4	3	3.5	1	3.5	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	1	3.5
		Increase in particulate dust levels (PM10 and PM 2.5)	O	3	5	4	3	3.5	1	3.5	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	1	3.5
		Increase in concentration of gaseous emissions	O	2	3	2.5	3	2.75	1	2.75	Routine maintenance of vehicles, equipment and generators. Optimisation of vehicle movement and haul distances.	1	2.75
	Noise	Increase of noise levels due to mining activities	O	5	3	4	3	3.5	1	3.5	Ongoing monitoring and community consultation	1	3.5
		Blasting	O	5	1	3	3	3	1	3	Ongoing monitoring and community consultation	1	3
	Visual Environment	Disturbance of views	O&C	5	5	5	3	4	1	4	Optimise backfilling. Reshaping and concurrent rehabilitation of slopes to reduce visual intrusion.	0.8	3.2
	Heritage	Loss of sites of heritage importance	O	3	5	4	1	2.5	1	2.5	Revise layout to reduce impact on heritage site where practicable. Phase 2 assessment to be undertaken on disturbed sites.	0.5	1.25
	Land Capability	Loss of grazing land	O	2	5	3.5	1	2.25	1	2.25	Optimise backfilling into pits. Rehabilitation of evaporation pond on closure.	0.5	1.125
	Land Use	Change in land use from agriculture to mining	O	2	5	3.5	1	2.25	1	2.25	Optimise backfilling into pit. Rehabilitation of evaporation pond on closure.	0.5	1.125

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
EXPANSION OF KLPBANKFONTEIN WASTE ROCK DUMP	Geology	Sterilisation of mineral resources	0	5	5	5	1	3	0.6	1.8	Kolomela to consult with Kumba geology as to final layout of the WRD. Sterilisation drilling to be undertaken prior to disposal, if required.	0.8	1.44
	Soil	Loss of available soil	0	3	5	4	1	2.5	1	2.5	Strip available topsoil. Protect stockpiles from erosion. Amelioration, tilling and aeration of soils prior to revegetation to restore soil fertility. Concurrent rehabilitation to ensure soil is used as soon as practicable.	0.5	1.25
		Contamination of soils	0	3	5	4	1	2.5	0.6	1.5	Protection of soils for spillages and leaks originating from the handling and storage of hazardous substances. Treatment of contaminated soils (bioremediation).	0.2	0.3
	Topography	Development of WRD	0	5	5	5	1	3	1	3	Optimise backfilling.	1	3
	Groundwater	Contamination of underlying aquifers	0	3	5	4	5	4.5	0.4	1.8	Divert clean water around dumps. Dewatering result in low risk of contamination.	0.5	0.9
	Surface Water	Disturbance of drainage lines/watercourses	0	5	5	5	3	4	0.2	0.8	None required		0.8
		Contamination of surface water	0	4	4	4	2	3	0.6	1.8	Divert clean water around dirty water areas.	0.2	0.36
	Wetlands	Loss of wetland pan habitat and ecological structure	0	2	5	3.5	2	2.75	1	2.75	Minimise/alter mining footprint to reduce extent of impact. Buffer zones to include pan catchments (see Jones & Wagener, 2015). Minimise secondary impacts.	0.5	1.375
		Changes to wetland ecological and sociocultural service provision	0	1	5	3	1	2	1	2	Minimise/alter mining footprint to reduce extent of impact. Buffer zones to include pan catchments (see Jones & Wagener, 2015). Minimise secondary impacts.	0.5	1
		Change to wetland hydrological function	0	1	5	3	2	2.5	1	2.5	Minimise/alter mining footprint to reduce extent of impact. Buffer zones to include pan catchments (see Jones & Wagener, 2015). Minimise secondary impacts.	0.5	1.25
	Biodiversity	Destruction of sensitive habitats	0	3	5	4	1	2.5	0.2	0.5	No sites of conservation importance (other than wetlands) identified in the footprint area.	1	0.5
		Loss of vegetation and habitat	0	3	5	4	1	2.5	1	2.5	Permits to be in place of removal of vegetation. Rehabilitation of evaporation dam footprint on closure.	0.5	1.25
		Loss of sensitive species	0	2	5	3.5	1	2.25	1	2.25	Permits to be in place for removal of protected species.	1	2.25
		Proliferation of alien species	0	2	5	3.5	1	2.25	0.6	1.35	Implementation of invasive vegetation monitoring and control programme. Remove existing populations of legislated weeds to reduce source populations	0.5	0.675

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
	Air Quality	Increase in fallout dust levels	O	3	5	4	3	3.5	1	3.5	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	1	3.5
		Increase in particulate dust levels (PM10 and PM 2.5)	O	3	5	4	3	3.5	1	3.5	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	1	3.5
		Increase in concentration of gaseous emissions	O	2	3	2.5	3	2.75	1	2.75	Routine maintenance of vehicles, equipment and generators. Optimisation of vehicle movement and haul distances.	1	2.75
	Noise	Increase of noise levels due to mining activities	O	5	3	4	3	3.5	1	3.5	Ongoing monitoring and community consultation	1	3.5
		Blasting	O	5	1	3	3	3	1	3	Ongoing monitoring and community consultation	1	3
	Visual Environment	Disturbance of views	O&C	5	5	5	3	4	1	4	Optimise backfilling. Reshaping and concurrent rehabilitation of slopes to reduce visual intrusion.	0.8	3.2
	Heritage	Loss of sites of heritage importance	O	3	5	4	1	2.5	0.2	0.5	Contact heritage specialist should sites become apparent during operations and implement mitigation as necessary.	0.2	0.1
	Land Capability	Loss of grazing land	O	2	5	3.5	1	2.25	1	2.25	Optimise backfilling into pits. Rehabilitation of evaporation pond on closure.	0.5	1.125
	Land Use	Change in land use from agriculture to mining	O	2	5	3.5	1	2.25	1	2.25	Optimise backfilling into pit. Rehabilitation of evaporation pond on closure.	0.5	1.125

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION	
NEW KAPSTLEVEL DMS PROCESSING PLANT AND STOCKPILE AREA INCLUDING CONVEYOR	Geology	Sterilisation of mineral resources	C	2	4	3	1	2	0.4	0.8	None considered necessary.	0.8	0.64	
	Soil	Loss of available soil	C	2	5	3.5	1	2.25	1	2.25	Minimise footprint of disturbance to that needed for operations. Strip available topsoil. Protect stockpiles from erosion. Amelioration, tilling and aeration of soils prior to revegetation to restore soil fertility.	0.5	1.125	
		Contamination of soils	C&O	4	5	4.5	1	2.75	0.8	2.2	Protection of soils for spillages and leaks originating from the handling and storage of hazardous substances. Treatment of contaminated soils (bioremediation).	0.5	1.1	
	Topography	Levelling of topography for infrastructure development.	C	2	5	3.5	1	2.25	0.8	1.8	Minimise footprint of disturbance to that needed for operations.	0.5	0.9	
	Groundwater	Contamination of underlying aquifers	C&O	2	5	3.5	2	2.75	0.8	2.2	Protection of groundwater resources from seepage that may originate from the storage and handling of hazardous substances by the implementation of bunding and impervious surfaces. Tailings to be temporarily stored in a facility provided with bunding and impervious surfaces.	0.5	1.1	
	Surface Water	Disturbance of drainage lines/watercourses	C	4	5	4.5	3	3.75	1	3.75	Revise layout to avoid watercourses where possible at processing plant. Conveyor to be aligned immediate adjacent to main haul road to avoid requirement for additional crossings.	0.5	1.875	
		Contamination of surface water	C&O	4	4	4	2	3	0.6	1.8	Separate any dirty water management area from any clean water management area. Contain all spills and prevent from coming into contact with run-off. Hazardous substances to be handled on impervious surfaces. Hazardous substances to be stored in bunded areas. Effluent is to be contained, treated and reused or removed from site.	0.2	0.36	
	Wetlands	No wetlands in the proximity of the Kapstlevel DMS Processing Plant, Stockpile area or Conveyor.												
	Biodiversity	Destruction of sensitive habitats	C	3	5	4	1	2.5	0.2	0.5	No sites of conservation importance identified in the footprint area.	1	0.5	
		Loss of vegetation and habitat	C	2	5	3.5	1	2.25	1	2.25	Permits to be in place of removal of vegetation. Rehabilitation of footprint on closure.	0.5	1.125	
		Loss of sensitive species	C	2	5	3.5	1	2.25	1	2.25	Permits to be in place for removal of protected species.	1	2.25	
		Proliferation of alien species	O	2	5	3.5	1	2.25	0.6	1.35	Implementation of invasive vegetation monitoring and control programme. Remove existing populations of legislated weeds to reduce source populations	0.5	0.675	

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
	Air Quality	Increase in fallout dust levels	C&O	3	3	3	3	3	0.4	1.2	Implementation of air quality management plan including wet suppression during material handling.	0.8	0.96
		Increase in particulate dust levels (PM10 and PM 2.5)	C&O	3	3	3	3	3	0.4	1.2	Implementation of air quality management plan including wet suppression during materials handling.	0.8	0.96
	Noise	Increase of noise levels due to processing and related activities	C&O	2	3	2.5	3	2.75	1	2.75	Ongoing monitoring and community consultation. Infrastructure to be maintained to ensure that noise levels remain within that required in terms of Occupational Health & Safety standards.	1	2.75
	Visual Environment	Disturbance of views	C&O	1	5	3	3	3	0.4	1.2	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.24
	Heritage	Loss of sites of heritage importance	C	1	5	3	1	2	0.2	0.4	Contact heritage specialist should sites become apparent during operations and implement mitigation as necessary.	0.2	0.08
	Land Capability	Loss of grazing land	C	2	5	3.5	1	2.25	1	2.25	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.45
	Land Use	Change in land use from agriculture to mining	C	2	5	3.5	1	2.25	1	2.25	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.45

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
TIERBULT PROCESSING PLANT	Geology	Sterilisation of mineral resources	C	2	4	3	1	2	0.2	0.4	None necessary as plant is located on WRD area.		0.4
	Soil	Loss of available soil	C	2	5	3.5	1	2.25	0.2	0.45	None necessary as plant is located on WRD area.		0.45
		Contamination of soils	C&O	4	5	4.5	1	2.75	0.2	0.55	None necessary as plant is located on WRD area.		0.55
	Topography	Levelling of topography for infrastructure development.	C	2	5	3.5	1	2.25	0.2	0.45	None necessary as plant is located on WRD area.		0.45
	Groundwater	Contamination of underlying aquifers	C&O	2	5	3.5	2	2.75	0.8	2.2	Protection of groundwater resources from seepage that may originate from the storage and handling of hazardous substances by the implementation of bunding and impervious surfaces. Tailings to be temporarily stored in a facility provided with bunding and impervious surfaces.	0.5	1.1
	Surface Water	Disturbance of drainage lines/watercourses	C	4	5	4.5	3	3.75	0.2	0.75	None necessary as plant is located on WRD area.		0.75
		Contamination of surface water	C&O	4	4	4	2	3	0.6	1.8	Separate any dirty water management area from any clean water management area. Contain all spills and prevent from coming into contact with run-off. Hazardous substances to be handled on impervious surfaces. Hazardous substances to be stored in bunded areas. Effluent is to be contained, treated and reused or removed from site.	0.2	0.36
	Wetlands	Disturbance of wetlands	C	2	5	3.5	2	2.75	0.2	0.55	None necessary as plant is located on WRD area.		0.55
	Biodiversity	Disturbance of biodiversity	C	3	5	4	1	2.5	0.2	0.5	None necessary as plant is located on WRD area.		0.5
		Proliferation of alien species	O	2	5	3.5	1	2.25	0.4	0.9	Implementation of invasive vegetation monitoring and control programme. Remove existing populations of legislated weeds to reduce source populations	0.5	0.45
	Air Quality	Increase in fallout dust levels	C&O	3	3	3	3	3	0.4	1.2	Implementation of air quality management plan including wet suppression during material handling.	0.8	0.96
		Increase in particulate dust levels (PM10 and PM 2.5)	C&O	3	3	3	3	3	0.4	1.2	Implementation of air quality management plan including wet suppression during materials handling.	0.8	0.96
Noise	Increase of noise levels due to processing and related activities	C&O	2	3	2.5	3	2.75	1	2.75	Ongoing monitoring and community consultation. Infrastructure to be maintained to ensure that noise levels remain within that required in terms of Occupational Health & Safety standards.	1	2.75	

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
	Visual Environment	Disturbance of views	C&O	1	5	3	3	3	0.4	1.2	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.24
	Heritage	Loss of sites of heritage importance	C	1	5	3	1	2	0.2	0.4	None necessary as plant is located on WRD area.	0.2	0.08
	Land Capability	Loss of grazing land	C	2	5	3.5	1	2.25	0.2	0.45	None necessary as plant is located on WRD area.	0.2	0.09
	Land Use	Change in land use from agriculture to mining	C	2	5	3.5	1	2.25	1	2.25	None necessary as plant is located on WRD area.	0.2	0.45

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
NEW KLIPBANKFONTEIN DMS PROCESSING PLANT AND STOCKPILE AREA	Geology	Sterilisation of mineral resources	C	2	4	3	1	2	0.2	0.4	None considered necessary.	0.8	0.32
	Soil	Loss of available soil	C	2	5	3.5	1	2.25	1	2.25	Strip available topsoil. Protect stockpiles from erosion. Amelioration, tilling and aeration of soils prior to revegetation to restore soil fertility.	0.5	1.125
		Contamination of soils	C&O	4	5	4.5	1	2.75	0.8	2.2	Protection of soils for spillages and leaks originating from the handling and storage of hazardous substances. Treatment of contaminated soils (bioremediation).	0.5	1.1
	Topography	Levelling of topography for infrastructure development	C	1	5	3	1	2	0.4	0.8	None considered necessary.		0.8
	Groundwater	Contamination of underlying aquifers	C&O	3	5	4	2	3	0.8	2.4	Protection of groundwater resources from seepage that may originate from the storage and handling of hazardous substances by the implementation of bunding and impervious surfaces. Tailings to be temporarily stored in a facility provided with bunding and impervious surfaces.	0.8	1.92
	Surface Water	Disturbance of drainage lines/watercourses	C	2	5	3.5	3	3.25	0.2	0.65	None considered necessary.		0.65
		Contamination of surface water	C&O	4	4	4	2	3	0.6	1.8	Separate any dirty water management area from any clean water management area. Contain all spills and prevent from coming into contact with run-off. Hazardous substances to be handled on impervious surfaces. Hazardous substances to be stored in bunded areas. Effluent is to be contained, treated and reused or removed from site.	0.2	0.36
	Wetlands	Disturbance of wetlands	C	2	5	3.5	2	2.75	0.4	1.1	Avoid disturbance of wetland pan catchment areas.	0.2	0.22
	Biodiversity	Destruction of sensitive habitats	C	3	5	4	1	2.5	0.2	0.5	No sites of conservation importance identified in the footprint area.	1	0.5
		Loss of vegetation and habitat	C	2	5	3.5	1	2.25	1	2.25	Permits to be in place of removal of vegetation. Rehabilitation of evaporation dam footprint on closure.	0.5	1.125
		Loss of sensitive species	O	1	5	3	1	2	1	2	Permits to be in place for removal of protected species.	1	2
		Proliferation of alien species	O	2	5	3.5	1	2.25	0.6	1.35	Implementation of invasive vegetation monitoring and control programme. Remove existing populations of legislated weeds to reduce source populations	0.5	0.675
	Air Quality	Increase in fallout dust levels	C&O	3	3	3	3	3	0.4	1.2	Implementation of air quality management plan including wet suppression during materials handling.	0.8	0.96

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
		Increase in particulate dust levels (PM10 and PM 2.5)	C&O	3	3	3	3	3	0.4	1.2	Implementation of air quality management plan including wet suppression during material handling.	0.8	0.96
	Noise	Increase of noise levels due to processing and related activities	C&O	3	3	3	3	3	1	3	Ongoing monitoring and community consultation. Infrastructure to be maintained to ensure that noise levels remain within that required in terms of Occupational Health & Safety standards.	1	3
	Visual Environment	Disturbance of views	C&O	1	5	3	3	3	0.4	1.2	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.24
	Heritage	Loss of sites of heritage importance	C	1	5	3	1	2	0.2	0.4	Contact heritage specialist should sites become apparent during operations and implement mitigation as necessary.	0.2	0.08
	Land Capability	Loss of grazing land	C	1	5	3	1	2	1	2	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.4
	Land Use	Change in land use from agriculture to mining	C	1	5	3	1	2	1	2	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.4

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION	
NEW KAPSTEVEL AT PIT FACILITY	Geology	Sterilisation of mineral resources	C	2	4	3	1	2	0.4	0.8	None considered necessary.	0.8	0.64	
	Soil	Loss of available soil	C	2	5	3.5	1	2.25	1	2.25	Minimise footprint of disturbance to that needed for operations. Strip available topsoil. Protect stockpiles from erosion. Amelioration, tilling and aeration of soils prior to revegetation to restore soil fertility.	0.5	1.125	
		Contamination of soils	C&O	4	5	4.5	1	2.75	0.8	2.2	Protection of soils for spillages and leaks originating from the handling and storage of hazardous substances. Treatment of contaminated soils (bioremediation).	0.5	1.1	
	Topography	Levelling of topography for infrastructure development.	C	2	5	3.5	1	2.25	0.8	1.8	Minimise footprint of disturbance to that needed for operations.	0.5	0.9	
	Groundwater	Contamination of underlying aquifers	C&O	3	5	4	2	3	0.8	2.4	Protection of groundwater resources from seepage that may originate from the storage and handling of hazardous substances by the implementation of bunding and impervious surfaces.	0.2	0.48	
	Surface Water	Disturbance of drainage lines/watercourses	C	2	5	3.5	2	2.75	1	2.75	Revise layout to avoid watercourses where possible. Conveyor to be aligned immediate adjacent to main haul road to avoid requirement for additional crossings.	0.5	1.375	
		Contamination of surface water	C&O	4	4	4	2	3	0.6	1.8	Separate any dirty water management area from any clean water management area. Contain all spills and prevent from coming into contact with run-off. Hazardous substances to be handled on impervious surfaces. Hazardous substances to be stored in bunded areas. Effluent is to be contained, treated and reused or removed from site.	0.2	0.36	
	Wetlands	No wetlands in the proximity of the Kapstevl At Pit Facility												
	Biodiversity	Destruction of sensitive habitats	C	3	5	4	1	2.5	0.2	0.5	No sites of conservation importance identified in the footprint area.	1	0.5	
		Loss of vegetation and habitat	C	2	5	3.5	1	2.25	1	2.25	Permits to be in place of removal of vegetation. Rehabilitation of footprint on closure.	0.5	1.125	
		Loss of sensitive species	C	2	5	3.5	1	2.25	1	2.25	Permits to be in place for removal of protected species.	1	2.25	
		Proliferation of alien species	O	2	5	3.5	1	2.25	0.6	1.35	Implementation of invasive vegetation monitoring and control programme. Remove existing populations of legislated weeds to reduce source populations	0.5	0.675	
	Air Quality	Increase in fallout dust levels	C&O	2	4	3	3	3	0.2	0.6	Dust suppression on haul roads including chemical suppression on main haul roads.	0.8	0.48	
		Increase in particulate dust levels (PM10 and PM 2.5)	C&O	2	4	3	3	3	0.2	0.6	Dust suppression on haul roads including chemical suppression on main haul roads.	0.8	0.48	

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
	Noise	Increase of noise levels due to processing and related activities	C&O	2	3	2.5	3	2.75	0.2	0.55	Ongoing monitoring and community consultation. Infrastructure to be maintained to ensure that noise levels remain within that required in terms of Occupational Health & Safety standards.	0.8	0.44
	Visual Environment	Disturbance of views	C&O	1	5	3	3	3	0.2	0.6	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.12
	Heritage	Loss of sites of heritage importance	C	1	5	3	1	2	0.2	0.4	Contact heritage specialist should sites become apparent during operations and implement mitigation as necessary.	0.2	0.08
	Land Capability	Loss of grazing land	C	2	5	3.5	1	2.25	1	2.25	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.45
	Land Use	Change in land use from agriculture to mining	C	2	5	3.5	1	2.25	1	2.25	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.45

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION	
NEW KLIPBANKFONTEIN AT PIT FACILITY AND HAUL ROAD	Geology	Sterilisation of mineral resources	C	2	4	3	1	2	0.6	1.2	Kumba geologists to review layout and revise layout as necessary.	0.2	0.24	
	Soil	Loss of available soil	C	2	5	3.5	1	2.25	1	2.25	Minimise footprint of disturbance to that needed for operations. Strip available topsoil. Protect stockpiles from erosion. Amelioration, tilling and aeration of soils prior to revegetation to restore soil fertility.	0.5	1.125	
		Contamination of soils	C&O	4	5	4.5	1	2.75	0.8	2.2	Protection of soils for spillages and leaks originating from the handling and storage of hazardous substances. Treatment of contaminated soils (bioremediation).	0.5	1.1	
	Topography	Levelling of topography for infrastructure development	C	2	5	3.5	1	2.25	0.8	1.8	Minimise footprint of disturbance to that needed for operations.	0.5	0.9	
	Groundwater	Contamination of underlying aquifers	C&O	3	5	4	2	3	0.8	2.4	Protection of groundwater resources from seepage that may originate from the storage and handling of hazardous substances by the implementation of bunding and impervious surfaces.	0.2	0.48	
	Surface Water	Disturbance of drainage lines/watercourses	C	4	5	4.5	3	3.75	1	3.75	Revise layout to avoid watercourses where possible - see final layout.	0.2	0.75	
		Contamination of surface water	C&O	4	4	4	2	3	0.6	1.8	Separate any dirty water management area from any clean water management area. Contain all spills and prevent from coming into contact with run-off. Hazardous substances to be handled on impervious surfaces. Hazardous substances to be stored in bunded areas. Effluent is to be contained, treated and reused or removed from site.	0.2	0.36	
	Wetlands	No wetlands in the proximity of the Klipbankfontein At Pit Facility												
	Biodiversity	Destruction of sensitive habitats	C	3	5	4	1	2.5	0.2	0.5	No sites of conservation importance identified in the footprint area.	1	0.5	
		Loss of vegetation and habitat	C	2	5	3.5	1	2.25	1	2.25	Permits to be in place of removal of vegetation. Rehabilitation of footprint on closure.	0.5	1.125	
		Loss of sensitive species	C	3	5	4	1	2.5	1	2.5	Permits to be in place for removal of protected species.	1	2.5	
		Proliferation of alien species	O	2	5	3.5	1	2.25	0.6	1.35	Implementation of invasive vegetation monitoring and control programme. Remove existing populations of legislated weeds to reduce source populations	0.5	0.675	
	Air Quality	Increase in fallout dust levels	C&O	2	4	3	3	3	0.2	0.6	Dust suppression on haul roads including chemical suppression on main haul roads.	0.8	0.48	
		Increase in particulate dust levels (PM10 and PM 2.5)	C&O	2	4	3	3	3	0.2	0.6	Dust suppression on haul roads including chemical suppression on main haul roads.	0.8	0.48	

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
	Noise	Increase of noise levels due to processing and related activities	C&O	2	3	2.5	3	2.75	0.2	0.55	Ongoing monitoring and community consultation. Infrastructure to be maintained to ensure that noise levels remain within that required in terms of Occupational Health & Safety standards.	0.8	0.44
	Visual Environment	Disturbance of views	C&O	1	5	3	3	3	0.2	0.6	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.12
	Heritage	Loss of sites of heritage importance	C	1	5	3	1	2	0.2	0.4	Contact heritage specialist should sites become apparent during operations and implement mitigation as necessary.	0.2	0.08
	Land Capability	Loss of grazing land	C	2	5	3.5	1	2.25	1	2.25	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.45
	Land Use	Change in land use from agriculture to mining	C	2	5	3.5	1	2.25	1	2.25	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.45

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
NEW HAUL ROADS TO KLIPBANKFONTEIN PIT AND LEEUWFONTEIN SOUTH WRD	Geology	Sterilisation of mineral resources	C	2	4	3	1	2	0.6	1.2	Kumba geologists to review layout and revise layout as necessary.	0.2	0.24
	Soil	Loss of available soil	C	2	5	3.5	1	2.25	1	2.25	Minimise footprint of disturbance to that needed for operations. Strip available topsoil. Protect stockpiles from erosion. Amelioration, tilling and aeration of soils prior to revegetation to restore soil fertility.	0.5	1.125
		Contamination of soils	C&O	4	5	4.5	1	2.75	0.8	2.2	Protection of soils for spillages and leaks originating from the handling and storage of hazardous substances. Treatment of contaminated soils (bioremediation).	0.5	1.1
	Topography	Levelling of topography for infrastructure development	C	2	5	3.5	1	2.25	0.8	1.8	Minimise footprint of disturbance to that needed for operations.	0.5	0.9
	Groundwater	Contamination of underlying aquifers	C&O	2	5	3.5	2	2.75	0.8	2.2	Protection of groundwater resources from seepage that may originate from the spillage of hazardous substances by the implementation of bunding and impervious surfaces.	0.2	0.44
	Surface Water	Disturbance of drainage lines/watercourses	C	4	5	4.5	3	3.75	0.2	0.75	None considered necessary.		0.75
		Contamination of surface water	C&O	4	4	4	2	3	0.6	1.8	Separate any dirty water management area from any clean water management area. Contain all spills and prevent from coming into contact with run-off. Hazardous substances to be handled on impervious surfaces. Hazardous substances to be stored in bunded areas. Effluent is to be contained, treated and reused or removed from site.	0.2	0.36
	Wetlands	Disturbance of wetlands	C	3	5	4	2	3	0.8	2.4	Avoid disturbance of wetland pans by re-routing if necessary. Secondary impacts on pans due to spillages during maintenance etc. to be avoided.	0.8	1.92
	Biodiversity	Destruction of sensitive habitats	C	3	5	4	1	2.5	0.2	0.5	No sites of conservation importance identified in the footprint area.	1	0.5
		Loss of vegetation and habitat	C	2	5	3.5	1	2.25	1	2.25	Permits to be in place of removal of vegetation. Rehabilitation of footprint on closure.	0.5	1.125
	Loss of sensitive species	C	2	5	3.5	1	2.25	1	2.25	Permits to be in place for removal of protected species.	1	2.25	

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
		Proliferation of alien species	O	1	5	3	1	2	0.6	1.2	Implementation of invasive vegetation monitoring and control programme. Remove existing populations of legislated weeds to reduce source populations	0.5	0.6
	Air Quality	Increase in fallout dust levels	C&O	5	4	4.5	3	3.75	0.8	3	Dust suppression on haul roads including chemical suppression on main haul roads.	1	3
		Increase in particulate dust levels (PM10 and PM 2.5)	C&O	5	4	4.5	3	3.75	0.8	3	Dust suppression on haul roads including chemical suppression on main haul roads.	1	3
	Noise	Increase of noise levels due to processing and related activities	C&O	2	3	2.5	3	2.75	0.6	1.65	Ongoing monitoring and community consultation. Infrastructure to be maintained to ensure that noise levels remain within that required in terms of Occupational Health & Safety standards.	1	1.65
	Visual Environment	Disturbance of views	C&O	1	5	3	3	3	0.2	0.6	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.12
	Heritage	Loss of sites of heritage importance	C	2	5	3.5	1	2.25	0.8	1.8	Avoid pans identified as being in heritage clusters - which are outside of disturbance footprint.	0.2	0.36
	Land Capability	Loss of grazing land	C	1	5	3	1	2	1	2	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.4
	Land Use	Change in land use from agriculture to mining	C	1	5	3	1	2	1	2	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.4

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION	
NEW EXPLOSIVES MAGAZINE	Geology	Sterilisation of mineral resources	C	2	4	3	1	2	0.4	0.8	None considered necessary.		0.8	
	Soil	Loss of available soil	C	1	5	3	1	2	1	2	Minimise footprint of disturbance to that needed for operations. Strip available topsoil. Protect stockpiles from erosion. Amelioration, tilling and aeration of soils prior to revegetation to restore soil fertility.	0.5	1	
		Contamination of soils	C&O	5	5	5	1	3	0.8	2.4	Contain all spills and prevent from coming into contact with run-off. Hazardous substances to be handled on impervious surfaces. Hazardous substances to be stored in bunded areas.	0.5	1.2	
	Topography	Levelling of topography for infrastructure development.	C	1	5	3	1	2	0.8	1.6	Minimise footprint of disturbance to that needed for operations.	0.5	0.8	
	Groundwater	Contamination of underlying aquifers	C&O	3	5	4	2	3	0.8	2.4	Protection of groundwater resources from seepage that may originate from the storage and handling of hazardous substances by the implementation of bunding and impervious surfaces.	0.5	1.2	
	Surface Water	Disturbance of drainage lines/watercourses	C	4	5	4.5	3	3.75	0.2	0.75	None considered necessary.		0.75	
		Contamination of surface water	C&O	4	4	4	2	3	0.8	2.4	Separate any dirty water management area from any clean water management area. Contain all spills and prevent from coming into contact with run-off. Hazardous substances to be handled on impervious surfaces. Hazardous substances to be stored in bunded areas. Effluent is to be contained, treated and reused or removed from site.	0.2	0.48	
	Wetlands	No wetlands in the proximity of the Explosive Magazine												
	Biodiversity	Destruction of sensitive habitats	C	3	5	4	1	2.5	0.2	0.5	No sites of conservation importance identified in the footprint area.	1	0.5	
		Loss of vegetation and habitat	C	1	5	3	1	2	1	2	Permits to be in place of removal of vegetation. Rehabilitation of footprint on closure.	0.5	1	
		Loss of sensitive species	C	1	5	3	1	2	0.8	1.6	Permits to be in place for removal of protected species.	1	1.6	
		Proliferation of alien species	O	1	5	3	1	2	0.6	1.2	Implementation of invasive vegetation monitoring and control programme. Remove existing populations of legislated weeds to reduce source populations	0.5	0.6	
	Air Quality	Increase in fallout dust levels	C&O	2	4	3	3	3	0.2	0.6	None considered necessary.		0.6	
		Increase in particulate dust levels (PM10 and PM 2.5)	C&O	2	4	3	3	3	0.2	0.6	None considered necessary.		0.6	

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
	Noise	Increase of noise levels due to processing and related activities	C&O	1	3	2	3	2.5	0.2	0.5	None considered necessary.		0.5
	Visual Environment	Disturbance of views	C&O	1	5	3	3	3	0.2	0.6	Removal of indrstructure and rehabilitation of footprint on closure.	0.2	0.12
	Heritage	Loss of sites of heritage importance	C	1	5	3	1	2	0.2	0.4	Contact heritage specialist should sites become apparent during operations and implement mitigation as necessary.	0.2	0.08
	Land Capability	Loss of grazing land	C	1	5	3	1	2	1	2	Removal of indrstructure and rehabilitation of footprint on closure.	0.2	0.4
	Land Use	Change in land use from agriculture to mining	C	1	5	3	1	2	1	2	Removal of indrstructure and rehabilitation of footprint on closure.	0.2	0.4

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION	
NEW SEWAGE TREATMENT WORKS	Geology	Sterilisation of mineral resources	C	2	4	3	1	2	0.2	0.4	None considered necessary.		0.4	
	Soil	Loss of available soil	C	1	5	3	1	2	0.2	0.4	Site already cleared - within railway balloon,		0.4	
		Contamination of soils	C&O	3	5	4	1	2.5	0.6	1.5	Contain all spills and prevent from coming into contact with run-off. Hazardous substances to be handled on impervious surfaces. Hazardous substances to be stored in bunded areas.	0.2	0.3	
	Topography	Levelling of topography for infrastructure development.	C	1	5	3	1	2	0.2	0.4	Site already levelled - within railway balloon.	0.5	0.2	
	Groundwater	Contamination of underlying aquifers	C&O	3	5	4	2	3	0.8	2.4	Protection of groundwater resources from seepage that may originate from the storage and handling of hazardous substances by the implementation of bunding and impervious surfaces.	0.2	0.48	
	Surface Water	Disturbance of drainage lines/watercourses	C&O	4	5	4.5	3	3.75	0.4	1.5	Disturbance of natural drainage/watercourse within the railway balloon is to be avoided.	0.2	0.3	
		Contamination of surface water	C&O	4	4	4	2	3	0.6	1.8	Contain dirty water run-off and leaks and prevent from entering into natural	0.2	0.36	
	Wetlands	No wetlands in the proximity of the sewage treatment works												
	Biodiversity	Disturbance of biodiversity	C	1	5	3	1	2	0.2	0.4	Site already cleared - within railway balloon,		0.4	
	Air Quality	Increase in fallout dust levels	C	2	4	3	3	3	0.2	0.6	None considered necessary.		0.6	
		Increase in particulate dust levels (PM10 and PM 2.5)	C	2	4	3	3	3	0.2	0.6	None considered necessary.		0.6	
	Noise	Increase of noise levels due to processing and related activities	C&O	1	3	2	3	2.5	0.2	0.5	None considered necessary.		0.5	
	Visual Environment	Disturbance of views	C&O	1	5	3	3	3	0.2	0.6	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.12	
	Heritage	Loss of sites of heritage importance	C	1	5	3	1	2	0.2	0.4	Site already cleared - within railway balloon,		0.4	
	Land Capability	Loss of grazing land	C	1	5	3	1	2	0.2	0.4	No additional disturbance		0.4	
	Land Use	Change in land use from agriculture to mining	C	1	5	3	1	2	0.2	0.4	No additional disturbance		0.4	

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
AQUIFER RECHARGE (INCLUDING PIPELINES)	Geology	Sterilisation of mineral resources	C	1	4	2.5	1	1.75	0.2	0.35	None considered necessary.		0.35
	Soil	Loss of available soil	C	1	5	3	1	2	0.6	1.2	Minimise footprint of disturbance to that needed for operations. Strip available topsoil where required (e.g. no stripping required along pipeline routes) Use stripped topsoil to rehabilitate disturbance used during construction.	0.5	0.6
		Contamination of soils	C	2	2	2	1	1.5	0.4	0.6	Contain all spills and prevent from coming into contact with run-off. Hazardous substances to be handled on impervious surfaces. Hazardous substances to be stored in banded areas.	0.5	0.3
	Topography	Levelling of topography for infrastructure development.	C	1	5	3	1	2	0.2	0.4	None considered necessary.	0.5	0.2
	Groundwater	Contamination of underlying aquifers	O	2	4	3	2	2.5	0.6	1.5	Local water quality is expected to improve.		1.5
	Surface Water	Disturbance of drainage lines/watercourses	C	4	5	4.5	3	3.75	1	3.75	Delineate 1 in 100 year flood line or 100 m buffer (whichever is greatest) as sensitive area - with restricted activities allowed. Minimise disturbance of banks and riverbeds. Minimise impedance of flow due to pipelines and boreholes.	0.8	3
		Change in natural hydrology	O	4	5	4.5	3	3.75	1	3.75	Monitor recharge volumes. Recharge of the aquifer must be done in a planned and controlled manner to prevent/minimise negative hydrological impact and promote positive impact on hydrology of the resource. Specific mention is made of monitoring of water volumes.	0.8	3
	Wetlands	Loss of valley bottom wetland habitat and ecological structure	O	4	5	4.5	2	3.25	1	3.25	Delineate 1 in 100 year flood line or 100 m buffer (whichever is greatest) as sensitive area - with restricted activities allowed. Minimise disturbance of banks and riverbeds. Minimise impedance of flow due to pipelines and boreholes.	0.8	2.6
		Changes to wetland ecological and sociocultural service provision	C	3	5	4	2	3	1	3	Delineate 1 in 100 year flood line or 100 m buffer (whichever is greatest) as sensitive area - with restricted activities allowed. Minimise disturbance of banks and riverbeds. Minimise impedance of flow due to pipelines and boreholes.	0.8	2.4

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
		Change to wetland hydrological function	O	3	5	4	1	2.5	1	2.5	Monitor recharge volumes. Recharge of the aquifer must be done in a planned and controlled manner to prevent/minimise negative hydrological impact and promote positive impact on hydrology of the resource. Specific mention is made of monitoring of water volumes.	0.8	2
	Biodiversity	Destruction of sensitive habitats	C	2	5	3.5	1	2.25	0.4	0.9	No sites of conservation importance identified in the footprint area.	1	0.9
		Loss of vegetation and habitat	C	2	5	3.5	1	2.25	1	2.25	Permits to be in place of removal of vegetation. Rehabilitation of footprint on closure.	0.5	1.125
		Loss of sensitive species	C	2	5	3.5	1	2.25	1	2.25	Permits to be in place for removal of protected species.	1	2.25
		Proliferation of alien species	O	3	5	4	2	3	0.8	2.4	Implementation of invasive vegetation monitoring and control programme. Remove existing populations of legislated weeds to reduce source populations	0.8	1.92
	Air Quality	Increase in fallout dust levels	C	1	4	2.5	2	2.25	0.2	0.45	None considered necessary.		0.45
		Increase in particulate dust levels (PM10 and PM 2.5)	C	1	4	2.5	2	2.25	0.2	0.45	None considered necessary.		0.45
	Noise	Increase of noise levels due to processing and related activities	C&O	1	3	2	3	2.5	0.2	0.5	None considered necessary.		0.5
	Visual Environment	Disturbance of views	C&O	5	5	5	3	4	0.2	0.8	Removal of infrastructure and rehabilitation of footprint on closure.	0.2	0.16
	Heritage	Loss of sites of heritage importance	C	5	5	5	3	4	1	4	Revise pipeline route - see revised layout plan.	0.2	0.8
	Land Capability	Loss of grazing land	C	1	5	3	1	2	0.2	0.4	None considered necessary.		0.4
	Land Use	Change in land use from agriculture to mining	C	1	5	3	1	2	0.2	0.4	None considered necessary.		0.4

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION	
KOLOMELA EXPANSION	SOCIO-ECONOMICS	Local procurement and enterprise development	0	2	4	3	4	3.5	1	3.5	Preferential procurement plan. Kumba supplier development programme. Programmes run by the Zimele Business Development Support Centre.	1	3.5	
		Local employment	0	3	4	3.5	4	3.75	1	3.75	Social and Labour Plan commitments and implementation of the mine's local recruitment policy. Collaboration with the municipality's unemployment forum. In addition: Local employment commitments from contractors and monitoring thereof.	1	3.75	
		Catalyst for local economic development	0	4	4	4	5	4.5	1	4.5	Participation in the municipal IDP and LED Forums. Collaboration and engagement with local business organisations. In addition: Encouraging contractors and other service providers to recruit and procure locally. Collaboration with regional LED structures to enhance economic development in the Gamagara Corridor.	1	4.5	
		Enhancement of community skills levels	0	1	4	2.5	4	3.25	0.8	2.6	Promote the Kolomela Community Skills Centre in local communities. Bursary scheme. Scholarship scheme. Internship programme. Investigations to establish a technical subjects section at Postmasburg secondary school. Investigations on the establishment of an FET satellite campus in Postmasburg. In addition: Require specific skills development interventions from contractors.	1	2.6	
		Enhanced infrastructure development	0	3	3	3	4	3.5	1	3.5	SLP commitments, aligned with the municipal IDP TSASSAMBA Public Private Partnership with Beeshoek mine and Tsantsabane Local Municipality	1	3.5	
		Improved access to, and quality of school education	0	4	4	4	4	4	4	1	4	SLP and CSI projects focusing on education. Effective engagement with the relevant levels of government when implementing projects. In addition: Agreements with largest contractors to also contribute to education projects, in coordination with Kolomela's planned initiatives. Regular needs assessment at schools.	1	4

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
		Improved access to, and quality of public healthcare services	O	3	4	3.5	4	3.75	1	3.75	Extension of the District hospital. Construction of accommodation for health professionals. In addition: Engagement with role players in the public health sector to inform them of the possible impact of the project. Agreements with largest contractors to also contribute to health related projects, in coordination with Kolomela's planned initiatives. Regular needs assessment at public health institutions.	1	3.75
		Support of the local municipality enhances service delivery	O	2	3	2.5	4	3.25	1	3.25	Capacity building programme with DBSA. Support to the municipality as part of the Operation and Maintenance agreement. Support to the municipality in rolling out a pre-paid water metering system.	1	3.25
		Unemployment and loss of livelihoods linked to restructuring and cost cutting measures as a result of international iron ore market pressures	O	3	3	3	4	3.5	1	3.5	Engagement with key local stakeholders to manage expectations and ensure they understand that funding and resources for social development will be less than before. Support to retrenched employees to find alternative employment.	1	3.5
		Pressure on municipal services and capacity due rapidly growing population	O	3	4	3.5	4	3.75	1	3.75	Capacity building and support initiatives to alleviate pressure on the municipality. In addition: Guide contractors to communicate and recruit responsibly.	0.8	3
		A shortage of proper and affordable housing due to the demand created by mining (poor living conditions in informal settlements)	O	4	3	3.5	4	3.75	1	3.75	Housing policy and building of additional houses (including rental stock) for employees. Project to provide accommodation for public service health professionals.	0.8	3
		Dust, noise and dewatering impacting the farming community's quality of life and livelihoods	O	3	5	4	3	3.5	0.8	2.8	Environmental Forum for engagement. Existing dust suppression initiatives. Existing dust, and vibration monitoring. Continue with monitoring of groundwater quality and levels. In addition: Implementation of mitigating measures as outlined in specialist reports. Effective engagement with affected parties, around the project in particular (not just business as usual).	1	2.8

ACTIVITY	ASPECT	POTENTIAL IMPACT	PHASE	INTENSITY	DURATION	CONSEQUENCE	EXTENT	SEVERITY	PROBABILITY	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION	MITIGATION CONFIDENCE	SIGNIFICANCE WITH MITIGATION
		Increase in social ills (e.g. crime, prostitution, substance abuse, teenage pregnancies) linked to population growth, poor living conditions, and contractors' employment practices	0	4	3	3.5	4	3.75	0.8	3	Planned programmes and initiatives to enhance social wellness in Tsantsabane through continued support of, and collaboration with institutions and organisations involved in combatting social ills. In addition: Develop a procedure for the management of contractors' social impacts and negotiate the implementation of the procedure with internal role players as well as key contractors.	1	3
		Strained relationships with selected stakeholders due to unmet expectations of economic benefits from the mine	0	3	3	3	4	3.5	0.8	2.8	Engagement plan to ensure that stakeholders are being kept up to date with the project and the opportunities for local community members – management of expectations. Effective engagement with key stakeholders. Open door to listen to aggrieved groups. Follow-through on commitments made. In addition: Communicate the mine's performance on socio-economic benefit delivery to the local community through wide distribution of the 2014 SEAT report.	1	2.8
		Increased traffic & consequences on road networks.	0	2	4	3	4	3.5	1	3.5	Geometric and structural upgrades of selected links. Some gravel roads may require surfacing and ones affected for short periods may require a more comprehensive maintenance plan including dust suppression. Responsibility should be shared between the developers and the road owners (provincial, municipal and private).	0.8	2.8

9 SUMMARY OF SPECIALIST REPORTS

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
Mineral Waste Streams Assessment and Mining Residue Facilities Impact Assessment Report (Golder, 2016)	<ul style="list-style-type: none"> • Given the low geochemical, toxicological and waste risk profile of the mineral waste streams, and the low to minimal impact of the MRFs on water resources and biodiversity, a Class C barrier system in terms of the <i>National Norms and Standards for Disposal of Waste to Landfill</i> (GN R.636 of 23 August 2013) would not add value in terms of environmental protection. • Given that the waste streams are not hazardous in terms of SANS10234 and that the leachate from any of the mineral waste streams does not exceed any of the initial leachable concentration thresholds (LC < LCT0 thus the complete definition of Type 3 waste is not met), the application of a Class C barrier system, which is prescribed for Type 3 waste, is not justified. 	<p>Recommendation Included.</p> <p>No provision for a Class C Barrier System for WRD extensions proposed.</p>	<p>Section 3.1.4</p> <p>Section 8.1.3.2</p>
Air Quality Impact Assessment (Airshed Planning Professionals, 2015)	<p>To ensure the lowest possible impact on air quality sensitive receptors and environment it is recommended that the air quality management plan as set out in this report should be adopted. In summary, this includes:</p> <ul style="list-style-type: none"> • The mitigation of sources of emission. Special attention should be paid to the mitigation of dust from unpaved haul roads, vehicle exhaust and areas with windblown dust potential; • The sampling of mobile equipment exhaust emissions as part of the maintenance program to ensure operation within specification; and • Continued ambient air quality monitoring, including: <ul style="list-style-type: none"> ○ Gravimetric sampling of PM₁₀ and PM_{2.5} concentrations. 	<p>Recommendations included in Part B- EMP.</p>	<p>Part B – Section 3.2</p>

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	<ul style="list-style-type: none"> ○ Dustfall sampling at an additional 3 locations around operations. 		
<p>Noise Impact Assessment (Airshed Planning Professionals, 2015)</p>	<p>GOOD ENGINEERING AND OPERATIONAL PRACTICES</p> <p>For general activities the following good engineering practice should be applied:</p> <ul style="list-style-type: none"> • All diesel powered equipment and plant vehicles must be kept at a high level of maintenance. This must particularly include the regular inspection and, if necessary, replacement of intake and exhaust silencers. Any change in the noise emission characteristics of equipment must serve as trigger for withdrawing it for maintenance. • To minimise noise generation, vendors must be required to guarantee optimised equipment design noise levels. • Acoustic attenuation devices should be installed on all ventilation outlet and high pressure gas or liquid should not be ventilated directly to the atmosphere, but through an attenuation chamber or device. • Vibrating equipment such as crushers must be on vibration isolation mountings. • A mechanism to monitor noise levels, record and respond to complaints and mitigate impacts should be developed. • Blasting at the surface will be audible over long distances and may cause a startling reaction at receptors in close proximity. This can be mitigated by adhering to blast schedules that have been communicated to the affected parties. <p>OPERATIONAL HOURS</p>	<p>Recommendations included in Part B- EMP.</p>	<p>Part B – Section 3.2</p>

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	<p>It is recommended that, as far is as feasible, noise generating activities be limited to day-time hours (considered to be between 06:00 and 22:00) since noise impacts are most significant during the night.</p> <p>ACOUSTIC BARRIERS</p> <p>Waste rock dumps and pit walls will serve as acoustic barriers. It is recommended that waste rock be disposed of as such that as far as possible/practical it will act as a noise barrier i.e. start with disposal as close to Sunnyside and work towards the north.</p> <p>TRAFFIC</p> <p>The measures described below are considered good practice in reducing traffic related noise.</p> <p>In managing transport noise specifically related to trucks, efforts should be directed at:</p> <ul style="list-style-type: none"> • Minimizing individual vehicle engine, transmission and body noise/vibration. This is achieved through the implementation of an equipment maintenance program. • Minimize slopes by managing and planning road gradients to avoid the need for excessive acceleration/deceleration. • Maintain road surface regularly to avoid corrugations, potholes etc. • Avoid unnecessary idling times. • Minimizing the need for trucks/equipment to reverse. This will reduce the frequency at which disturbing but necessary reverse warnings will occur. Alternatives to the traditional reverse 'beeper' alarm such as a 'self-adjusting' or 'smart' alarm could be considered. These alarms include a mechanism to detect the local noise level and automatically adjust the output of the alarm is so that it is 5 to 10 dB above the noise 		

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	<p>level in the vicinity of the moving equipment. The promotional material for some smart alarms does state that the ability to adjust the level of the alarm is of advantage to those sites 'with low ambient noise level' (Burgess & McCarty, 2009).</p> <p>MONITORING</p> <p>Kolomela has already adopted a noise monitoring programme as part of its Environmental Management Plan. It is recommended it be kept to by conducting short term 20 minute to 24-hour sampling at the already established noise sensitive receptors and monitoring points. Monitoring should always be conducted in accordance with the procedures specified by SANS 10103 (2008). Samples should include the following parameters: L_{Aeq}, L_{Aeq}, L_{A90}, and the un-weighted octave band sound pressure levels (L_{Zeq}). In the interpretation and reporting of sampled environmental noise levels, use should be made of a trained specialist.</p>		
Biodiversity Impact Assessment (Omni Eko, 2015)	<ul style="list-style-type: none"> • Permits to remove and/or destroy protected tree species (Camel Thorn, Grey Camel Thorn (<i>Vachellia haematoxylon</i>) and Shepherd's Tree) will have to be obtained from the Department of Agriculture, Forestry and Fisheries, Northern Cape. • Permits to remove and/or destroy <i>Boophone disticha</i>, <i>Hoodia gordonii</i> and <i>Pachypodium succulentum</i> must be obtained from the Northern Cape Department of Tourism, Environment and Conservation (DTEC). • There is no cure-all for eradicating different alien invasive species. Each site should therefore be evaluated and control measures must be based on site and species specific situations. • Sensitive areas as indicated in must be clearly demarcated to prevent damage. 	<p>Recommendations included in Part B- EMP.</p> <p>It should however that the layout plan assessed by the specialist was revised to reduce impacts (Final Layout Plan 3)</p>	<p>Part B – Section 3.2 Section 10.2 (Final Layout Plan)</p>

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	<ul style="list-style-type: none"> The proposed pits and areas of mining activity at Ploegfontein must be fenced to prevent any access and damage to this sensitive area. If the areas identified as part of the amendment to mining activity are strictly adhered to it will not be necessary to change the proposed layout plan. 		
Heritage Impact Assessment (PGS, 2015)	<p>STONE AGE SITES</p> <p>Phase 2 mitigation (sampling) of a significant number of these pans is proposed before they are destroyed by mining activities. This will require a permit issued by the South African Heritage Resources Agency (SAHRA) (African Heritage Consultants 2011:20).</p> <p>LATE IRON AGE / HISTORIC SITES</p> <p>Due to the closeness of the proposed Kapstevl North Dump 2 to the mining site, a number of mitigation measures are recommended in the report, including a Phase 2 Archaeological Assessment of the site to establish the extent and characteristics of the old mining activities and, at the same time, the provisional establishment of a 400 m buffer area around the site. Once the exact extent and characteristics of the site have been established, final recommendations with regard to the required buffer zone around the site will be made. A monitoring programme has also been recommended.</p> <p>HISTORIC STRUCTURES / FARMSTEAD SITES</p> <p>Due to the high negative impact represented by the KSS Waste Rock Dump on the farm worker cemetery, as well as the impact on the buffer zone that was established in the Heritage Management Plan, it is required that the layout of the KSS Waste Rock Dump be changed to allow for the continued preservation of the site and all of its components. The layout of the KSS Waste Rock Dump will have to be changed in such a way that the presently</p>	<p>Final Layout Plan 3 included revision of Kapstevl WRD to avoid heritage sites and allow for recommended buffers.</p> <p>Recommendations included in Section 8.8 and Part B-EMP including:</p> <ul style="list-style-type: none"> Requirement for Phase 2 mitigation of Stone Age Sites. Requirement for a Palaeontological Impact Assessment. 	<p>Section 10.2 (Final Layout Plan).</p> <p>Part B – Section 3.2</p>

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	<p>high sensitivity zone identified in the Heritage Management Plan is maintained and to allow for a buffer area of at least 250 m around the newly discovered farm worker cemetery and a buffer area distance of 100 m between the proposed development and the area of high significance identified in the Heritage Management Plan. Monitoring would also be required during construction.</p> <p>Furthermore, due to the equally high negative impact represented by the proposed new pipeline for the Floradale Aquifer Recharge Project on Site 4.2 (the Bredenkamp cemetery) as well as on the high sensitivity buffer zone identified in the Heritage Management Plan, it is required that the layout of the section of pipeline located on the farms Wolhaarkop 485 and Kapstevl 541 be changed to allow for the continued preservation of the buffer area around the site as well as all the site components. The layout of the pipeline will have to be changed in such a way that the presently high sensitivity zone identified in the Heritage Management Plan is maintained and to allow for a buffer area of at least 250 m around the white cemetery. Monitoring will also be required during construction.</p> <p>PALAEONTOLOGY</p> <p>The EAP as well as the ECO for this project must be made aware of the fact that the Ghaap Group sediments, as well as the surface limestone, contain significant fossil remains, albeit mostly stromatolites and micro-fossil assemblages in the dolomite of the Ghaap Group and possibly vertebrate remains in the surface limestone.</p>		

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	<p>An accredited palaeontologist must be appointed to do a Phase Palaeontological Impact Assessment (PIA) to confirm the presence of significant fossils of stromatolites and possible cave breccia deposits in areas underlain by dolomite of the Ghaap Group, as well as areas underlain by surface limestone, where these limestones are exposed or where they are planned to be exposed during mining operations. The palaeontologist must make the necessary recommendations regarding a possible Phase 2 PIA during the initial mining operations.</p> <p>The EAP and ECO must be informed of the possible presence of fossils in rocks of the Postmasburg, Olifantshoek and Kalahari Groups, as well as in the Koegas Subgroup and alluvial deposits. If fossils are observed, the ECO must be notified and the fossils recorded by the palaeontologist according to SAHRA specifications. These recommendations must form part of the EMP of the project.</p>		
Wetland Assessment (SAS, 2015)	<ul style="list-style-type: none"> • A sensitivity map has been developed for the study area, indicating the various wetland features/clusters which are considered to be of increased ecological importance and sensitivity. It is recommended that this sensitivity map be considered during the planning of the proposed mining related activities to aid in the conservation of ecology within the study area; • The mining related footprint area must be limited to what is absolutely essential in order to minimise environmental damage; • The boundaries of footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas; 	<ul style="list-style-type: none"> • Pan clusters have been considered in revised final layout planning. • Final Layout Plan 3 is based on a revised footprint that minimises the impact on pans. • The outer boundaries of the catchments as defined by Jones & 	<p>Section 7.1.6 Section 8.3.3 Section 10.2 (Final Layout Plan). Part B – Section 3.2</p>

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	<ul style="list-style-type: none"> • The outer boundary of the catchment areas as defined by Jones and Wagener (2015) should guide the buffer size needed in order to sufficiently protect wetland clusters, if not possible a minimum of 100 meter should be implemented as a buffer; • Individual pans with their defined catchment areas (Jones and Wagener, 2015) falling outside wetland clusters or proposed expansion areas, should be demarcated as sensitive habitat; • Demarcate the 1:100 year floodline of the Valley Bottom Wetlands or 100 meter buffers (whichever distance is greater) as a sensitive area and allow only authorized mining personnel and activities within these areas; • Connectivity between depressions should be maintained as far as possible to ensure the migration of fauna is catered for; • The amount of vegetation cleared near depressions should be kept to a minimum; • <i>Nerine laticoma</i> occurs in patches near Wetland Pans (personal communication with Mr. J. Lambrechts). It is recommended that if mining related activities are planned within an area known to support <i>N. laticoma</i>, the required permit is applied for and that as many individuals as possible is rescued and relocated; • Access into wetland areas not directly affected by or falling within the proposed development footprint, particularly by vehicles, is to be strictly controlled; • Implement waste management as contemplated in the Environmental Management Programme in order to prevent construction related waste from entering the wetland environment; 	<p>Wagener have been avoided as far as practicable in final layout planning (Layout Plan 3).</p> <ul style="list-style-type: none"> • Other specific recommendations for mitigation included in EMP 	

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	<ul style="list-style-type: none"> • Inspect all vehicles for leaks regularly; • Waste material spills and waste refuse deposits near depressions that may result in contamination of surface water should immediately be addressed; • Ensure that seepage from dirty water systems is prevented as far as possible; • Prevent run-off from work areas entering wetland habitats; • Incorporate adequate erosion and stormwater management measures in order to prevent erosion and the associated sedimentation of the wetland areas; • Curtail sheet runoff from roads; • Inspect and maintain infrastructure installed for stormwater management regularly; • Remove alien and weed species in order to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998). Species specific and area specific eradication recommendations: • Take care with the choice of herbicide to ensure that no additional impacts on wetland habitat occur due to the herbicide used; • Keep footprint areas as small as possible when removing alien plant species; • Do not allow vehicles to drive through designated sensitive wetland/riparian areas during the eradication of alien and weed species; • Dispose of removed alien plant material at a registered waste disposal site; • Ensure no dumping of waste material or temporary storage of any material take place within any wetland or buffer zone; 		

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	<ul style="list-style-type: none"> • Provide appropriate sanitation facilities for the duration of any activity and remove all waste to an appropriate facility. These facilities must be located outside of the wetland features and associated buffers and must be regularly serviced; and • Monitor effects of recharge within Valley Bottom Wetlands over time through monitoring of wetland integrity. • All vehicles must remain on designated roads with no indiscriminate driving through wetland areas; • Remove alien and weed species in order to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998); • Rehabilitate and reshape all areas disturbed by mining to be as representative of pre-mining terrain units as possible in order to re-instate natural runoff patterns; • The rehabilitated areas should be monitored and alien vegetation removed for as long as it takes for natural vegetation to re-establish in the area; and • Initiatives should be investigated for the protection of pans with similar habitat to the pans that will be lost, both within the Kolomela Mine Boundary as well as within the surrounding area, in order to safeguard panveld habitat in future. 		
Hydrological Assessment of Pan Clusters (Jones & Wagener, 2015)	No particular recommendations, but pan catchments defined to allow for layout planning.	Pan catchments have been used in Final Layout Plan.	Section 7.1.6 Section 8.3.3 Section 10.2 (Final Layout Plan).

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
<p>Social Impact Assessment (G3 Business Solutions, 2015)</p>	<p>ADDITIONAL MITIGATION AND MANAGEMENT MEASURES RECOMMENDED TO ENHANCE POSITIVE IMPACTS</p> <ul style="list-style-type: none"> • Local employment commitments from contractors and monitoring thereof. • Encouraging contractors and other service providers to recruit and procure locally. • Collaboration with regional LED structures to enhance economic development in the Gamagara Corridor. • Specific skills development interventions from contractors. • Close collaboration between the project and Kolomela Mine’s Public Affairs Department. • Agreements with key contractors to also contribute to education projects, in coordination with Kolomela’s planned initiatives. • Regular needs assessment at schools. • Engagement with role players in the public health sector to inform them of the possible impact of the project. • Agreements with largest contractors to also contribute to health related projects, in coordination with Kolomela’s planned initiatives. • Regular needs assessment at public health institutions. <p>ADDITIONAL MITIGATION AND MANAGEMENT MEASURES RECOMMENDED FOR NEGATIVE IMPACTS</p> <ul style="list-style-type: none"> • Guide contractors to communicate and recruit responsibly. 	<p>Specialist recommendations are included in discussions on mitigation (Section 8.3) and also in the Part B - EMP.</p>	<p>Section 8.3.9 Part B – Section 3.2</p>

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	<ul style="list-style-type: none"> • Implementation of mitigating measures as outlined in specialist reports. • Effective engagement with affected parties, around the project in particular (not just business as usual). • Develop a procedure for the management of contractors' social impacts and negotiate the implementation of the procedure with internal role players as well as key contractors. • Communicate the mine's performance on socio-economic benefit delivery to the local community through wide distribution of the 2014 SEAT report. • Effective engagement of stakeholders on project progress and impact • Management of contractors' social impact as recommended by the Anglo American SEAT guideline • Proactive planning for the social changes or impacts expected, with role players in the public sector and civil society. 		
Economic Impact Assessment (Demacon, 2015)	<ul style="list-style-type: none"> • A housing sector plan or housing needs analysis is required to assess the housing market needs in the local economy. • Goods and services should as far possible be procured locally. • Once the mining activities scale down, with mine closures, the impact on unemployment is expected to be high. The local municipality should already be made aware of this possible impact and initiate local development initiatives to minimise the impact of mine closures. 		

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
Groundwater Flow Model (Itasca, 2015)	<ul style="list-style-type: none"> • Conduct an audit of the borehole data to ensure that the information related to the monitoring and dewatering boreholes is consistent. • Conduct an audit of the pumps in the dewatering boreholes. This audit would ensure that the pumps perform as expected and would provide beneficial information for future dewatering designs. • Based on the recommended Items 1 and 2 above, construct various cross sections that show the geologic setting, locations of the pits, locations of the pumps, the measured water levels from the monitoring and dewatering boreholes, and the water strikes. • Continue to install multi-level piezometers or monitoring boreholes in various geologic units and monitor the water levels over time using automatic data loggers. This task is critical to improving the understanding of dynamic groundwater conditions in the mine area as well as the confidence level of the groundwater flow model because the current dewatering at the Kolomela Mine essentially acts as a long-term, large-volume pumping test. For this reason, well-designed piezometers will provide much-needed data that can be used to predict and plan for future dewatering requirements. Furthermore, the groundwater levels at each geologic unit are critical to the slope stability design. • Evaluate the performance of the dewatering boreholes. Currently, the maximum pumping rate from the existing boreholes is approximately 200 m³/hr. Increasing the pumping rate would decrease the number of dewatering boreholes. In order for the Kolomela Mine to conduct a cost-benefit analysis, the performance of the dewatering 	Recommendations included in Part B – EMP.	Part B – Section 3.2

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	<p>boreholes must be investigated. These investigation activities may include hydraulic testing, logging, data collection, and data analysis.</p> <ul style="list-style-type: none"> • Create a dewatering folio. • As soon as additional data become available, the groundwater flow model should be updated. • Work with the mine planning group to assess the option of installing in-pit dewatering boreholes as the pits deepen. 		
Visual Impact Assessment (SLR, 2015)	<ul style="list-style-type: none"> • The ongoing vegetation of the waste dumps will increase the potential for the infrastructure to be assimilated into the landscape. • Lighting impacts can be reduced by limiting the number of high lighting masts. • Lighting should be focussed in the direction of areas of work and light spill can be reduced by the inclusion of lighting hoods to reduce light spill. Sodium vapour lights should also be considered as the light spill for such lights is less and the lights also have lower potential to attract insects. 	Specialist recommendations are included in discussions on mitigation (Section 8.3) and also in the Part B - EMP.	Section 8.3.7 Part B – Section 3.2
Traffic Impact Assessment (Jeffares & Green, 2014)	<p>The effect of all the developments can be successfully mitigated by geometric and structural upgrades of selected links. Some gravel roads may require surfacing and ones affected for short periods may require a more comprehensive maintenance plan including dust suppression.</p> <p>Responsibility should be shared between the developers and the road owners (provincial, municipal and private). Alternative routes can also be investigated.</p>	Specialist recommendations are included in discussions on mitigation (Section 8.3) and also in the Part B - EMP.	Section 8.3.10 Part B – Section 3.2

10 ENVIRONMENTAL IMPACT STATEMENT

10.1 SUMMARY OF KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

The following have been identified as the key findings of the impact assessment:

10.1.1 EMPLOYMENT AND ECONOMIC DEVELOPMENT

- Kolomela Mine is a significant role player in terms of direct and indirect employment in the community. Kolomela employs close to 3000 employees (both permanent and contracted).
- Due to the down-turn in the economy and the cancellation of projects, 872 contractor workers lost employment in 2015.
- The proposed expansion activities at the mine, include the provision in 2020, to incorporate 500 contractor workers into its permanent work force. Contractor employee numbers will continue to decrease until 2019, when it will grow again with 400 new employees which will be involved in pre stripping activities of the proposed new pit areas.
- The increase in number of permanent employees is expected to place additional pressure on housing in Postmasburg in the future.
- The overall change in employment from 2015 is not insignificant, with the number of jobs lost being replaced over time. The type of employment will however change.
- Kolomela Mine is a significant catalyst for local economic development. The potential down-scaling of SIOC's Sishen Mine in Kathu and the increased production at Kolomela Mine will mean that Kolomela plays an even more important role in the regional economy.
- There is expected to be an overall decrease in economic development due to mining as a result of economic conditions in the region, but with Kolomela Mine playing a greater role in a smaller economy.

10.1.2 LOWERING OF GROUNDWATER LEVELS

- The increased production rate from 9 Mtpa to 16 Mtpa will require an increase in the current dewatering rate from 1 950 m³/hr to 3 990 m³/hr.
- Dewatering at a rate of 3 990 m³/hr is expected to result in a drawdown of the natural groundwater levels by up to 50 m outside of the mining area in the years 2050 and 2060, impacting on the immediately neighbouring farms up to 5 km east of the mine.

10.1.3 LOW RISK OF CONTAMINATION DUE TO WASTE ROCK DUMPS

- Seepage from waste rock dumps poses a minimal risk to the environment.
- The inclusion of a barrier system under waste rock dumps is considered unnecessary as it will not result in any significant change in terms of protecting the environment.

10.1.4 DISTURBANCE OF WATERCOURSES

- The proposed layout of some infrastructure, including the Kapsteveld DMS Plant and Klipbankfontein At Pit Facility would result in the disturbance of watercourses
- The revised Layout Plan 3 has resulted in the mitigation of the impact on watercourses by the repositioning of infrastructure.

- The Aquifer Recharge Facility is to be constructed within the tributary of the Soutloop River on the Farms Floradale 230 and Floradale 230. The nature of the activity will result in the disturbance of the beds and banks of the river and the disturbance of the flow.
- Aquifer Recharge can also result in disturbance of natural surface flow if water levels are not monitored correctly.

10.1.5 LOSS OF WETLANDS

- There are also several Wetland Pans in the area to be affected by the development of the Ploegfontein and Tierbult Pit areas, Leeuwfontein North WRD, Leeuwfontein South WRD and the Klipbankfontein WRD. These wetlands will be lost due to the development.
- None of the wetland features encountered are regarded to be of exceptional importance in terms of function and service provision except for biodiversity maintenance.
- The destruction of the wetlands will however result in a direct loss of wetland habitat and ecological function.
- The delineation of catchment of pans by Jones & Wagener (2015) has allowed for the determination of precise buffer zones for pans and pan clusters.
- The Final Layout Plan 3 has taken into account the protection of pans by avoiding catchments where practicable.

10.1.6 INCREASED DUST LEVELS

- It is predicted that the proposed changes will result in non-compliance with the daily NAAQS at receptors (homesteads) located adjacent to the mine.
- Vehicles travelling on roads within the mine are the most important contributor to dust generation.
- The predicted impact takes into account the use of chemical suppressants on main haul roads and wet suppression on temporary roads. It is thus not expected that the impact can be mitigated further to reduce the impact.

10.1.7 NOISE DISTURBANCES

- It is expected that the night-time noise levels experienced at residences surrounding the mine will exceed the IFC guidelines at times, particularly during the years of highest production.
- The noise impact may however be over predicted as it does not take into consideration the buffering of noise as activities in pits move below ground level (as the pits deepen).
- Several recommendations for reducing noise levels have been made (Airshed, 2015), but mitigation confidence is not high as the measures require operational changes and/or may not be effective in reducing noise.

10.1.8 LANDSCAPE AND VISUAL DISTURBANCES

- The expanded revised layout plan at Kolomela will mean additional pit areas and expanded WRDs. The height of the WRDs will also be increased from the currently planned 40 m above surface to 70 m above surface.

- Optimisation of backfilling, ongoing rehabilitation including shaping and vegetation of waste rock dumps will serve to assist in amelioration of visual intrusion, but the impact will remain high as a result of the scale of the final disturbance.

10.1.9 HERITAGE PROTECTION

- The proposed site Layout Plan 2, was found to have a significant impact on heritage sites, particularly as a result of the proposed layout of the Kapsteveld WRD.
- The revision of the site layout to the Final Site Layout Plan 3 means that the direct disturbance on heritage sites in the Kapsteveld area has been avoided.

10.2 FINAL SITE MAP

The Final Site Layout is as depicted in Figure 6.3 and included here as Figure 10.1

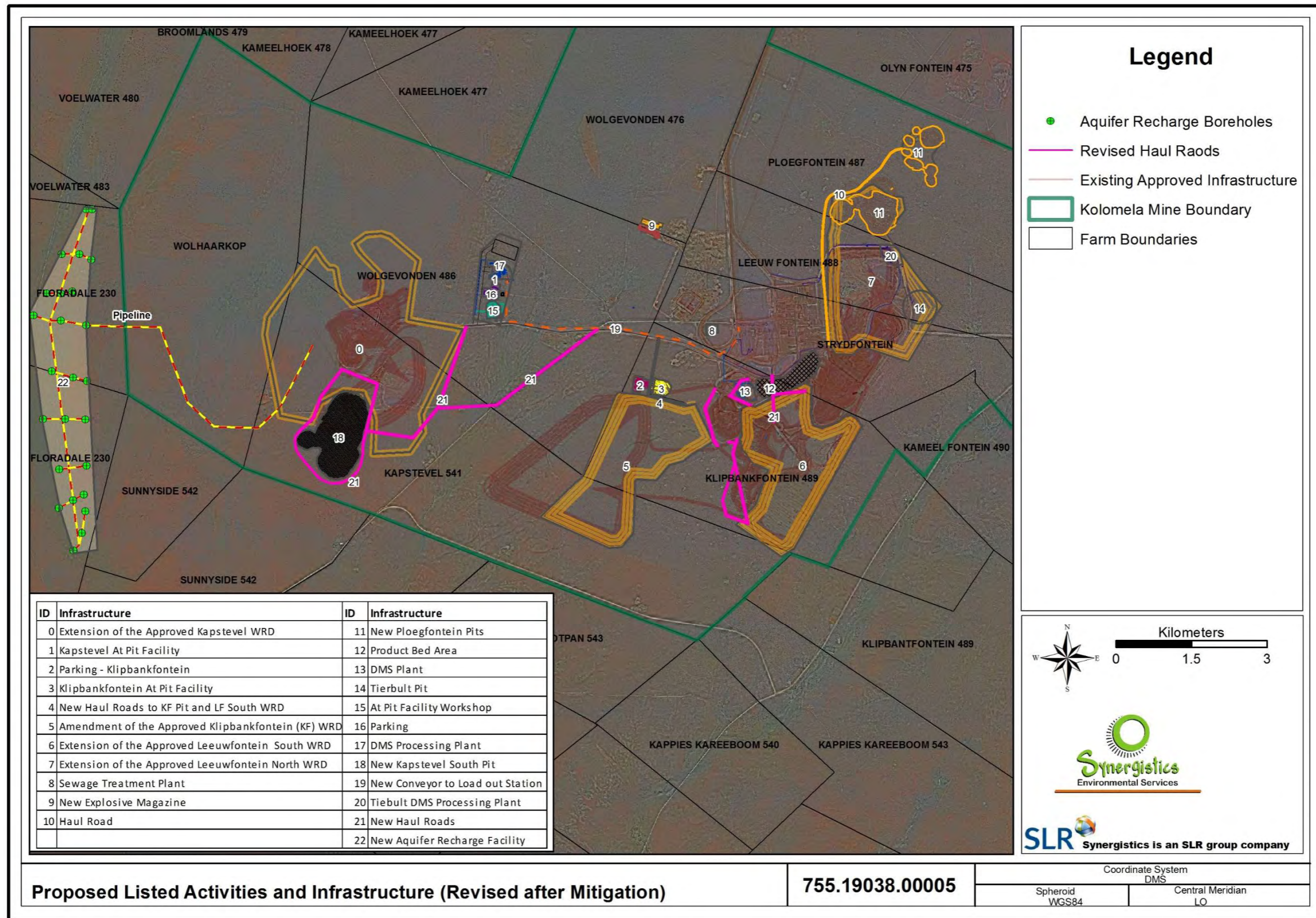


FIGURE 10.1: FINAL LAYOUT PLAN 3 (MITIGATED LAYOUT) TAKING INTO CONSIDERATION THE AVOIDANCE OF SENSITIVITIES HIGHLIGHTED BY THE EIA AND SPECIALIST STUDIES

10.3 SUMMARY OF THE POSITIVE AND NEGATIVE IMPLICATIONS AND RISKS OF THE PROPOSED ACTIVITY AND IDENTIFIED ALTERNATIVES

TABLE 10.1: SUMMARY OF KEY POSITIVE AND NEGATIVE IMPACTS IDENTIFIED FOR THE MITIGATED AND UNMITIGATED SCENARIOS

ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION ²	MITIGATION	SIGNIFICANCE WITH MITIGATION ³
KAPSTEVEL SOUTH PIT AND EVAPORATION POND	Groundwater	Lowering of groundwater levels	VERY HIGH	Confirm spatial extent of dewatering cone and update dewatering requirements on an ongoing basis. Aquifer recharge.	HIGH
	Noise	Increase of noise levels due to mining activities	HIGH	Ongoing monitoring and community consultation	HIGH
EXPANSION OF KAPSTEVEL WASTE ROCK DUMP	Air Quality	Increase in fallout dust levels	HIGH	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	HIGH
		Increase in particulate dust levels (PM10 and PM 2.5)	HIGH	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	HIGH
	Noise	Increase of noise levels due to mining activities	HIGH	Ongoing monitoring and community consultation	HIGH
	Visual Environment	Disturbance of views	HIGH	Optimise backfilling into pit. Reshaping and concurrent rehabilitation of slopes to reduce visual intrusion. Implementation Rehabilitation Strategy (Golder, 2015)	HIGH
	Heritage	Loss of sites of heritage importance	VERY HIGH	Revise layout plan to reduce impact on heritage resources (particularly graves and other sites of high significance) - see final layout alternative.	MODERATE
PLOEGFONTEIN AND TIERBULT PITS INCLUDING HAUL ROAD AND EVAPORATION POND	Groundwater	Lowering of groundwater levels	VERY HIGH	Confirm spatial extent of dewatering cone and update dewatering requirements on an ongoing basis. Aquifer Recharge.	HIGH
	Wetlands	Loss of wetland pan habitat and ecological structure	HIGH	Minimise/alter mining footprint to reduce extent of impact. Buffer zones to include pan catchments (see Jones & Wagener, 2015). Minimise secondary impacts.	MODERATE
	Noise	Increase of noise levels due to mining activities	HIGH	Ongoing monitoring and community consultation	HIGH
EXPANSION OF LEEUWFONTEIN NORTH WASTE ROCK DUMP	Air Quality	Increase in fallout dust levels	HIGH	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	HIGH
		Increase in particulate dust levels (PM10 and PM 2.5)	HIGH	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	HIGH
	Noise	Increase of noise levels due to mining activities	HIGH	Ongoing monitoring and community consultation	HIGH

² Considers Layout Plan 2³ Considers Revised Layout Plan 3

ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION ²	MITIGATION	SIGNIFICANCE WITH MITIGATION ³
	Visual Environment	Disturbance of views	HIGH	Optimise backfilling into pit. Reshaping and concurrent rehabilitation of slopes to reduce visual intrusion. Implementation Rehabilitation Strategy (Golder, 2015)	HIGH
EXPANSION OF LEEUWFOONTEIN SOUTH WASTE ROCK DUMP	Wetlands	Loss of wetland pan habitat and ecological structure	HIGH	Minimise/alter mining footprint to reduce extent of impact. Buffer zones to include pan catchments (see Jones & Wagener, 2015). Minimise secondary impacts.	MODERATE
	Air Quality	Increase in fallout dust levels	HIGH	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	HIGH
		Increase in particulate dust levels (PM10 and PM 2.5)	HIGH	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	HIGH
	Noise	Increase of noise levels due to mining activities	HIGH	Ongoing monitoring and community consultation	HIGH
	Visual Environment	Disturbance of views	HIGH	Optimise backfilling. Reshaping and concurrent rehabilitation of slopes to reduce visual intrusion. Implementation Rehabilitation Strategy (Golder, 2015)	HIGH
EXPANSION OF KLIPBANKFOONTEIN WASTE ROCK DUM	Air Quality	Increase in fallout dust levels	HIGH	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	HIGH
		Increase in particulate dust levels (PM10 and PM 2.5)	HIGH	Implementation of air quality management plan utilising a combination of wet suppression on non-permanent haul roads. Dust suppression chemical to be in place on all permanent haul roads.	HIGH
	Noise	Increase of noise levels due to mining activities	HIGH	Ongoing monitoring and community consultation	HIGH
	Visual Environment	Disturbance of views	HIGH	Optimise backfilling. Reshaping and concurrent rehabilitation of slopes to reduce visual intrusion.	HIGH
NEW KAPSTEVEL DMS PROCESSING PLANT AND STOCKPILE AREA INCLUDING CONVEYOR	Surface Water	Disturbance of drainage lines/watercourses	HIGH	Revise layout to avoid watercourses where possible at processing plant. Conveyor to be aligned immediate adjacent to main haul road to avoid requirement for additional crossings.	LOW
NEW KLIPBANKFOONTEIN AT PIT FACILITY AND HAUL ROAD	Surface Water	Disturbance of drainage lines/watercourses	HIGH	Revise layout to avoid watercourses where possible - see final layout.	VERY LOW
	Surface Water	Disturbance of drainage lines/watercourses	HIGH	Delineate 1 in 100 year flood line or 100 m buffer (whichever is greatest) as sensitive area - with restricted activities allowed.	MODERATE

ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION ²	MITIGATION	SIGNIFICANCE WITH MITIGATION ³
AQUIFER RECHARGE (INCLUDING PIPELINES)				Minimise disturbance of banks and riverbeds. Minimise impedance of flow due to pipelines and boreholes.	
		Change in natural hydrology	HIGH	Monitor recharge volumes. Recharge of the aquifer must be done in a planned and controlled manner to prevent/minimise negative hydrological impact and promote positive impact on hydrology of the resource. Specific mention is made of monitoring of water volumes.	MODERATE
	Wetlands	Loss of valley bottom wetland habitat and ecological structure	HIGH	Delineate 1 in 100 year flood line or 100 m buffer (whichever is greatest) as sensitive area - with restricted activities allowed. Minimise disturbance of banks and riverbeds. Minimise impedance of flow due to pipelines and boreholes.	MODERATE
	Heritage	Loss of sites of heritage importance	HIGH	Revise pipeline route - see revised layout plan.	VERY LOW
KOLOMELA EXPANSION	Socio-Economics	Local procurement and enterprise development	HIGH POSITIVE	Preferential procurement plan. Kumba supplier development programme. Programmes run by the Zimele Business Development Support Centre.	HIGH POSITIVE
		Local employment	HIGH POSITIVE	Social and Labour Plan commitments and implementation of the mine's local recruitment policy. Collaboration with the municipality's unemployment forum. In addition: Local employment commitments from contractors and monitoring thereof.	HIGH POSITIVE
		Catalyst for local economic development	VERY HIGH POSITIVE	Participation in the municipal IDP and LED Forums. Collaboration and engagement with local business organisations. In addition: Encouraging contractors and other service providers to recruit and procure locally. Collaboration with regional LED structures to enhance economic development in the Gamagara Corridor.	VERY HIGH POSITIVE
		Enhanced infrastructure development	HIGH POSITIVE	SLP commitments, aligned with the municipal IDP TSASSAMBA Public Private Partnership with Beeshoek Mine and Tsantsabane Local Municipality	HIGH POSITIVE
		Improved access to and quality of school education	HIGH POSITIVE	SLP and CSI projects focusing on education. Effective engagement with the relevant levels of government when implementing projects. In addition: Agreements with largest contractors to also contribute to education projects, in coordination with Kolomela's planned initiatives. Regular needs assessment at schools.	HIGH POSITIVE
		Improved access to, and quality of public healthcare services	HIGH POSITIVE	Extension of the District hospital. Construction of accommodation for health professionals. In addition: Engagement with role players in the public health sector to inform them of the possible impact of the project. Agreements with largest contractors to also contribute to health	HIGH POSITIVE

ACTIVITY	ASPECT	POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION ²	MITIGATION	SIGNIFICANCE WITH MITIGATION ³
				related projects, in coordination with Kolomela's planned initiatives. Regular needs assessment at public health institutions.	
		Support of the local municipality enhances service delivery	HIGH POSITIVE	Capacity building programme with DBSA. Support to the municipality as part of the Operation and Maintenance agreement. Support to the municipality in rolling out a pre-paid water metering system.	HIGH POSITIVE
		Unemployment and loss of livelihoods linked to restructuring and cost cutting measures as a result of international iron ore market pressures	HIGH	Engagement with key local stakeholders to manage expectations and ensure they understand that funding and resources for social development will be less than before. Support to retrenched employees to find alternative employment.	HIGH
		Pressure on municipal services and capacity due rapidly growing population	HIGH	Capacity building and support initiatives to alleviate pressure on the municipality. In addition: Guide contractors to communicate and recruit responsibly.	MODERATE
		A shortage of proper and affordable housing due to the demand created by mining (poor living conditions in informal settlements)	HIGH	Housing policy and building of additional houses (including rental stock) for employees. Project to provide accommodation for public service health professionals.	MODERATE
		Increased traffic & consequences on road networks.	HIGH	Geometric and structural upgrades of selected links. Some gravel roads may require surfacing and ones affected for short periods may require a more comprehensive maintenance plan including dust suppression. Responsibility should be shared between the developers and the road owners (provincial, municipal and private).	MODERATE

10.4 PROPOSED MANAGEMENT OBJECTIVES AND THE IMPACT MANAGEMENT OUTCOMES FOR INCLUSION IN THE EMPR

Mitigation measures required to reduce key negative impacts and enhance positive impacts are included in Table 10.1. The key mitigation measures to be included in the EMPr are as follows:

- Implementation of Site Layout Plan 3 (mitigated scenario) as depicted in Figure 6.3 and Figure 10.1 in order to ensure mitigated impacts on heritage, Wetland Pans and watercourses.
- Regular (annual) confirmation of extent of dewatering impact and update of the dewatering model, to allow for a continual improvement in the understanding of the dewatering impact (based on recommendation made by Itacsa (2015) as given in Table 9.1.
- Buffer zones to allow for the protection of remaining Wetland Pans to be based on catchments as identified by Jones & Wagener (2015). Buffer zones will vary depending on clusters.
- Optimisation of opportunities for backfilling by ongoing revision of mine plan (at least annually) to investigate additional opportunities for backfilling and inclusion where practicable.
- Ongoing and concurrent rehabilitation of waste rock dumps in accordance with the Rehabilitation Strategy (Golder, 2016).
- Delineate the 1 in 100 year flood line of the section of the Soutloop River and designate this (or a distance of 100 m from banks) as sensitive with only restricted activities allowed.
- Minimise the area of disturbance and infrastructure which can impede within the Soutloop River due to the Aquifer Recharge Project. Only boreholes and pipelines absolutely required to be in the flood line to be included.
- Ongoing community consultation including quarterly presentation of air quality monitoring data annual noise monitoring data.
- Wet suppression to continue on temporary haul roads. Effectiveness to be monitored on a daily basis and frequency to be increased as required.
- Chemical suppressants to be placed on all new permanent haul roads. The effectiveness to be monitored and maintenance and additional suppression to be implemented as required.
- Implement Social and Labour Commitments to ensure continued enhancement of positive economic development. In addition to current commitments and activities being carried out by Kolomela Mine the following should be implemented:
 - Local employment commitments are to be obtained from contractors and these are to be monitored.
 - Contractors to be encouraged (through preferential procurement process) to make use of local suppliers.
 - Undertake regular needs assessments at schools and encourage largest contractors to assist with educational initiatives.
 - Undertake regular needs assessment of public health institutions and encourage largest contractors to also contribute to health related projects.
 - Identify road upgrade requirements (update of Jefarres & Green Study, 2015) and implementation in consultation with local municipality and regional roads authority (Public

Works).

10.5 FINAL PROPOSED ALTERNATIVES

The proposed final layout alternative is given depicted in Section 10.2 (see Figure 6.3 & Figure 10.1).

10.6 ASPECTS FOR INCLUSION AS CONDITIONS IN THE AUTHORISATION

The authorisation is subject to the implementation of Site Layout Plan 3 (mitigated scenario) which is required to reduce negative impacts to acceptable levels. The authorisation is also subject to the amendment of the Kolomela Mine Water Use Licence by the Department of Water and Sanitation.

10.7 DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

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

- The impacts are as for the project description provided by Kolomela Mine and as described in Section 3.
- The proposed layout of the extended and new facilities at Kolomela Mine as provided in Figure 6.3 and Figure 10.1 are conceptual. Detailed design of such infrastructure is still to be undertaken. The final layout may differ slightly from the conceptual layout plan. The principles as specified in the outcomes of the EIA Report will however be adhered to during final design
- The modelled scenarios for groundwater, air quality and noise impacts are based on the mine works programme available at the time. The details with respect to the actual implementation of the programme with respect to the production from different pit areas may differ from that used in the air dispersion modelling. It is however, anticipated that the magnitude and extent of the predicted impacts present a reasonable estimate for the purposes of the EIA.
- The predicted impact on groundwater is based on a 3D hydrogeological model. The impact takes into consideration the cumulative effect of future dewatering from Assmang's Beeshoek Mine located to the north of Kolomela Mine and that proposed for Kolomela Mine. The model is subject to limitations with respect to available data on hydraulic conductivity and faults which may affect the prediction on the extent on the drawdown cones.
- All mining activities were assumed to be at the surface of pit areas. The mitigating effect of pit walls and waste rock dumps were therefore not accounted for. The noise impacts at receptor points are thus conservative and the modelling results will have over predicted the impact to be experienced.
- The estimation of future employee and contract level employment is as provided by Kolomela Mine at the time of the assessment. The actual numbers are however dependent on economic conditions.
- Kolomela Mine's available budget to implement management and mitigation measures to enhance positive social impacts and mitigate negative social impacts, especially in view of the cumulative social impacts of mining developments are dependent on world economic conditions in particular deteriorating iron ore prices and increased iron ore production worldwide.

10.8 REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD OR SHOULD NOT BE AUTHORISED

10.8.1 REASONS WHY THE ACTIVITY SHOULD BE AUTHORISED OR NOT

It is the opinion of the EAP that the proposed expanded and additional activities at Kolomela Mine be authorised based on the following reasons:

- Impacts of the proposed expanded layout has been revised to minimise the impact as far as practicable;
- The disturbance areas are limited to the mining right area, with the exception of the aquifer recharge project on the Soutloop River (the impacts of which are not considered to be substantial);
- The nature of the impacts for the proposed expansion and additional activities do not differ from that which has already been authorised for Kolomela Mine;
- The magnitude and extent of the impacts on groundwater, air quality and noise receptors does increase but no significant new areas are expected to be impacted on;
- The positive socio-economic impacts of Kolomela Mine are substantial for the local economy and the proposed changes will mean that the mine will have the potential to continue to provide such benefits to local communities.
- The proposed expansion is strongly motivated by the need for a greater role to be played by Kolomela Mine in terms of SIOC's continued contribution to the regional economy forced by a change in global climatic conditions and iron ore prices.
- Kolomela Mine has a good track record in terms of environmental practices and there is high confidence in the successful implementation of mitigation and ongoing liaison with stakeholders and affected parties to ensure that no person will be worse-off as a result of the proposed expanded operations

10.8.2 CONDITIONS TO BE INCLUDED IN THE COMPILATION AND APPROVAL OF EMPR

The following key mitigation measures are to be included in the EMPr:

- Implementation of Site Layout Plan 3 (mitigated scenario).
- Buffer zones around remaining wetland pans (not to be disturbed by proposed layout plan) to be left based on the catchments defined for such pans.
- Determination of 1 in 100 year flood line for the Soutloop River, which is to be defined as a sensitive area.
- Annual update of the groundwater model towards more accurate prediction of the magnitude and extent of the dewatering impact.
- Implementation of the Rehabilitation Strategy as outlined in the Site-Wide Operational Rehabilitation Strategy (Golder, 2016).
- A Phase 1 Palaeontological study is to be undertaken in accordance with the recommendations of PGS (2015).
- Ongoing air quality monitoring, including revisions to the monitoring network as proposed by Airshed, 2015 and communication of such impacts to stakeholders on a quarterly basis.
- Biannual monitoring of noise (as per existing EMPr) and communication of such results to stakeholders.

10.8.3 REHABILITATION REQUIREMENTS

The rehabilitation requirements for Kolomela Mine are documented in the Site Operation Rehabilitation Strategy (Golder, 2016). The strategy is provided in Part C, Appendix O.

10.9 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

Given the uncertainties regarding the current economic conditions, it is requested that the authorisation be valid for a period of 10 years. This is motivated by the fact that the reasons for the authorisation of the activities as indicated in 10.8.1 are not expected to change substantially over this period.

11 FINANCIAL PROVISION

11.1 DERIVATION OF QUANTUM

Onno Fortuin Consulting was contracted by Synergistics Environmental Services to conduct a detailed closure estimate for the planned new Kolomela Mine Amendment. The Closure Costing Report is provided as Part C, Appendix M. An annual increase has of 6% has been added as the report was completed in 2015.

Based on the information provided at the time of the assessment, the closure costs the following adjustments to the pre-mature and final closure costs:

TABLE 11.1: UPDATED PREMATURE AND FINAL (LOM) CLOSURE COSTS FOR PROPOSED KOLOMELA AMENDMENT (ALL VALUES EXCLUDE SALVAGE VALUES)

	DEC 2015	KOLOMELA AMENDMENT	REVISED TOTAL
PRE-MATURE CLOSURE COST	R490 380 704	R19 520 331	R509 901 035
LOM CLOSURE	R734 937 017	R1 461 441 144	R2 196 378 160

11.2 AMOUNT TO BE PROVIDED FOR FROM OPERATING EXPENDITURE

Kolomela Mine carries out ongoing rehabilitation of the WRDs as part of the operations. The rehabilitation of the waste rock dumps forms the bulk of the rehabilitation costs. It is estimated that in the order of R1 800 000 000, could be incurred as operational expenses. This amounts to the amount to rehabilitate the WRDS.

12 DEVIATIONS FROM THE APPROVED SCOPING REPORT AND PLAN OF STUDY

12.1 DEVIATIONS FROM THE METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF THE POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS

Not applicable.

12.2 MOTIVATION FOR DEVIATION

Not applicable.

13 OTHER INFORMATION REQUIRED BY COMPETENT AUTHORITY

Not applicable

14 OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF NEMA

Not applicable.

15 REFERENCES

Airshed Planning Professionals. March 2015. Air Quality Specialist Report for the Proposed Kolomela Amendment Project. Report No. 13SLR22.

Airshed Planning Professionals. March 2015. Noise Impact Assessment for the Proposed Kolomela Amendment Project. Report No. 13SLR23.

Demacon Market Studies. February 2015. Kolomela Amendment Economic Impact Assessment. Findings and Recommendations.

Golder Associates. January 2016. Sishen Iron Ore Company Pty Ltd. Kolomela Mineral Waste Streams Assessment and Mining Residues Facilities Impact Report. Report Number 1527024-299063-1.

Golder Associates. December 2015. Site-wide Operational Rehabilitation Strategy for Kolomela Mine. Report No. 527835-298236-1

Jefarres & Green. August 2014. Traffic Impact Assessment. Kolomela Optimisation Project.

Jones & Wagener. February 2015. Hydrological Assessment of the Pan Clusters Potential Affected by the Kolomela Mine Expansion Project. Report No. JW206/14/E581-Rev 2.

Omni-Eko. March 2015. Fauna and Flora Report. Proposed Amendment at Kolomela Mine.

Onno Fortuin Consulting. March 2015. Kolomela Amendment Project – Closure Cost Estimate.

PGS Heritage. March 2015. Kolomela Amendment Project. Heritage Impact Assessment.

Scientific Aquatic Services. January 2015. Wetland Impact Assessment as Part of the Environmental Assessment and Authorisation Process for the Kolomela Amendment., Northern Cape Province.

Synergistics Environmental Services. July 2010. Kolomela Mine. Environmental Impact Assessment and Environmental Management Programme.

Synergistics Environmental Services. April 2015. Kolomela Mine Amendment. Visual Impact Assessment.

16 UNDERTAKING

I, **Kerry Colleen Fairley**, acting as independent environmental assessment practitioner hereby confirm:

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

Kerry Colleen Fairley

Environmental Assessment Practitioner

Pr.Sci. Nat.