

DER BROCHEN AMENDMENT PROJECT

Environmental Impact Assessment & Environmental Management Programme Report

DMR Reference Number: LP 30/5/1/3/2/1 (182) EM

Report Prepared for

Anglo American Platinum: Rustenburg Platinum Mines Der Brochen Section

Report Number 533247 – EIA/EMPr Report



Report Prepared by



October 2019

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Anglo American Platinum: Rustenburg Platinum Mines Der Brochen Section

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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).

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FILE REFERENCE NUMBER SAMRAD: **LP 30/5/1/3/2/1 (182) EM**

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 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.

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.

Executive Summary

The Der Brochen Mine is a platinum project owned by Rustenburg Platinum Mines Limited (RPM), a wholly owned subsidiary of Anglo American Platinum (AAP), and is located approximately 25 km south-west of the town of Steelpoort and 40 km west of Mashishing (Lydenburg), in the Limpopo Province. The mine falls within the Fetakgomo – Greater Tubatse Local Municipality, under jurisdiction of the Greater Sekhukhune District Municipality.

Der Brochen Mine's mining right (LP 30/5/1/3/2/1 (182) MR) falls on the following farms and farm portions:

- Richmond 370 KT (Remaining extent, portions 1 and 2);
- St George 2 JT (Remaining extent, portions 1 and 2);
- Hermansdal 3 JT (Remaining extent);
- Hebron 5 JT (Remaining extent and portion 1);
- Helena 6 JT (Remaining extent and portion 3); and
- Der Brochen 7 JT (Remaining extent).

In addition to the above listed farms, RPM also holds the surface right to Portion 7 of the farm Mareesburg 8 JT on which the Mareesburg tailings storage facility (TSF), associated return water dams (RWDs) and tailings-return water pipeline system are located. The Mareesburg TSF operation forms part of the Der Brochen Mine operations.

Project Description

It is the intention of RPM to apply for the necessary environmental and waste authorisations as well as a water use licence for the proposed Der Brochen Amendment Project, and amending the Der Brochen Mine's approved Consolidated EMPr and associated Environmental Authorisation (EA) to include the following:

- The construction of a buttress wall at the existing Helena TSF and the additional filter press plant at the existing Mototolo Concentrator Plant, due to emergency situation¹, as agreed by the DMR in October 2017. Refer to Appendix A1 for the DMR letter in this regard. The construction of the buttress wall and filter press plant commenced in October 2017 after permission was obtained from the DMR to implement these infrastructures as mitigation measures to prevent and contain the emergency situation or to mitigate the effects of the emergency situation in accordance with Section 30(A)(2)(b) of the National Environmental Management Act, Act 107 of 1998 (NEMA); and
- The development and operation of the following additional mining related infrastructure as part of the mine's development strategy:
 - The South decline shaft with associated infrastructure, i.e. water management infrastructure, to access the new underground mining operation area to be mined through the bord-and-pillar mining method.
 - RPM intends to locate the South decline shaft within the previously approved Southern open-pit areas, thereby converting the previously approved open-pit mining operation of the Southern open-pit to an underground mining operation.

¹ 'Emergency situation' means a situation that has arisen suddenly that poses an imminent and serious threat to the environment, human life or property, including a 'disaster' as defined in section 1 of the Disaster Management Act, 2002 (Act No. 57 of 2002).

- Three up-cast ventilation shafts required for the underground workings associated with the South Decline Shaft;
- A Dense Medium Separation (DMS) Plant to be located within the existing footprint area of the Mototolo Concentrator Plant area;
- A DMS Stockpile with associated pollution control dams (PCDs);
- The conversion of the existing Mototolo chrome recovery plant located within the existing Mototolo Concentrator Plant area from a final tailings' arrangement to an inter-stage arrangement;
- The installation of a Mainstream Inert Grinding (MIG) mill at Mototolo Concentrator Plant area;
- Additional Run of Mine (RoM) stockpiles and associated silos;
- Change houses and office complex to be located at the proposed South Decline Shaft area;
- An explosive destruction bay area to be located near the proposed South decline shaft;
- Staff accommodation camp to be located near the Der Brochen Dam; and
- Additional linear infrastructure, i.e.:
 - *Two conveyor systems.* One conveyor belt system will be constructed to connect the proposed South Decline Shaft with the proposed DMS Plant that will be located in the existing footprint area of the Mototolo Concentrator Plant, for the purpose of transporting ore from the South Decline Shaft to the plant area. Another conveyor belt system will be required to transport DMS material from the proposed DMS Plant to the proposed DMS Stockpile area. It is currently anticipated that the DMS conveyor system will run along the existing Mareesburg tailings pipeline system.
 - *Access and haul roads.* New access roads to the proposed ventilation shafts will be required for maintenance purposes. Certain existing roads will also be required to be upgraded to provide sufficient access roads to the project related infrastructure such as the North open-pit area, the South Decline Shaft and offices. The mine is also considering including a haul road within the proposed corridor associated with the ore conveyor belt system to transport ore from the proposed South Decline Shaft to the Mototolo Concentrator Plant area as an interim measure, whilst the conveyor belt system is being constructed.

Majority of the infrastructure required for the proposed Der Brochen Amendment Project will be located within the current Der Brochen Mining Right and surface right areas.

Legal Requirements

Before RPM may commence with the development of the additional mining related activities, as detailed above, the following environmental authorisations processes and licence amendment need to be undertaken in accordance with the relevant national legislation:

A Scoping and Environmental Impact Assessment (EIA) for any project related Listed Activities stipulated in the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA). The Der Brochen Mine's existing approved Consolidated EMPr will be amended in terms of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA). The Scoping, EIA and amended EMPr will be submitted to Limpopo Province's DMR for approval; and

An Integrated Water Use Licence (IWUL) for any project related water uses and accompanying Integrated Water and Waste Management Plan (IWWMP) under the National Water Act (Act No. 36 of 1998) (NWA), for submission and approval from the Department of Water and Sanitation (DWS).

RPM appointed SRK Consulting (South Africa) (SRK) as the independent Environmental Assessment Practitioner (EAP) to manage and facilitate the integrated environmental authorisation and associated public participation process in accordance with NEMA, NEM:WA, NWA and MPRDA.

Outcomes of the impact assessment

The impact assessment undertaken by the EAP, as part of the integrated environmental authorisation process for the Der Brochen Amendment Project, followed due process to inform the findings of the EIA study in accordance with the EIA Regulations of 2014, as amended. The EIA process included an assessment of potential impacts identified, further investigations by specialists in their respective fields, and the undertaking of the legislated required participation with interested and affected parties.

The impact assessment considered both the biophysical and socio-economic aspects of the environment within which the Der Brochen Amendment Project will be located.

The assessment of the biophysical environment revealed that the project area is located within the Sekhukhune Centre of Plant Endemism. Significant habitat loss has already occurred within this centre of endemism, largely attributable to the expansion of local communities and mines and associated mining exploration. Although the proposed project will result in the long term loss of habitat and species in the region, appropriate mitigation measures have been developed for this project to minimise these anticipated impacts and which are aligned with the minimum requirements of AAP's Biodiversity Strategy to achieve Net Positive Impact (NPI) and maximise biodiversity opportunities.

In addition, a detailed site investigation further assessed RPM is determining the least intrusive areas where the project related infrastructure and activities can be placed.

From a socio-economic point of view, the Der Brochen Amendment Project will create temporary employment opportunities for local employees during the pre-construction, construction and rehabilitation phases of the project. The Der Brochen Amendment project is seen as a replacement project for the Borwa and Lebowa shafts, which previously formed part of the Mototolo Mine operation managed under a JV between RPM and Glencore. It is anticipated that employees will be moved around from old sections of the mine to continue working at the new mine activities thereby allowing the mine to continue to operate with its current workforce.

Assuming all phases of the project adhere to the mitigation and management commitments stipulated in this EIA/EMPr, it is believed that all of the negative impacts identified for the proposed project can be mitigated and managed to such an extent to either avoid or where not possible, at least minimise and remediate the impact that may occur.

It is therefore the EAP's opinion that based on the process that has been followed and the findings of the impact assessment, in conjunction with the proposed mitigation measures, that no unmanageable adverse impacts are expected to occur. Some positive impacts are also expected to occur in terms of the continued provision of employment opportunities to the current mine's workforce.

Purpose of this document

The Draft EIA/EMPr Report is available for public review and comment for a period of thirty (30) calendar days from Tuesday, 01 October to Thursday, 31 October 2019. The Report will be available in PDF format on the SRK website (<https://www.srk.co.za/en/za-der-brochen-mine-amendment-project>), and the following public places:

Public places where the Scoping Report will be made available

Public Place	Locality	Tel No
Mapodile/Eerstegeluk Public Library	735 Kgahlanong Street, Mapodile	013 237 0039

Public Place	Locality	Tel No
Burgersfort Public Library	Cnr Kort & Eddie Sedibe Str, Burgersfort	013 231 7815
Kalkfontein CPA offices	Kalkfontein (Nokaneng)	No landline available
Pakaneng Community Trust Office	Schaapkraal Farm	No landline available
Gamawela Community Centre	St George Farm	No landline available

All stakeholders are encouraged to comment on the Draft EIA/EMP_r Report by Thursday, 31 October 2019, as your comments and suggestions on any aspect of the project will ultimately assist the relevant authorities to make an informed decision.

You are welcome to comment on the Draft EIA/EMP_r Report by:

- Writing a letter and submitting the letter via mail, email, or fax;
- Attending stakeholder meetings; and/or
- Contacting the Stakeholder Engagement Office.

Should you have any questions, need more information, or wish to raise issues of concern or suggestions, please contact SRK's Stakeholder Engagement Office at:

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Disclaimer

The opinions expressed in this Report have been based on the information supplied to SRK Consulting (South Africa) (Pty) Ltd (SRK) by Rustenburg Platinum Mines Limited (RPM). SRK has exercised all due care in reviewing the supplied information. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

List of Abbreviations

AAP	Anglo American Platinum Limited
ABA	Acid Based Accounting
ABET	Adult Basic Education and Training
AET	Adult Education and Training
APM	Archaeology, Palaeontology and Meteorites
ARD	Acid Rock Drainage
BA	Basic Assessment
BC	Bushveld Complex
bgs	Below Ground Surface
BH	Borehole
BID	Background Information Document
CA	Competent Authority
cm	Centimetres
CMF	Community Monitoring Forum
CPA	Communal Property Associations
CPI	Consumer Price Index
CR	Critically Endangered
CV	Curriculum Vitae
DAFF	Department of Agriculture, Forestry and Fisheries
Db	Decibels
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DEEEP	Direct Estimation of Ecological Effect Potential
DMR	Department of Minerals Resources
DMRE	Department of Mineral Resources and Energy
DMS	Dense Medium Separation
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EC	Electrical Conductivity
ECO	Environmental Control Officer
EDL	Ephemeral Drainage Lines
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMP	Environmental Management Programme
EMS	Environmental Management System
EMPr	Environmental Management Programme Report
EN	Endangered
EW	Extinct in the Wild
EWR	Ecological Water Requirement
FHA	Fish Habitat Assessment
FMP	Fire Management Plan
FRAI	Fish Response Assessment Index
FTLM	Fetakgomo Tubatse Local Municipality
GCS	Groundwater Consulting Services
GHG	Greenhouse Gas
GN	Government Notices
GNR	Government Notice Regulation
GPS	Global Positioning System
GSDM	Greater Sekhukhune District Municipality
GTM	Greater Tubatse Municipality
ha	Hectares
HCR	Habitat Cover Rating
HIA	Heritage Impact Assessment
HR	Human Resources
HRD	Human Resources Development
HRDD	Human Rights Due Diligence
Hz	Hertz

I&APs	Interested and Affected Parties
IHI	Index of Habitat Integrity
IFC	International Finance Corporation
IWWMP	Integrated Water and Waste - Management Plan
JV	Joint Venture
kg	Kilograms
km	Kilometres
km ²	Square kilometres
ktpm	Kilo tons per month
LEDET	Department of Economic Development, Environment and Tourism
LEMA	Limpopo Environmental Management Act, Act 7 of 2003
LHD	Load Haul Dumper
Lion's Head	Lion's Head Platinum (Pty) Ltd
LoM	Life of Mine
LOS	Level of Service
l/s	Litres per Second
mamsl	Metres above mean sea level
MAR	Mean Annual Runoff
mbgl	Metres Below Ground Level
mg/l	Milligrams per Litre
m	Metres
m/s	Metres per Second
m ²	Squared Metres
ML	Metal Leaching
ML/d	Megalitres per Day
mm	Millimetres
mm/s	Millimetres per Second
Mm ³ /a	Million cubic metres per annum
m ³	Cubic Metres
MIG	Mainstream Inert Grinding
MIRAI	Macro-Invertebrate Response Assessment Index
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
NAAQS	National Ambient Air Quality Standards
NAG	Net Acid Generation
NEM:AQA	National Environmental Management: Air Quality Act, Act no. 39 of 2004
NEM:BA	The National Environmental Management: Biodiversity Act, Act No. 10 of 2004
NEM:WA	National Environmental Management: Waste Act, Act No. 59 of 2008
NEMA	National Environmental Management Act, Act No. 107 of 1998
NFA	The National Forestry Act, Act No. 84 of 1998
NHRA	The National Heritage Resources Act, Act No. 25 of 1999
NPI	Net Positive Impact
NT	Near Threatened
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PCCT	Pakaneng Choma Community Trust
PCD	Pollution Control Dam
PCLU	Post Closure Land Use
PES	Present Ecological Status
PGM	Platinum group metals
PM	Particulate Matter
PS	Performance Standard
PTO	Professional Training Officer
RE	Regionally Extinct
RLCC	Regional Land Claims Commissioner
RMF	Regional Maximum Flood
RoM	Run of Mine
RPM	Rustenburg Platinum Mines
RQIS	Resource Quality Information System
RWD	Return Water Dam
SAHRA	South African Heritage Resources Agency
Samancor	Samancor Chrome Ltd
S&EIA	Scoping and Environmental Impact Assessment
SABS	South African Bureau of Standards

SANAS	South African National Accreditation System
SANS	South African National Standard
SAWQG	South African Water Quality Guidelines
SCC	Species of Conservation Concern
SDM	Sekhukhune District Municipality
SEAT	Socio-Economic Assessment Toolbox
SEMA	Specific Environmental Management Acts
SEP	Stakeholder Engagement Plan
SHE	Safety, Health and Environmental
SIA	Social Impact Assessment
SLP	Social Labour Plan
SMME	Small Medium and Micro Enterprises
SP	Social Performance
SPD	Social Performance Department
SPLUMA	Spatial Planning and Land Use Management Act, Act No. 16 of 2013
SRK	SRK Consulting (Pty) Limited
SUD	Sustainable Drainage System
TCLM	Thaba Chweu Local Municipality
TCT0	Total Concentration Threshold
TDS	Total Dissolved Solids
ToR	Terms of Reference
TSF	Tailings Storage Facility
UG2	Upper Group 2
VIS	Visual Impact Study
VMP	Vegetation Management Plan
VU	Vulnerable
WRD	Waste Rock Dump
WUL	Water Use Licence
WULA	Water Use Licence Application
ZoI	Zone of Influence
ZoR	Zone of Regulation

NOTE: This Report comprises of **Part A: the Environmental Impact Assessment (EIA)** and **Part B: the Environmental Management Programme (EMPr)** of the Der Brochen Amendment Project. The Report has been compiled in terms of the provisions of Appendix 3 and Appendix 4 of the 2014 EIA Regulations (as amended) promulgated under the National Environmental Management Act, At 107 of 1998 (NEMA).

Part A – Environmental Impact Assessment (EIA) Report

1 Introduction, background and purpose of the EIA

1.1 Introduction and background to the Der Brochen Mine

The Der Brochen Mine is a platinum project owned by Rustenburg Platinum Mines Limited (RPM), a wholly owned subsidiary of Anglo American Platinum (AAP), and is located approximately 30 km south-southwest of the town of Steelpoort (approximately 40 km by road) and 35 km west of Mashishing (Lydenburg) (approximately 65 km by road), in the Limpopo Province. The project area falls within the Fetakgomo Tubatse Local Municipality (FTLM), under jurisdiction of the Sekhukhune District Municipality (SDM).

Der Brochen Mine's mining right (LP 30/5/1/3/2/1 (182) MR) falls on the following farms and farm portions:

- Richmond 370 KT (Remaining extent, portions 1 and 2);
- St George 2 JT (Remaining extent, portions 1 and 2);
- Hermansdal 3 JT (Remaining extent);
- Hebron 5 JT (Remaining extent and portion 1);
- Helena 6 JT (Remaining extent and portion 3); and
- Der Brochen 7 JT (Remaining extent).

In addition to the above listed farms, RPM also holds the surface right to Portion 7 of the farm Mareesburg 8 JT on which the Mareesburg tailings storage facility (TSF), associated return water dams (RWDs) and tailings-return water pipeline system are located. The Mareesburg TSF operation forms part of the Der Brochen Mine operations.

Current operations at the Der Brochen Mine include the processing of platinum and chrome bearing ore at the existing Mototolo Concentrator Plant that is received from the underground workings at the Borwa and Lebowa shafts via an existing conveyor belt system. The Borwa and Lebowa shafts formed part of the previously known Mototolo Joint Venture² (JV) between RPM and Glencore Operations South Africa (Pty) Ltd (Glencore).

The final concentrate from the Mototolo Concentrator Plant is transported via trucks to the Polokwane Smelter for further processing, whilst the tailings material from the plant is disposed of on the existing Helena TSF and recently constructed Mareesburg TSF via pipeline systems. The water contained in the tailings' slurry settles on top of the TSFs and collects in the existing RWDs associated with the Helena TSF and Mareesburg TSF respectively. From the RWDs the water is pumped back to the Mototolo Concentrator Plant for reuse via return water pipeline systems.

The operations at the Der Brochen Mine are undertaken in accordance with the mine's Consolidated Environmental Management Programme Report (EMPr) that was approved by the Department of Mineral Resources (now known as the Department of Mineral Resources (DMR)) in 2016 (LP 30/5/1/3/2/1 (182) EM). The mine also operates under three approved Water Use Licences (WULs)

² RPM acquired Glencore's shares in the Mototolo JV during November 2018, and will combine the Mototolo JV area with the downdip and adjacent Der Brochen resource to create a major platinum hub for the company.

issued by DWS in 2011 (WUL No. 24072959), 2016 (WUL No. 04/B41G/CI/4141) and 2017 (WUL Ref. No. 06/B41G/ABCFGIJ/5329), respectively.

Other activities and infrastructure associated with the Der Brochen Mine, as authorised through the Der Brochen Mine's approved Consolidated EMPr and current WULs, includes:

Existing facilities and activities:

- The Mototolo Concentrator;
- The Helena TSF with associated RWDs;
- The Mareesburg TSF and associated RWDs;
- Tailings-return water pipeline systems from the Helena TSF and Mareesburg TSF, respectively, to Mototolo Concentrator;
- Mine offices and access roads;
- Prospecting activities comprising of site preparation, drilling of prospecting boreholes, site rehabilitation and monitoring;
- Trial mining area on the Richmond farm (activity is completed, and the soil stockpile and waste rock dump are well vegetated);
- Abstraction of groundwater in support of mining from the Helena and Richmond licenced wellfields; and
- Abstraction from Der Brochen Dam based on an existing lawful industrial allocation.

Activities previously authorised, but which have not yet commenced:

- The Helena and Richmond wellfields;
- Helena and Richmond shafts and associated waste rock dumps;
- Two Open Pits (Northern and Southern Pits) and associated waste rock/overburden dumps and pollution control dam;
- Re-routing of a 132 kV powerline; and
- A Co-Disposal Facility.

Refer to Figure 1-1 for the regional locality of the Der Brochen Project.

RPM is currently planning to commence with the open-pit activities at the Northern open-pit before the end of 2019, as previously authorised by the competent authorities. The Northern open-pit will be developed to mine the near-surface layer of the Upper Group 2 (UG2) Reef. The Life of Mine (LoM) for the Northern open-pit is expected to be 3.5 to 4 years. Ore mined from the Northern open-pit will be crushed using a mobile crusher, whereafter the ore will be transported to the existing Mototolo Concentrator for processing via haul roads.

Waste rock from the open pit will be re-used for construction purposes, which will include the use of the material for terracing, constructing the services corridor, as road aggregate, buttressing and as construction material for containment facilities embankments.

The original Der Brochen Project included a co-disposal facility that was originally designed and approved for the disposal of waste rock material and tailings material, however, recent amendments to the designs have been made by RPM to the co-disposal facility to consist of a waste rock embankment with lined containment dams within the embankment facility for the storage of raw (clean) water and dirty water as part of the mine's updated water management strategy. As the Mareesburg TSF has been commissioned the co-disposal facility is no longer required for disposal of tailings.



1.2 Overview of the proposed Der Brochen Amendment Project

Der Brochen Project has been the focus of an exploration program targeting the Merensky and UG2 Reef horizons since 2001. Several study iterations followed, all indicating a significant value to be realised by extracting the Der Brochen resource which lead to the commencement of the Der Brochen Amendment Project, which primarily focussed on a fully mechanised bord and pillar UG2 reef mining operation, but also include the platinum bearing Merensky reef mining option.

It is the intention of RPM to apply for the necessary environmental and waste authorisations as well as a water use licence for the proposed Der Brochen Amendment Project, and amending the Der Brochen Mine's approved Consolidated EMPr and associated Environmental Authorisation (EA) to include the following:

- The construction of a buttress wall at the existing Helena TSF and the additional filter press plant at the existing Mototolo Concentrator Plant, due to emergency situation³, as agreed by the DMR in October 2017. Refer to Appendix A1 for the DMR letter in this regard. The construction of the buttress wall and filter press plant commenced in October 2017 after permission was obtained from the DMR to implement these infrastructures as mitigation measures to prevent and contain the emergency situation or to mitigate the effects of the emergency situation in accordance with Section 30(A)(2)(b) of the National Environmental Management Act, Act 107 of 1998 (NEMA); and
- The development and operation of the following additional mining related infrastructure as part of the mine's development strategy:
 - The South decline shaft with associated infrastructure, i.e. water management infrastructure, to access the new underground mining operation area to be mined through the bord-and-pillar mining method.
 - RPM intends to locate the South decline shaft within the previously approved Southern open-pit areas, thereby converting the previously approved open-pit mining operation of the Southern open-pit to an underground mining operation.
 - Three up-cast ventilation shafts required for the underground workings associated with the South Decline Shaft;
 - A Dense Medium Separation (DMS) Plant to be located within the existing footprint area of the Mototolo Concentrator Plant area;
 - A DMS Stockpile with associated pollution control dams (PCDs);
 - The conversion of the existing Mototolo chrome recovery plant located within the existing Mototolo Concentrator Plant area from a final tailings' arrangement to an inter-stage arrangement;
 - The installation of a Mainstream Inert Grinding (MIG) mill at Mototolo Concentrator Plant area;
 - Additional Run of Mine (RoM) stockpiles and associated silos;
 - Change houses and office complex to be located at the proposed South Decline Shaft area;

³ 'Emergency situation' means a situation that has arisen suddenly that poses an imminent and serious threat to the environment, human life or property, including a 'disaster' as defined in section 1 of the Disaster Management Act, 2002 (Act No. 57 of 2002).

- An explosive destruction bay area to be located near the proposed South decline shaft;
- Staff accommodation camp to be located near the Der Brochen Dam; and
- Additional linear infrastructure, i.e.:
 - *Two conveyor systems.* One conveyor belt system will be constructed to connect the proposed South Decline Shaft with the proposed DMS Plant that will be located in the existing footprint area of the Mototolo Concentrator Plant, for the purpose of transporting ore from the South Decline Shaft to the plant area. Another conveyor belt system will be required to transport DMS material from the proposed DMS Plant to the proposed DMS Stockpile area. It is currently anticipated that the DMS conveyor system will run along the existing Mareesburg tailings pipeline system.
 - *Access and haul roads.* New access roads to the proposed ventilation shafts will be required for maintenance purposes. Certain existing roads will also be required to be upgraded to provide sufficient access roads to the project related infrastructure such as the North open-pit area, the South Decline Shaft and offices. The mine is also considering including a haul road within the proposed corridor associated with the ore conveyor belt system to transport ore from the proposed South Decline Shaft to the Mototolo Concentrator Plant area as an interim measure, whilst the conveyor belt system is being constructed.

Majority of the infrastructure required for the proposed Der Brochen Amendment Project will be located within the current Der Brochen Mining Right and surface right areas.

Please refer to Figure 1-2 for the location of the proposed infrastructure in relation to the nearest town and roads in the region.

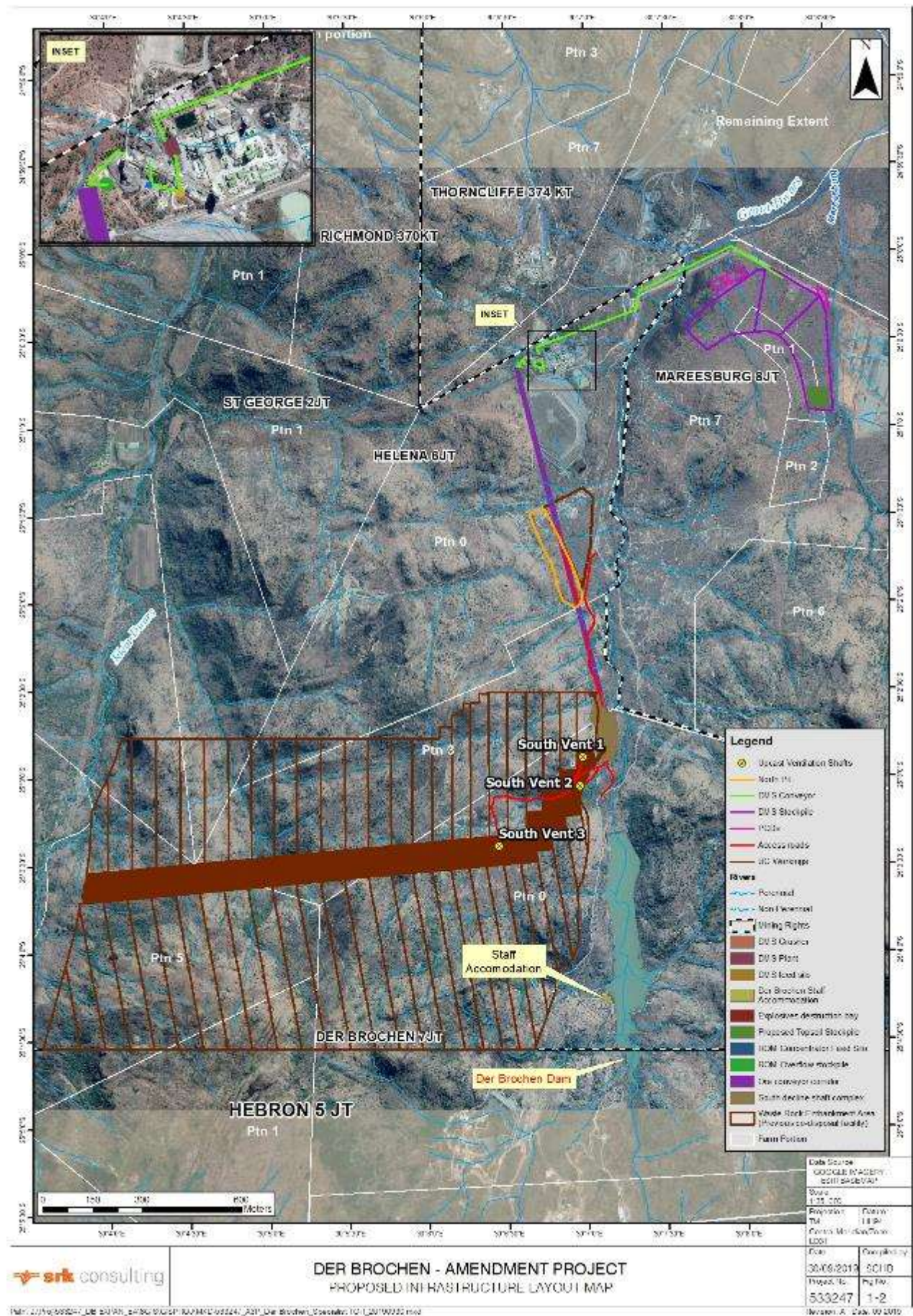


Figure 1-2: Proposed infrastructure layout of the Der Brochen Amendment Project

1.3 EMPr amendment and related permitting requirements

Before RPM may commence with the development of the additional mining related activities, as detailed above, the following environmental authorisations and licence processes need to be undertaken in accordance with the relevant national legislation:

- A Scoping and Environmental Impact Assessment (S&EIA) for any project related Listed Activities stipulated in the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA). The Scoping, EIA and amended EMPr will be submitted to Limpopo Province's DMR for approval; and
- An Integrated Water Use Licence (IWUL) for any project related water uses and accompanying Integrated Water and Waste Management Plan (IWWMP) under the National Water Act (Act No. 36 of 1998) (NWA), for submission and approval from the Department of Water and Sanitation (DWS).

The Der Brochen Mine's existing approved Consolidated EMPr will also be amended as part of the integrated authorisation process of the Der Brochen Amendment Project, in terms of Section 102 of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA).

The purpose of amending the existing approved Consolidated EMPr is to include the activities and infrastructure associated with the proposed amendment project and the recent design changes to the previously approved co-disposal facility in relation to the authorised and planned North open-pit mining operations.

RPM appointed SRK Consulting (South Africa) (SRK) as the independent Environmental Assessment Practitioner (EAP) to manage and facilitate the integrated environmental authorisation and associated public participation process in accordance with NEMA, NEM:WA, NWA and MPRDA. The integrated environmental authorisation process, timeframes and associated public participation process are illustrated in Figure 1-3.



Figure 1-3: Integrated Environmental Authorisation Process (NEMA, NEM:WA & NWA)

1.4 Purpose and structure of the EIA

The EIA section of this report has been compiled in accordance with Appendix 3 of the NEMA 2014 EIA Regulations, as amended (GN R 982) as well as the requirements of an EIA report template issued by the DMR for listed activities associated with mining right and/or bulk sampling activities. A summary of the requirements of an EIA report is provided in Table 1-1, including cross-references to sections in this report where the legislated requirements have been addressed.

All comments received during the review of the Draft Scoping Report for public comment have been incorporated into the Final Scoping Report which was submitted for approval to the DMR. The DMR have issued a letter of acceptance of the Final Scoping Report (See Appendix A2 on 31 May 2019 that included general comments and additional requirements. Table 1-2 provides details of the comments and requirements pertained in the acceptance letter from the DMR as well as references to sections in this report where the DMR's additional requirements were addressed.

Table 1-1: Regulatory requirements of an EIA Report as stipulated in Appendix 3 of the NEMA 2014 EIA Regulations and cross-references

Legislated requirements (EIA Reg. Appendix 3)		Section Reference
An EIA Report must include information on:		
(1)(a)	details of-	Section 2.1 & 2.2 and Appendix B
	(i) the EAP who prepared the EMPr	
	(ii) the expertise of the EAP, including a curriculum vitae;	
(1)(b)	The location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including:	Section 3.1
	(i) The 21-digit Surveyor General code of each cadastral land parcel	
	(ii) where available, the physical address and farm name; and	
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
(1)(c)	a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is -	Section 4.2
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken	
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken.	
(1)(d)	A description of the scope of the proposed activity, including -	Section 4.2
	(i) a listed and specified activities triggered and being applied for; and	
	(ii) a description of the associated structures and infrastructure related to the development.	
(1)(e)	A description of the policy and legislation context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context	Section 5
(1)(f)	A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report.	Section 6
(1)(g)	A motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report	Section 7
(1)(h)	A full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including:	Section 7
	(i) details of the development footprint considered	
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs	
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	
	(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	
	(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts including the degree to which these impacts –	
	(aa) can be reversed (bb) may cause irreplaceable loss of resources and (cc) can be avoided, managed or mitigated	
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of the potential environmental impacts and risks	

Legislated requirements (EIA Reg. Appendix 3)		Section Reference
An EIA Report must include information on:		
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	
	(viii) the possible mitigation measures that could be applied and the level of residual risk	
	(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such; and	
	(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report.	
(1)(i)	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity including -	Section 10
	(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process, and	
	(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	
(1)(j)	An assessment of each identified potentially significant impact and risk, including -	Section 10
	(i) cumulative impacts	
	(ii) the nature, significance and consequences of the impact and risk	
	(iii) the extent and duration of the impact and risk	
	(iv) the probability of the impact and risk occurring	
	(v) the degree to which the impact and risk can be reversed	
	(vi) the degree to which the impact and risk may cause irreplaceable loss of resources	
	(vii) the degree to which the impact and risk can be mitigated	
(1)(k)	Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report.	Section 10.5
(1)(l)	An environmental impact statement which contains-	Section 11
	(i) a summary of the key findings of the environmental impact assessment	
	(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided including buffers and	
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	
(1)(m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact assessment outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorization	Section 13
(1)(n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment	Section 7
(1)(o)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorization	Section 13
(1)(p)	A description of any assumptions, uncertainties and gaps in the knowledge which relate to the assessment and mitigation measures provided.	Section 14

Legislated requirements (EIA Reg. Appendix 3)		Section Reference
An EIA Report must include information on:		
(1)(q)	A reasoned opinion as to whether the proposed activity should or should not be authorized and if the opinion is that it should be authorized, any conditions that should be made in respect of that authorisation	Section 15
(1)(r)	Where the proposed activity does not include operational aspects, the period for which the environmental authorization is required and the date on which the activity will be conducted, and the post construction monitoring requirements finalized.	Section 16
(1)(s)	An undertaking under oath or affirmation by the EAP in relation to:	Sections 17 & 35
	(i) the correctness of the information provided in the reports	
	(ii) the inclusion of comments and inputs from stakeholders and I&APs	
	(iii) the inclusion of inputs and recommendations from the specialists reports where relevant and	
	(iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties	
(1)(t)	Where applicable, details of any financial provisions for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts	Section 18, 31 and Appendix D10
(1)(u)	An indication of any deviation from the approved Scoping Report, including the plan of study, including-	Section 19
	(i) and deviation from the methodology used in determining the significance of potential environmental impacts and risks, and	
	(ii) a motivation for the deviation	
(1)(v)	Any specific information that may be required by the competent authority; and	Section 20
(1)(w)	Any other matters required in terms of section (24)(4)(a) and (b) of the Act	Section 21
(2)	Where a government notice gazette by the Minister provides for any protocol or minimum information requirement to be applied to an environmental impact assessment report the requirements as indicated in such notice will apply.	Noted

Table 1-2: Indication of where the DMR's comments have been addressed in the Draft EIA/EMPr

DMR comment/requirements		Relevant Report Section where comment has been addressed
1	The Department has evaluated the submitted SR (Scoping Report) and Plan of Study for Environmental Impact Assessment submitted on 07th March 2019 and is satisfied that the documents comply with the minimum requirements of Appendix 2(2) of National Environmental Management Act, 1998 (as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations, 2014. The SR is hereby accepted by the Department in terms of regulation 22(a) of the NEMA EIA Regulations, 2014.	Noted
2	You may proceed with the environmental impact assessment process in accordance with the tasks contemplated in the Plan of Study for Environmental Impact Assessment as required in terms of the NEMA EIA Regulations, 2014.	Noted
3	Please ensure that comments from all relevant stakeholders are submitted to the Department with the Environmental Impact Assessment Report (EIA). This includes but is not limited to the Provincial Heritage Resources Authority, Provincial Environmental Department, Department of Agriculture, Forestry and Fisheries (DAFF), Department of Water and Sanitation (DWS), Department of Economic Development, Environment and Tourism (LEDET) and the local municipality. Proof of correspondence with the various stakeholders must be included in the EIA. Should you be unable to obtain comments, proof of the attempts	Comments from all relevant stakeholders have been included in the Comments and Responses section of this report (Section 8.3). Proof of communication with commenting authorities has been included in Appendix C8

DMR comment/requirements	Relevant Report Section where comment has been addressed
4	that were made to obtain comments should be submitted to the Department.
	In addition, the following amendments and additional information are required for the EIA and EMPr:
	a) Details of the future land use for the site and infrastructure after decommissioning in 20-30 years
	Refer to Section 11.1.1.
	b) The total footprint of the proposed development should be indicated
	Refer to Section 3.1
	c) Possible impacts and effects of the development on the vegetation ecology with regard to low and highland interface in the locality should be indicated
	Refer to Section 10 and Appendix D5
	d) Possible impacts and effects of the development on the surrounding industrial area
	Refer to Section 10
	e) A construction and operational phase EMPr to include mitigation and monitoring measures
	Refer to Sections 10 and 32
5	The applicant is hereby reminded to comply with the requirements of regulation 3 of the EIA Regulations, 2014 with regards to the time period allowed for complying with the requirements of the Regulations.
	Noted
6	Please ensure that the EIA includes the A3 size locality maps of the area and illustrates the exact location of the proposed development. The maps must be of acceptable quality and as a minimum, have the following attributes:
	<ul style="list-style-type: none"> - Maps are relatable to one another; - Co-ordinates; - Legible legends; - Indicate alternatives; - Scale.
	All maps relevant to the EIA have been included in this EIA/EMPr report and have been compiled to meet the department's requirements.
7	Further it must be reiterated that, should an application for Environmental Authorisation be subjected to any permits or authorisations in terms of the provisions of any Specific Environmental Management Acts (SEMA), proof of such application will be required.
	Please see Appendix A3 for proof of submission of a Water Use Licence Application to DWS.
8	You are requested to submit three (3) hard copies of the EIA and EMPr and at least one electronic copy (CD/DVD) of the complete EIA and EMPr to this Regional Office.
	Noted
9	Your attention is brought to Section 24F of the NEMA which stipulates "that no activity may commence prior to environmental authorisation being granted by the competent authority".
	Noted

2 Details of EAP and project proponent

The details and qualifications of the EAP who prepared this Draft EIA/EMPr Report for the Der Brochen Amendment Project are provided in the sections below.

2.1 Details of EAP who prepared the report

SRK assigned Selma Nel, a principal environmental scientist, Estie Retief, a senior environmental scientist and Thumo Neluvhalani, an environmental scientist as the EAPs to undertake the required integrated environmental authorisation process for the Der Brochen Amendment Project. Details of the EAPs are provided in Table 2-1.

Table 2-1: EAP Contact Details

EAP Name	Contact Number	Fax Number	Email Address
Franciska Lake	011 441 1024	086 555 0886	flake@srk.co.za
Selma Nel	011 441 1127	086 751 4709	snel@srk.co.za
Estie Retief	011 441 6161	086 503 2498	eretief@srk.co.za
Thumo Neluvhalani	011 441 6192	011 880 8086	tneluvhalani@srk.co.za

2.2 Expertise of the EAP

2.2.1 Qualifications of the EAP

The qualifications held by the EAP are summarised in Table 2-2 below. Please refer to Appendix B for copies of the qualifications.

Table 2-2: EAP Qualifications

EAP Name	Qualifications	University
Franciska Lake	B.Sc. Hons (Zoology)	Rand Afrikaans University
Selma Nel	MA (Environmental Management)	University of Johannesburg
Estie Retief	MA (Environmental Management)	University of Johannesburg
Thumo Neluvhalani	MA (Environment and Society)	University of Pretoria

2.2.2 Summary of EAPs past experience

Table 2-3 provides a summary of the EAP expertise. Detailed CVs of the EAP team are provided in Appendix B.

Table 2-3: EAP Expertise

EAP Name	Expertise
Franciska Lake	Franciska Lake is a registered natural science practitioner (PrSciNat (400248/05)) involved in water and waste management as well as environmental impact assessments and the development of environmental management programmes for the last 18 years. Her expertise includes: <ul style="list-style-type: none"> • Water and waste management • Water use licensing for mines and industry • General environmental management • Environmental impact assessments • Environmental management programmes • Environmental audits
Selma Nel	Selma Nel has over 12 years of experience in the environmental consulting field. Her experience thus far focussed mainly on environmental authorisation processes relating to mining developments in terms of the MPRDA, NEMA & NEM:WA and NWA legislation. Her expertise includes: <ul style="list-style-type: none"> • General environmental management • Waste management • Environmental impact assessments

EAP Name	Expertise
	<ul style="list-style-type: none"> Environmental management programmes Environmental and waste audits Biomonitoring
Estie Retief	<p>Estie Retief has 13 years of experience in the environmental consulting field. Estie has extensive experience in environmental authorisation processes relating to mining developments. Her expertise includes:</p> <ul style="list-style-type: none"> Environmental and waste audits Environmental impact assessments Environmental management programmes Climate change carbon footprint assessments
Thumo Neluvhalani	<p>Thumo Neluvhalani has been involved in the field of environmental science for the past 4 years. Her expertise includes:</p> <ul style="list-style-type: none"> Environmental and waste monitoring and auditing Water use license applications Environmental authorisations

2.2.3 Statement of SRK Independence

Neither SRK nor any of the authors of this Draft EIA/EMPr report have any material present or contingent interest in the outcome of this Report, nor do they have any pecuniary or other interest that could be reasonably regarded as being capable of affecting their independence or that of SRK.

SRK has no prior association with RPM in regard to the mineral assets that are the subject of this Report. SRK has no beneficial interest in the outcome of the technical assessment being capable of affecting its independence.

SRK's fee for completing this Report is based on its normal professional daily rates plus reimbursement of incidental expenses. The payment of that professional fee is not contingent upon the outcome of the Report.

2.3 Der Brochen Mine details

The physical and postal address of Der Brochen Project is provided in Table 2-4 and details of the responsible persons at the mine are presented in Table 2-5.

Table 2-4: Physical and postal address for Der Brochen

Address	Details
Physical address:	Farm Helena no 6, Lydenburg, 1120
Postal address:	Rustenburg Platinum Mines Limited, Der Brochen Project, Private Bag X7275, Witbank, 1035

Table 2-5: Der Brochen Mine's Responsible Persons

Name	Designation	Responsibilities
Mr Daan Breedt	General Manager (GM)	Mine Manger
Mr Frank Pieterse	Environmental Manager	Environmental Manager Eastern Limb
Ms Mashamba Avhashoni	Environmental Officer Mototolo Concentrator	All Environmental matters at Mototolo Concentrator
Mr Byron Redmead	Land Manager Der Brochen Project	All Environmental matters for the Der Brochen Project, excluding the Mototolo Concentrator
Mr Jack Selowa	Social Performance Manager	Head of Social Performance Department for Der Brochen - Mototolo Complex

2.4 Details of specialists

A team of qualified specialists were appointed to undertake various specialist investigations. The specialist studies investigated the baseline environment and the potential impact (including cumulative impacts) of each component of the proposed Der Brochen Amendment Project in relation to the construction, operational, closure, decommissioning and rehabilitation phases. All specialists developed appropriate and implementable mitigation measures to avoid, reduce and/or mitigate the potential impacts that have been identified by the specialists. The specialists also addressed (as far as practically possible) the comments and recommendations obtained through the public participation process which has been undertaken to date.

Table 2-6 outlines the specialist studies that were undertaken for the Der Brochen Amendment Project.

Table 2-6: Specialist studies to be undertaken for the Der Brochen Amendment Project

Specialist Field	Company	Contact Person
Air Quality	Airshed	Ms Reneé von Gruenewalt
Biodiversity – Terrestrial Ecology	SAS Environmental	Mr Chris Hooton
Biodiversity – Aquatic Ecology	SAS Environmental	Mr Stephen van Staden
Blasting and Vibrations	dBAcoustics	Mr Barend van der Merwe
Geohydrology & Geochemistry	Delta H	Dr Martin Holland
Heritage	PGS Heritage (Pty) Ltd	Mr Polke Birkholtz
Hydrology (Surface Water)	SRK	Mr Peter Shepherd
Rehabilitation and Closure	SRK	Mr James Lake
Social Impact	SRK	Ms Adel Malebana
Soil, land capability and land use	SAS Environmental	Mr Stephen van Staden
Traffic	Aurecon	Mr Faisal Barakzai
Visual	SRK	Mr Scott Masson
WULA	SRK	Ms Jacky Burke

2.5 Competent authorities' details

The Der Brochen Amendment Project is subject to authorisation from the following authorities:

- The DMR for the listed activities stipulated in the NEMA EIA Regulations of 2014 and the NEM:WA that will be associated with the proposed project, as well as for the amendment of the EMPr to include the project related mining infrastructure and activities in accordance with the MPRDA; and
- The DWS for the water uses that are associated with the proposed project as well as the accompanying Integrated Water and Waste Management Plan (IWWMP) under NWA.

Details of the relevant authorities are given in Table 2-7 below.

Table 2-7: Competent authority details

Department	Contact Person	Contact Details	
DMR (Polokwane Offices)	Mr T. Kolani	Telephone:	015 230 3600
		Email:	Thivhulawi.Kolani@dmr.gov.za
DWS (Polokwane Offices)	Ms M. Malapane	Telephone:	013 235 4206
		Email:	MalapaneM@dws.gov.za

2.6 Municipality and Ward Details

The Der Brochen Mine is situated approximately 30 km south-southwest of the town of Steelpoort and 35 km west of Mashishing (Lydenburg) within the Fetakgomo Tubatse Local Municipality (FTLM), which forms part of the greater Sekhukhune District Municipality (SDM) of the Limpopo Province. Details of the relevant municipalities and ward are provided Table 2-8 and illustrated in Figure 2-1.

Table 2-8: Local and district municipality details

Municipality	Contact Person	Designation	Office number
Fetakgomo Tubatse Local Municipality	Mrs MR Magooa	Acting Municipal Manager	013 231 1121
Fetakgomo Tubatse Local Municipality	Mr MA Mathebula	Director Development Planning	013 231 1202
Sekhukhune District Municipality	Mr Bongane Molefe	Planning And Economic Development	013 262 7300
Sekhukhune District Municipality	Ms Enica Mabena	Mayor's Office	013 262 7300
Fetakgomo Tubatse Local Municipality	Councillor C Makua	Ward 27 Councillor	013 231 1000

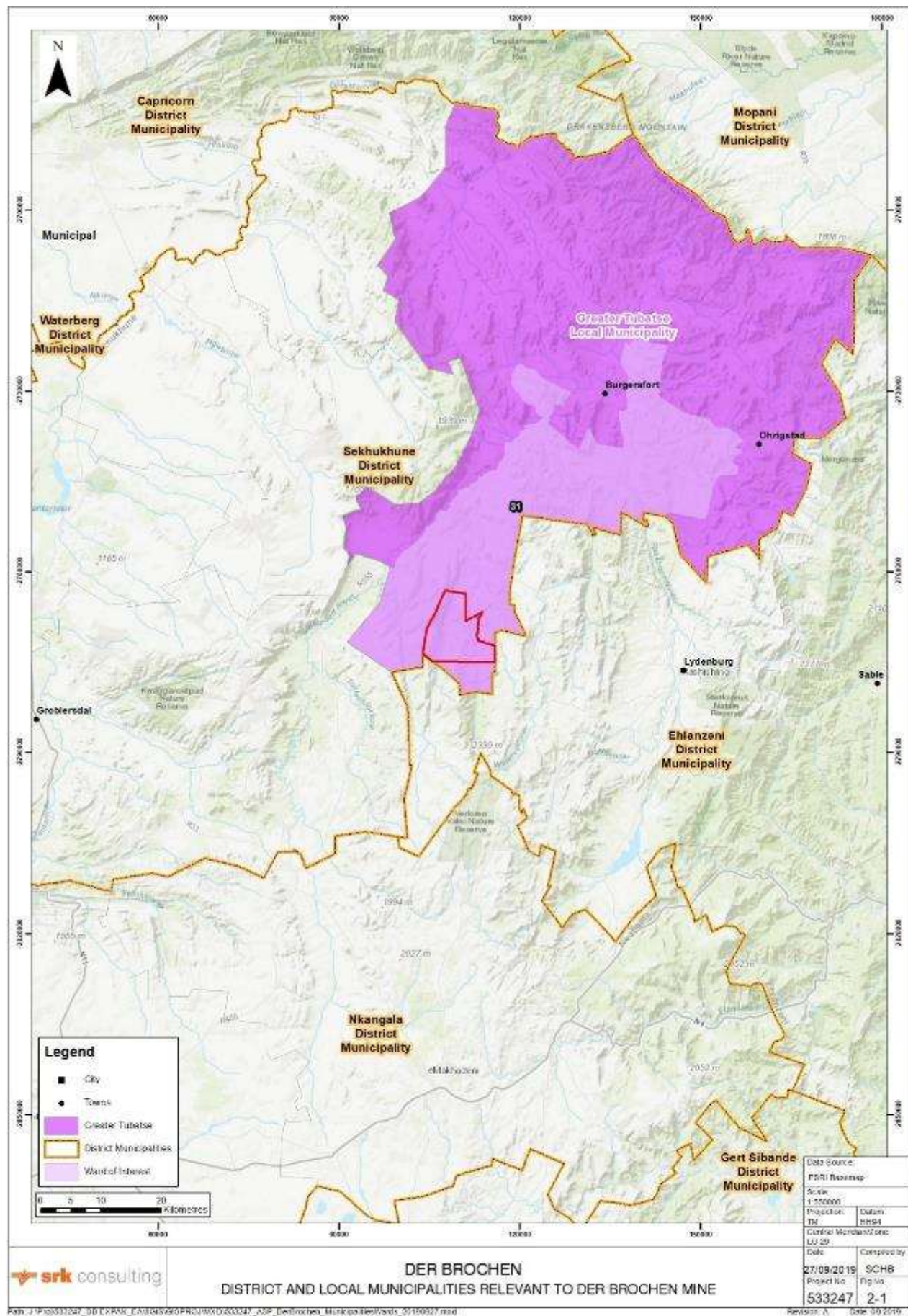


Figure 2-1: District and local municipalities and ward relevant to the Der Brochen Amendment Project

3 Description of Property

The Der Brochen Mine's mining right area covers a distance of approximately 12 km and 8 km on strike and dip respectively and falls on the following farms:

- Richmond 370 KT (Remaining extent, portions 1 and 2);
- St George 2 JT (Remaining extent, portions 1 and 2);
- Hermansdal 3 JT (Remaining extent);
- Hebron 5 JT (Remaining extent and portion 1);
- Helena 6 JT (Remaining extent and portion 3); and
- Der Brochen 7 JT (Remaining extent).

In addition to the above listed farms, RPM also holds the surface right to Portion 7 of the farm Mareesburg 8 JT on which the Mareesburg TSF, associated RWDs and tailings-return water pipeline system are located. The Mareesburg TSF operation forms part of the Der Brochen Mine operations.

3.1 Proposed project related properties

The Der Brochen Amendment Project will however, only affect the following farms and associated farm portions:

- Helena 6 JT, Remaining Extent;
- Helena 6 JT, Portion 3;
- Mareesburg 8 JT, Portion 1;
- Mareesburg 8 JT, Portion 7; and
- Der Brochen 7 JT, Remaining Extent.

RPM owns majority of the properties on which the project infrastructure will be located, with the exception of Portion 1 of the farm Mareesburg 8 JT which is owned by Samancor Chrome Ltd (Samancor).

Samancor currently leases Portion 1 of the farm Mareesburg 8 JT to Lion's Head Platinum (Pty) Ltd (Lion's Head). RPM have been in consultation with Samancor and Lion's Head regarding Portion 1 of the farm Mareesburg 8 JT and RPM's intention to construct a DMS stockpile over a section of Portion 1 of the farm Mareesburg 8 JT. Refer to Appendix ??? for the letters of consent received from Samancor and Lion's Head in this regard.

Table 3-1 provides a summary of the properties that will be affected by the proposed project including details on the surface right holder, the estimated size of the area that will be affected in relation to the overall property size, distance of the farm in relation to the nearest town and the surveyor general code. Land ownership has been determined using WINDEED and the property information obtained from WINDEED has been provided in Appendix E

Table 3-1: List of properties affected by the proposed Der Brochen Amendment Project

Farm Name:	Surface Right Holder	Application area (Ha)	Magisterial district:	Distance and direction from nearest town	Surveyor General Code
Helena 6 JT, Remaining Extent	Rustenburg Platinum Mines Ltd	39.5 Ha to be utilised for the proposed project out of the total farm area of 1000.5436 Ha	Fetakgomo Tubatse Local Municipality	Approximately 35 km south-west of Steelpoort	T0JT000000000000600000
Helena 6 JT, Portion 3	Rustenburg Platinum Mines Ltd	9.23 Ha to be utilised for the proposed project out of the total farm area of 553.9192 Ha	Fetakgomo Tubatse Local Municipality	Approximately 37 km south-west of Steelpoort	T0JT000000000000600003
Der Brochen 7 JT, Remaining Extent	Rustenburg Platinum Mines Ltd	14.32 Ha to be utilised for the proposed project out of the total farm area of 1721.1029 Ha	Fetakgomo Tubatse Local Municipality	Approximately 38 km south-west of Steelpoort	T0JT000000000000700000
Mareesburg 8 JT, Portion 1	Samancor Chrome Ltd	13.4 Ha to be utilised for the proposed project out of the total farm area of 42.8266 Ha	Fetakgomo Tubatse Local Municipality	Approximately 31 km south-west of Steelpoort	T0JT000000000000800001
Mareesburg 8 JT, Portion 7	Rustenburg Platinum Mines Ltd	90.6 Ha to be utilised for the proposed project out of the total farm area of 728.5102 Ha	Fetakgomo Tubatse Local Municipality	Approximately 32 km south-west of Steelpoort	T0JT000000000000800007

The location and estimated extent of the project required infrastructure in relation to the affected properties area summarised in Table 3-2.

Table 3-2: Infrastructure location and extent in terms of the Der Brochen Amendment Project

Farm name and farm portion	Proposed Infrastructure	Area (Ha) estimated	Total Project area (Ha)
Helena 6 JT, Remaining Extent	Ore conveyor section	10.2	39.5
	Der Brochen gate and security house	0.2	
	Access, maintenance and haul roads	0.7	
	Buttress wall	2.0	
	Filter press plant	0.2	
	DMS plant	0.3	
	RoM stockpiles & silos	0.2	
	DMS conveyor	2.5	
	WRD embankment facility	23.2	
Helena 6 JT, Portion 3	Access, maintenance and haul roads	1.0	9.23
	Explosive destruction bay	0.5	
	South decline shaft complex including offices	2.8	
	Ore conveyor section	5.0	
Der Brochen 7 JT, Remaining Extent	South decline shaft complex including water management infrastructure, offices and change houses	10.9	14.32
	3 x ventilation shafts	0.1	
	Access, maintenance and haul roads	1.0	
	Staff accommodation camp	0.6	
	Ore conveyor Section	1.7	
Mareesburg 8 JT, Portion 1	DMS stockpile	13.4	13.4
Mareesburg 8 JT, Portion 7	DMS stockpile	86.6	90.6
	Section of the DMS conveyor system (located within existing Mareesburg TSF's pipeline corridor)	2 Km	
	PCDs	4.0	
Total area utilised for the Der Brochen Amendment Project			167.1

Majority of the infrastructure associated with the proposed Der Brochen Amendment Project will fall within areas rezoned for mining purposes. Only the proposed DMS stockpile will however fall outside of the rezoned area. RPM will lodge a rezoning application with the local municipality in this regard.

3.2 Locality Map

The locality map of the Der Brochen Amendment Project, as well as the positions of the proposed infrastructure in relation to the affected farms and farm portions is provided in Figure 3-1.



4 Description of the scope of the proposed overall activity

4.1 Description of the activities to be undertaken

It is the intention of RPM to amend the Der Brochen Mine's approved Consolidated EMPr and associated EA as well as updating their existing WULs to include the following:

- The construction of a buttress wall at the existing Helena TSF and the additional filter press plant at the existing Mototolo Concentrator Plant, due to emergency circumstances, as agreed by the DMR in October 2017. The construction of the buttress wall and filter press plant commenced in October 2017 after permission was obtained from the DMR to implement these infrastructure as mitigation measures to prevent and contain the emergency situation or to mitigate the effects of the emergency situation in accordance with Section 30(A)(2)(b) of NEMA; and
- The development and operation of the additional mining related infrastructure as part of the mine's development strategy.

The following sections provide further details of each of the above-mentioned aspects associated with the Der Brochen Amendment Project.

4.1.1 Helena TSF buttress wall and filter press plant required due to emergency situation

In April 2017, seepage on the first bench on the south-eastern embankment of the existing Helena TSF was observed and investigations in terms of managing the situation from a safety point of view commenced immediately. Preliminary mitigation measures, such as the installation of a trench drain system, the undertaking of piezocone tests and a stability analysis, were implemented after notifying the relevant authorities of the situation. In addition to the preliminary mitigation measures implemented, RPM also reduced the volume of tailings deposited onto the Helena TSF.

During the initial investigation period, increased phreatic levels were measured indicating a possible drop in the Factor of Safety to below design requirements, which could have resulted in a possible failure of the Helena TSF. Due to the potential stability risk of the Helena TSF, it was concluded that a buttress wall would need to be constructed along the seepage area along south-eastern embankment along to address the drainage issue and to increase the stability of the Helena TSF.

A site meeting with the DMR was held on 8 August 2017 to discuss the potential emergency situation of the Helena TSF due to the seepage detected. During this meeting the following aspects of the Helena TSF emergency situation was discussed:

- the risk aspect to the Helena TSF in respect of the seepage detected;
- the outcomes of the investigations that were undertaken to date;
- the extent and location of the proposed buttress wall;
- the need for an additional filter press plant (similar to the existing Larox Filters operation at the Mototolo Concentrator Plant) to reduce the volume tailings to be deposited on the Helena TSF whilst producing the necessary construction material required for the approved Mareesburg TSF; and
- the authorisation process to be followed in terms of an emergency situation, with specific reference to Section 30A of NEMA.

Subsequent to the site meeting the DMR submitted a letter dated 3rd October 2017 (Appendix A1) to RPM confirming that the risk and potential for the Helena TSF wall to collapse is indeed seen as an emergency situation, and that permission is given for the construction of the buttress wall and filter press plant.

The buttress wall was constructed during October 2017 utilising waste rock sourced from neighbouring mining operations. Based on the preliminary designs of the buttress wall, it became evident that the extent of the buttress wall will marginally exceed the current authorised footprint area associated with the Helena TSF, specifically along the south-eastern embankment. With the development of the buttress wall the final footprint area of the Helena TSF have increased in total by approximately 2 Ha mainly along the edge of the south-eastern embankment. Refer to Figure 4-1 for the extent of the buttress wall in relation to the approved EMPr footprint area of the Helena TSF.

The filter press plant was constructed in November 2017 and commissioned in January 2018 to produce dewatered filter cakes from the current Mototolo Concentrator' fines tailing stream. Through the operation of the filter press plant the following were achieved:

- Firstly, the filter press plant assisted in reducing the volume of tailings that would have been deposited on the Helena TSF, thereby reducing the rate of rise of the Helena TSF and hence contributing to managing the emergency situation; and
- Secondly the plant produced the required bedding material required for the construction of the Mareesburg TSF as approved in the detailed designs reports by DWS in 2017.

The water strained from the fines tailing stream through the filter press process is pumped back to the Mototolo Concentrator Plant for reuse as process water. The DMR also indicated in the letter (Appendix A1) that RPM must comply with the requirements of Section 30(A)(2)(b) of NEMA, as amended, in respect of the listed or specified activities that will be commenced with in response to the emergency situation.

RPM is therefore amending the Der Brochen Mine's approved EMPr as part of the Der Brochen Amendment Project to include the construction of the buttress, the construction and operation of the filter press plant as well as the undertaking of the following listed activity in accordance with Section 30(A)(2)(b) of NEMA:

Listing Notice 1 (GN R 983, as amended), Activity 27:

The clearing of an area of 1 hectares of more, but less than 20 hectares of indigenous vegetation, excluding where such clearing of indigenous vegetation is required for –

- (i) The undertaking of linear activity; or*
- (ii) Maintenance purposes undertaken in accordance with a maintenance management plan.*

Considering that the filter press plant operates similar to the existing Larox Filters operation undertaken at the Mototolo Concentrator, as approved in the 2002 EMPr of the Der Brochen Mine Project and is located in an area that was previously disturbed during the construction of the Mototolo Concentrator Plant no significant additional or new impacts or listed activities are associated with the additional filter press operation.



Figure 4-1: Extent of the Helena TSF buttress wall in relation to the approved Consolidated EMPr of 2015

4.1.2 Der Brochen Mine's amendment project

Der Brochen Project has been the focus of an exploration program targeting the Merensky and UG2 Reef horizons since 2001. Several study iterations followed, all indicating a significant value to be realised by extracting the Der Brochen resource which lead to the commencement of the Der Brochen Amendment Project, which primarily focussed on a fully mechanised bord and pillar UG2 reef mining operation, but also include the platinum bearing Merensky reef mining option.

During 2014/5 it was RPM's intention to mine the Merensky and UG2 Reef horizons via the open-pit mining method at the North and the South open-pit operations. Subsequent to obtaining environmental authorisations from the DMR in 2016 for the open-pit mining operations (amongst other project related aspects), RPM has decided to commence with the North open-pit as authorised but to change the open-pit mining operation of the authorised South open-pit to an underground mining operation.

Ore from the North open-pit will be transported by trucks to the existing Mototolo Concentrator Plant for processing via a new haul road. The proposed haulage road will be aligned with the proposed ore conveyor corridor. It is anticipated that during the construction and start-up of the South Decline Shaft operations, ore will be transported to the existing Mototolo Concentrator Plant by truck along the corridor road. Once the construction of the conveyor system is completed, there will be a transportation transition period where ore will be trucked and conveyed to the plant for processing, whereafter only the conveyor belt will be used for the transportation of the ore from the South Decline Shaft area to the Mototolo Concentrator Plant when the North open-pit is mined out.

The main reason for the change from an open-pit operation to an underground operation at the previously approved South open-pit is that the platinum bearing reef in this area lends itself to a fully mechanised underground bord and pillar mining operation of the UG2 reef as well as the Merensky reef, as currently mined successfully at the neighbouring Booyendal Mine (Northam Platinum).

The following infrastructure and activities will be associated with the proposed South Decline Shaft Complex:

- Surface infrastructure:
 - Access roads and entrance.
 - Surface buildings such as offices, change houses, workshops, stores, security, etc. Majority of the offices will consist of pre-fabricated structures. Workshops and stores will be steel portal frame structures, whereas all the electrical buildings are brick buildings.
 - Clear stormwater cut-off drain and channels to divert any uncontained stormwater back to the Groot Dwaars River.
 - Dirty stormwater channels and settling structures to manage contaminated water.
 - Ore handling facilities from the shaft head to the existing Mototolo Concentrator.
 - Electrical supply and reticulation.
 - Water supply and reticulation.
 - Three up-cast ventilation shafts.
 - Services to ventilation shafts (road access and electrical infrastructure).
 - Ore interface with the Concentrator plant.
- Underground infrastructure:
 - Positioning of the portal and decline configuration of engineering services.
 - A decline shaft that will consist of a four-barrel decline cluster. Each barrel will be dedicated to:
 - 1) Trackless Mechanised Mining Machinery down into the decline;
 - 2) Trackless Mechanised Mining Machinery out of the decline,

- 3) Ore handling;
- 4) Chairlift and services.

Fire water pipeline will be routed down the ore handling barrel next to the conveyor. The conveyors in the decline will be hanging wall mounted, suspended type with access available for a maintenance vehicle.

- Underground ore handling system with Load Haul Dumper (LHD) tipping on a conveyor network that transports ore to surface.
- Underground water handling to include service and potable water supply as well as dirty water handling and clear water pumping.
- Other services such as compressed air, underground electrical distribution, instrumentation and control, diesel and lubrication.
- Personnel transport via chairlifts.
- Underground levels equipped with standard items such as mini-sub-stations and repair/service bays.
- Underground refuge chambers
- Decline conveyors, chairlifts, electrical and water reticulation and infrastructure;
- Underground bord and pillar sections consisting of satellite workshops, water reticulation infrastructure, ventilation infrastructure, electrical, control and instrumentation infrastructure, refuge bay and 2 of strike conveyors (two per section).

It is also anticipated that as the current Borwa and Lebowa shafts nears the end of their economic life the proposed replacement North open-pit and South shaft will operate at a combined mining rate of 320 ktpm.

RPM further plans to include a Dense Medium Separation (DMS) Plant, as part of the Der Brochen Amendment Project, within the footprint area of the existing Mototolo Concentrator area, that will form part of the pre-concentration aspect of the ore processing process. The main benefit of the proposed DMS plant is the selective discard of waste from the feed stream to the Mototolo Concentrator Plant, thus improving the product recovery rate whilst reducing the power and water requirements for processing.

It is estimated that the DMS Plant will produce 80 ktpm of DMS material from the 320 ktpm mine feed and the remaining 240 ktpm will be sent to the existing Mototolo Concentrator Plant for further processing. Through the implementation of the proposed project the Der Brochen Mine can increase from the planned 240 ktpm to an estimated 320 ktpm mechanised low profile mine.

The waste material produced by the DMS Plant, known as DMS material, will be stockpiled on an area of approximately 100 ha on Portion 7 and a section of Portion 1 of the farm Mareesburg 8 JT. The DMS material will be conveyed from the DMS Plant to the demarcated stockpile area as part of the deposition strategy. The DMS Stockpile will have dedicated Pollution Control Dams (PCDs) located around the edge of the stockpile area to capture and retain any dirty water runoff from the DMS stockpile for potential reuse as process water in the concentrator process. The DMS conveyor will run parallel with and within the existing Mareesburg TSF Pipeline corridor, as far as practically possible.

The increase in the Der Brochen Mine's overall production will further require the conversion of the existing final-stage chrome recovery plant to an inter-stage configuration for the optimal mining and recovery of minerals. Through the conversion process the rougher tailing stream from the Mototolo Concentrator Plant will go through the chrome recovery plant scavenging the chrome and return the residual tailings stream back to the operation.

In addition, RPM will also require the installation of a Mainstream Inert Grinding (MIG) mill at the existing Mototolo Concentrator Plant to enhance recovery of Platinum Group Metals (PGMs) at an acceptable PGM final flotation product grade for downstream smelting.

Other mining related infrastructure and activities that will be associated with the Der Brochen Amendment project include:

- Additional RoM stockpiles and silos;
- An explosive destruction bay area to be located near the proposed South decline shaft; and
- Staff accommodation camp to be located near the Der Brochen Dam.

Please refer to Figure 3-1 for the location of the proposed infrastructure associated with the Der Brochen Amendment Project.

4.2 Listed and specified activities

The listed activities associated with the proposed Der Brochen Amendment Project is provided in Table 4-1, and the location of these activities are illustrated in Figure 4-2.

Table 4-1: Listed activities triggered by the Der Brochen Amendment Project

Proposed project area / infrastructure	Aerial extent (estimate)	Applicable Notice	Listed activity & summarised description
1) DMS conveyor & return water pipeline	2.5 Ha	GNR983	10 – Bulk transportation of process water
		GNR984	19 – Infill/deposition/excavation of soil from a watercourse
		GNR985	11 – Transfer of water between impoundments
		GNR985	12 – Clearing of an area of 300 m ² or more
2) Ore conveyor corridor used for conveying ore, distribution of electricity, transfer of process water	16.9 Ha	GNR983	14 – Development of infrastructure with physical footprint area greater than 10 m ² in or within 32 m from a watercourse
			10 – Bulk transportation of process water
			11 – Distribution of electricity (33 kV)
			12 – Development of infrastructure with physical footprint area greater than 100 m ² in or within 32 m from a watercourse
			19 – Infill/deposition/excavation of soil from a watercourse
			24 – Development of roads wider than 8 m
			27 – Clearing of an area of 1 Ha but less than 20 Ha
3) South decline shaft complex	13.7 Ha	GNR984	11 – Transfer of water between impoundments
		GNR985	8 – Development of above ground cableways
		GNR983	12 – Development of infrastructure with physical footprint area greater than 100 m ² in or within 32 m from a watercourse
			14 – Storage and handling of dangerous goods (combined capacity of 80 m ³ but less than 500 m ³)
			19 – Infill/deposition/excavation of soil from a watercourse
		GNR984	6 – Process or activity which requires a permit other than environmental or waste authorisation (i.e. Water Use Licence)
			15 – Clearing of an area of 20 Ha or more
4) Access and maintenance roads to the ventilation shafts	0.7 Ha	GNR985	17 – An activity which requires a mining right
			2 – Development of a reservoir
		GNR983	10 – Storage and handling of dangerous goods (combined capacity of 30 m ³ but less than 80 m ³)
			14 – Development of infrastructure with physical footprint area greater than 10 m ² in or within 32 m from a watercourse
5) DMS stockpile area and the WRD	DMS stockpile 100 Ha	GNR983	12 – Development of infrastructure with physical footprint area greater than 100 m ² in or within 32 m from a watercourse
			19 – Infill/deposition/excavation of soil from a watercourse
			4 – Development of roads wider than 4 m
			12 – Clearing of an area of 300 m ² or more
			14 – Development of infrastructure with physical footprint area greater than 10 m ² in or within 32 m from a watercourse

Proposed project area / infrastructure	Aerial extent (estimate)	Applicable Notice	Listed activity & summarised description
embankment facility (previous authorised co-disposal facility)	& WRD embankment facility 23.2 Ha	GNR984	6 – Process or activity which requires a permit other than environmental or waste authorisation (i.e. Water Use Licence)
			15 – Clearing of an area of 20 Ha or more
		GNR985	12 – Clearing of an area of 300 m ² or more
			14 – Development of infrastructure with physical footprint area greater than 10 m ² in or within 32 m from a watercourse
		GNR921* Category B	10 – The construction of a facility for a waste management activity listed in Category B
6) PCDs associated with the DMS stockpile	4 Ha	GNR983	11 – The establishment of a residue stockpile resulting from activities requiring a mining right
			12 – Development of infrastructure with physical footprint area greater than 100 m ² in or within 32 m from a watercourse
		GNR984	19 – Infill/deposition/excavation of soil from a watercourse
			6 – Process or activity which requires a permit other than environmental or waste authorisation (i.e. Water Use Licence)
		GNR985	15 – Clearing of an area of 20 Ha or more
7) Staff accommodation camp	0.6 Ha	GNR985	12 – Clearing of an area of 300 m ² or more
			4 – Development of roads wider than 4 m
			6 – Development of hospitality facilities that sleep 15 people or more
8) RoM stockpiles and silos	0.2 Ha	GNR985	12 – Clearing of an area of 300 m ² or more
			12 – Clearing of an area of 300 m ² or more
9) Access and haul roads	2 Ha	GNR983	24 – Development of roads wider than 8 m
		GNR985	14 – Development of infrastructure with physical footprint area greater than 10 m ² in or within 32 m from a watercourse
			18 – Widening of a road by more than 4 m or lengthening a road by more than 1 km
10) Buttressing of the Helena TSF	2 Ha	GNR984	27 – Clearing of an area of 1 Ha but less than 20 Ha
11) DMS Plant and associated crusher	0.3 Ha	GNR984	17 – An activity which requires a mining right
		GNR985	10 – Storage and handling of dangerous goods (combined capacity of 30 m ³ but less than 80 m ³)
12) Explosive destruction bay area	0.5 Ha	GNR985	12 – Clearing of an area of 300 m ² or more
13) Ventilation shafts	0.1 Ha	GNR985	12 – Clearing of an area of 300 m ² or more
* GNR921 – Waste management activity requiring waste management licence			

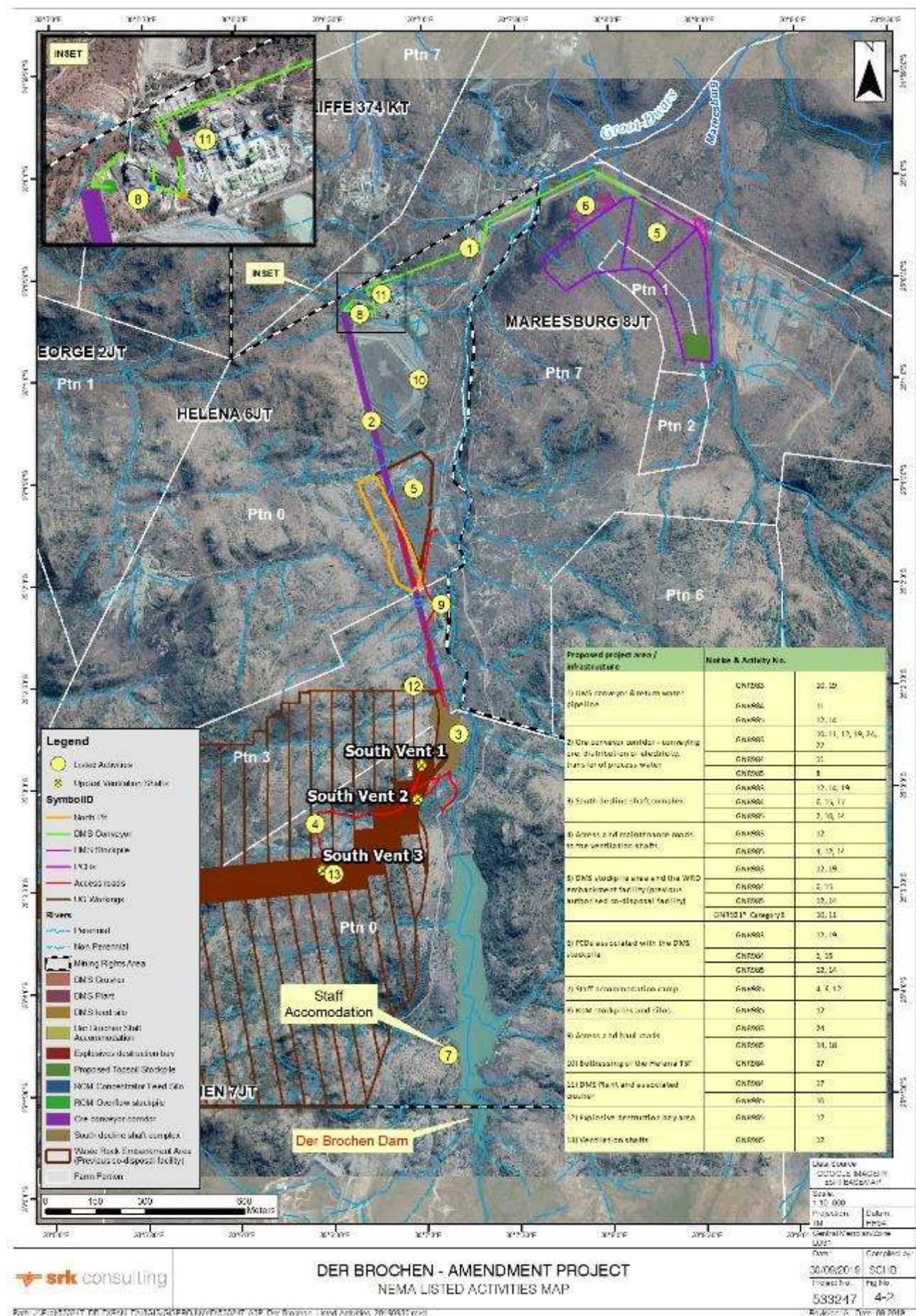


Figure 4-2: Listed activities associated with the Der Brochen Amendment Project

4.3 Water use activities

As indicated in Section 1.3, the Der Brochen Amendment Project will be subject to a WULA process to authorise the following water uses, as specified in Section 21 of the NWA, that will be triggered by the proposed project:

- 21(a): taking water from a water resource;
- 21(b): storing water;
- 21(c): impeding or diverting the flow of water in a watercourse;
- 21(g): disposing of waste in a manner which may detrimentally impact on a water resource;
- 21(i): altering the bed, banks, course or characteristics of a watercourse; and
- 21(j): removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.

Table 4-2 provides a breakdown of the water uses that will be triggered by the Der Brochen Amendment Project in relation to the relevant farm portions. The location of the water uses are depicted in Figure 4-3.

Table 4-2: Der Brochen Amendment Project's associated water uses to be authorised

Farm Name and Portion	Water Use	Description of project related water use
Der Brochen 7 JT Ptn RE	21(a)	Collecting of fissure water (groundwater seepage) from the underground workings at the South decline shaft
		Taking water from a stream to supply the existing Top House structure
		Abstracting water from a borehole to supply the proposed staff accommodation camp
	21(b)	Storing of water in tank at South decline shaft for raw water supply and fire water supply
	21(c) & (i)	Diversion of a watercourse at the South decline shaft complex
		Construction of the terrace at the South decline shaft within 100 m of Groot Dwars River
		Development of the staff accommodation camp and conservancy tank within 100 m of existing Der Brochen Dam
		Underground mining within 100 m vertical depth of a watercourse at the South decline shaft area
		Water crossings along the maintenance roads of the proposed ventilation shafts
	21(g)	Disposal of dirty water in the proposed settling pond at the South decline shaft complex
		Disposal of dirty water in the proposed mine service water dam at the South decline shaft complex
		Disposal of dirty water in the proposed pollution control dam at the South decline shaft complex
		Disposal of dirty water in a proposed tank at the South decline shaft complex to be used as service water
		The utilisation of the conservancy tank for storage of sewage effluent at the staff accommodation camp
		The utilisation of the conservancy tank for storage of sewage effluent at the existing Top House structure
		Utilisation of dirty water for dust suppression along service corridors
	21(j)	Removal of fissure water from the underground workings at the South decline shaft
Helena 6 JT Remaining Extent	21(b)	Storage of raw water in steel panel tank at the existing Mototolo Concentrator Plant
		Storage of raw water in lined containment facility near the North open-pit area
	21(g)	Disposal of dirty water contained in the North open-pit to the proposed dirty water dam

Farm Name and Portion	Water Use	Description of project related water use
		Disposal of excess dirty water from the North open-pit to the proposed pollution control dam located near the pit area
		Construction and utilisation of the waste rock dump area associated with the proposed waste rock embankment facility to be located adjacent to the North open-pit
		Utilisation of the proposed ore stockpile at DMS Plant
		Utilisation of dirty water for dust suppression along service corridors
	21(c) & (i)	Various bridge crossings over a watercourse for ore conveyor, road, pipelines and powerlines
Helena 6 JT Ptn 3	21(g)	Utilisation of dirty water for dust suppression along service corridors
	21(c) & (i)	Diversion of a water course at the South decline shaft complex
		Construction of the terrace at the South decline shaft within 100 m of Groot Dwars River
		Underground mining within 100 m vertical depth of a watercourse at the South decline shaft area
		Various ridge crossings over a watercourse for ore conveyor, road, pipelines and powerlines
Mareesburg 8 JT Ptn 1	21(g)	The construction and utilisation of the DMS Stockpile
		Utilisation of dirty water for dust suppression at the proposed DMS stockpile
	21(c) & (i)	Diversion of watercourses around the proposed DMS stockpile
Mareesburg 8 JT Ptn 7	21(g)	Diversion of watercourses around the proposed DMS stockpile
		The construction and utilisation of the PCDs associated with the proposed DMS Stockpile
		Utilisation of dirty water for dust suppression along conveyor corridors and at the proposed DMS stockpile
	21(c) & (i)	Diversion of watercourses around the proposed DMS stockpile and associated PCDs
		Various bridge crossings over a watercourse for DMS conveyor, road and pipelines



5 Policy and Legislative Context

This section provides an overview of the policy and legislative context applicable to the Der Brochen Amendment Project. It identifies relevant legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to the proposed project that have been considered during the assessment process.

Table 5-1: Policy and Legislative Context

Applicable legislation and guidelines used to compile the report	Reference where applied	Project compliance and response to the policy and legislative context
APPLICABLE LEGISLATION		
<p>Constitution of the Republic of South Africa, Act No. 108 of 1996</p> <p>The Bill of Rights is the cornerstone of democracy in South Africa, ensuring the rights of all people and affirming the democratic values of human dignity, equality and freedom. Section 24 is directly relevant to environmental law and states that everyone has the right to:</p> <p><i>“An environment that is not harmful to their health or well-being; and have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that: Prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development”</i></p>	Throughout the Scoping and EIA (S&EIA) process.	<p>The Constitution of South Africa is the overarching framework legalisation driving the NEMA principles and therefore EIA process.</p> <p>The right to a safe environment and the right to information are addressed in the EIA process through stakeholder engagement, where available information pertaining to the environment and proposed activities are disclosed.</p>
<p>Mineral and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA)</p> <p>The MPRDA makes provision for equitable access to and sustainable development of South Africa’s mineral resources. The MPRDA requires that the environmental management principles set out in NEMA shall apply to all mining operations and serves as a guideline for the interpretation, administration and implementation of the environmental requirements of NEMA.</p> <p>The MPRDA requires that a reconnaissance permission, prospecting right, Mining Right, mining permit, retention permit, technical corporation permit, reconnaissance permit, exploration right, production right, prospecting work programme; exploration work programme, production work programme, mining work programme, environmental management programme, or an environmental authorization issued in terms of the National Environmental Management Act, 1998, as the case may be, may not be amended or varied (including by extension of the area covered by it or by the addition of minerals or a share or shares or seams, mineralized bodies, or strata, which are not at the time the subject thereof) without the written consent of the Minister.</p>	Throughout the S&EIA process.	Mining activities for the Der Brochen Project will require authorisation in terms of Section 102 of the MPRDA due to the amendment to the Der Brochen Project’s approved EMPr.
<p>The National Environmental Management Act, Act No. 107 of 1998 (NEMA)</p> <p>The NEMA read together with the EIA Regulations of 4 December 2014 (R982, R983, R984 and R985) and amended in April 2017 (R324, R325, R326 and R327) were considered during the authorisation process.</p>	Throughout the S&EIA process. Section 4 of this report details the proposed project developments and	An application for an EA in respect of the Listed Activities triggered by the proposed Der Brochen Amendment Project was submitted to the DMR (as the CA) on 23 January 2019.

Applicable legislation and guidelines used to compile the report	Reference where applied	Project compliance and response to the policy and legislative context
<p>NEMA is the key national legislation underpinning environmental authorisations in South Africa.</p> <p>Listed Activities, as stipulated in the 2014 EIA Regulations, are activities identified in terms of Section 24 of the NEMA which are likely to have a detrimental impact on the environment, and which may not commence without Environmental Authorisation (EA) from the Competent Authority (CA). EA required for Listed Activities is subject to the completion of either a Basic Assessment (BA) process or full Scoping and Environmental Impact Assessment (S&EIA) with applicable timeframes associated with each process.</p> <p>An EA must be obtained prior to the commencement of those listed activities.</p>	<p>associated listed activities triggered to be authorised according to NEMA.</p> <p>This EIA/EMPr Report is compiled according to the requirements as set out in the 2014 EIA Regulations (GNR. 982) with specific reference to Appendices 3 and 4.</p>	<p>Based on the Listed Activities triggered by the proposed project a full Scoping and EIA process is required to be followed as part of the authorisation process for the Der Brochen Amendment Project.</p> <p>The S&EIA process is based on the principles of the NEMA and the 2014 EIA Regulations, as amended.</p>
<p>The National Water Act, Act No. 36 of 1998 (NWA)</p> <p>The NWA recognises that water is a scarce and unevenly distributed national resource, which must manage encompassing all aspects of water resources.</p> <p>Section 21 of the NWA lists 11 water uses that requires authorisation, either as a Water Use Licence Application (WULA) or a General Authorisation.</p> <p>In terms of Chapter 4 of the NWA, activities and processes associated with any water use are required to be licensed by the Department of Water and Sanitation (DWS).</p> <p><u>Other applicable Government Notice Regulations in relation to NWA:</u></p> <p>Government Notice Regulation 704 of 4 June 1999</p> <p>Regulations on use of water for mining and related activities aimed at the protection of water resources.</p>	<p>Throughout the S&EIA process.</p> <p>Sections 4.3 and 28 of this report detail the water uses triggered by the proposed project to be authorised according to NWA.</p> <p>GN 704 have been assessed as part of the WULA process and the needed applications for exemptions submitted as part of the WULA process.</p>	<p>In terms of the NWA a Water Use Licence has been applied for in respect of the water uses that will be triggered by the proposed project.</p> <p>The WULA also include the application of certain exemptions in relation to GN 704.</p>
<p>The National Environmental Management: Waste Act, Act No. 59 of 2008 (NEM:WA)</p> <p>According to the NEM:WA, all listed waste management activities must be licensed and in terms of Section 44 of the Act, the licensing procedure must be integrated with the environmental impact assessment process. Government Notice 921, which commenced on 29 November 2013, lists the waste management activities that require licensing in terms of the NEM:WA.</p> <p>One of the major amendments effected by the National Environmental Management Amendment Act 2014 is the insertion of section 24S, as a result of which the NEM:WA became applicable to mining residue deposits and residue stockpiles, as follows:</p> <p>“Planning and management of residue stockpiles and residue deposits”, 24S.</p>	<p>Throughout the S&EIA process.</p> <p>Section 4 of this report details the proposed project developments and associated waste management activities to be authorised by the DMR.</p> <p>Section 27.1 provides details of how the waste</p>	<p>Waste management activities 10 & 11, as per GNR 921, applies to the proposed project and were included in the application for EA from the DMR, as part of the integrated environmental and waste authorisation process associated with the Der Brochen Amendment Project.</p> <p>The waste management activities applied for relates to the proposed new DMS Stockpile and the previously authorised co-disposal</p>

Applicable legislation and guidelines used to compile the report	Reference where applied	Project compliance and response to the policy and legislative context
Recent amendment to the regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits (Government Gazette No. 41920, 21/09/2018), 'allow for the pollution control measure, to be determined on a case by case basis, based on a risk analysis conducted by a competent person'. "Competent person" is defined in the existing regulations. The amendments also provide for textual amendments to provide clarity, consequential amendments and transitional arrangements.	material were characterised based on the risk analysis	facility that was originally designed and approved for the disposal of waste rock material and tailings material, but which designs have subsequently been amended to consist of a waste rock dump embankment with lined containment dams for the storage of clean and dirty water as part of the mine's updated water management plan.
OTHER APPLICABLE NATIONAL LEGISLATION		
HERITAGE		
<p>The National Heritage Resources Act, Act No. 25 of 1999 (NHRA)</p> <p>The National Heritage Resources Act aims to promote good management of cultural heritage resources and encourages the nurturing and conservation of cultural legacy so that it may be bestowed to future generations.</p> <p>The Act requires all developers (including mines) to undertake cultural heritage studies for any development exceeding 0.5 ha. It also provides guidelines for impact assessment studies to be undertaken where cultural resources may be disturbed by development activities.</p> <p>The South African Heritage Resources Agency (SAHRA) will need to approve heritage assessments undertaken as part of any impact assessment process.</p>	<p>Section 13.13 details the baseline information of the archaeological and cultural heritage aspect associated with the footprint area of the proposed project.</p> <p>For the full archaeological and cultural heritage study undertaken as part of the impact assessment process, refer to Appendix D8.</p>	<p>The qualified specialist screened the proposed project footprint area, and the information taken into consideration in the preliminary layout of the infrastructure areas in order to avoid sensitive areas.</p> <p>Based on the findings of the heritage specialist study there will be a need to apply for the necessary permits from the SAHRA in respect of grave and archaeological site identified to be affected by the proposed project.</p>
BIODIVERSITY		
<p>The National Environmental Management: Biodiversity Act, Act No. 10 of 2004 (NEM:BA)</p> <p>The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA) provides for the management and conservation of South Africa's biodiversity within the framework of NEMA, as well as the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.</p> <p>NEM:BA GN 1002 of 9 Dec 2011 contains a National List of Ecosystems that are threatened and in need of protection and requires environmental authorisation.</p> <p>Regulation 151 published on 23 February 2007</p>	<p>Section 13.8 details the baseline information of the ecological aspects of the footprint area associated with the proposed project.</p> <p>The ecological study took into consideration NEM:BA, NFA and Limpopo</p>	<p>The qualified specialist screened the proposed project footprint area, and the information taken into consideration in the preliminary layout of the infrastructure areas in order to avoid sensitive areas.</p> <p>Based on the findings of the ecological study there will be a need to apply for the necessary permits from the Limpopo Department of Economic Development and Tourism (LEDET)</p>

Applicable legislation and guidelines used to compile the report	Reference where applied	Project compliance and response to the policy and legislative context
<p>Publication of critically endangered, vulnerable and protected species: No person may carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit.</p> <p>National Forestry Act, Act No. 84 of 1998 (NFA)</p> <p>The NFA protects against the cutting, disturbance, damage, destruction or removal of protected trees. During the specialist investigation phase, it will be determined if a permit from the Department of Agriculture, Forestry and Fisheries (DAFF) which authorises the removal and transplantation of trees will be required.</p> <p>Limpopo Environmental Management Act, Act 7 of 2003 (LEMA)</p> <p>The objectives of this Act are:</p> <ul style="list-style-type: none"> • To manage and protect the environment in the Province; • To secure ecological sustainable development and responsible use of natural resources in the Province; • Generally, to contribute to the progressive realisation of the fundamental rights contained in Section 24 of the Constitution of the Republic of South Africa of 1996; and • To give effect to international agreements effecting environmental management which are binding on the Province. <p>Chapter 8 of the Act states, amongst others, that no person may without a permit pick, be in possession of, sell, purchase, donate, receive as a gift, import into, export or remove from the Province, or convey a specially protected plant or a protected pant.</p> <p>Schedules 11 and 12 under the Act specifies the Province specific protected plants and specially protected plant species, which requires a permit from the Limpopo Department of Economic Development and Tourism (LEDET) should such flora plant species be affected by a proposed development.</p>	<p>Environmental Management Act, Act 7 of 2003 (LEMA).</p> <p>For the full biodiversity study undertaken as part of the impact assessment process, refer to Appendix D5</p>	<p>and the Department of Agriculture, Forestry and Fisheries (DAFF), respectively, to remove, cut or destroy some of the identified protected species that will be affected by the proposed development. Such permits will need to be obtained before any proposed activities may take place within the areas where such protected species are located.</p>
<p>Air Quality</p> <p>The National Environmental Management: Air Quality Act, Act No. 39 of 2004 (NEM:AQA)</p> <p>The main objectives of NEM:AQA are to protect the environment by providing reasonable legislative and other measures to:</p> <ul style="list-style-type: none"> • Prevent air pollution and ecological degradation; • Promote conservation; and 	<p>The air quality study took into consideration the NEM:AQA and associated Regulations and Standards.</p> <p>For the full air quality study undertaken as part of the</p>	<p>No Air Emission Licence will be required in respect of the new proposed project related activities.</p>

Applicable legislation and guidelines used to compile the report	Reference where applied	Project compliance and response to the policy and legislative context
<ul style="list-style-type: none"> Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development in alignment with Sections 24a and 24b of the Constitution of the Republic of South Africa. <p>The Act has devolved the responsibility for air quality management from the national sphere of government to local spheres of government (district and local municipal authorities), who are tasked with baseline characterisation, management and operation of ambient monitoring networks, licensing of listed activities, and development of emissions reduction strategies. The National Ambient Air Quality Standards (NAAQS) for common pollutants, as set in terms of the NEM:AQA.</p> <p>The National Dust Control Regulations (GN R.827), which were promulgated on 1 November 2013, define acceptable dust fall rates for residential areas as <600 (mg/m²/day) taken over a 30 day average (with no more than 2 exceedances per year, in non-sequential months), and non-residential areas as dust fallout >600<1200 (mg/m²/day) taken over a 30 day average (with no more than 2 exceedances per year, in non-sequential months).</p> <p>The National Greenhouse Gas (GHG) Emission Reporting Regulations (promulgated in April 2017) were released to introduce a single national GHG reporting system that would enable the implementation of the Carbon Tax Act.</p>	<p>impact assessment process, refer to Appendix D3.</p>	
<p>Spatial Planning and Land Use Management Act, Act No. 16 of 2013 (SPLUMA)</p> <p>The Spatial Planning and Land Use Management Act (Act 16 of 2013) (SPLUMA) was promulgated in May 2015.</p> <p>SPLUMA is a framework act for all spatial planning and land use management legislation in South Africa. It seeks to promote consistency and uniformity in procedures and decision-making in this field. SPLUMA will also assist municipalities to address historical spatial imbalances and the integration of the principles of sustainable development into land use and planning regulatory tools and legislative instruments.</p> <p>Section 28 of the SPLUMA states that a municipality may amend its land use scheme by rezoning any land considered necessary by the municipality to achieve the development goals and objectives of the municipal spatial development framework.</p>	<p>Section 3.1 of this report provides details of the rezoning of land required in respect of the proposed project.</p>	<p>Although majority of the proposed project related infrastructure will fall within areas rezoned for mining, the DMS Stockpile falls outside the rezoned area and an additional rezoning application will have to be lodged by RPM for these areas.</p>

5.1 Anglo American Policies and Guidelines

The Anglo American Executive Committee has endorsed and committed to the implementation of an internal document known as the Anglo American Safety, Health and Environmental (SHE) Way, which is governing framework for the management of SHE impacts for all new projects. The Board seeks assurance of compliance with the Anglo American SHE Way standards through regular self-assessments, peer review and third party audits.

The Anglo American SHE Policy describes Anglo's environmental vision, which is to minimise harm to the environment by designing, operating and closing all of their operations in an environmentally responsible manner.

Underpinning this vision are four core principles:

- Zero mind set: Anglo American shall apply the mitigation hierarchy of avoiding, minimising and mitigating environmental impacts arising from our activities, products and services;
- No repeats: all necessary steps will be taken to learn from environmental impacts, incidents, audit findings and other non-conformances, to prevent their recurrence; and
- Non-negotiable standards and rules: common, non-negotiable.
- Environmental Performance Standards and Procedures shall be applied throughout the Group as a minimum requirement.
- The Anglo American policies will guide and inform the study phase inputs.

5.1.1 Anglo American Platinum Strategy and Values

Anglo Platinum's strategy is to create maximum value through understanding and developing the market for PGMs, grow the Company to expand into those opportunities and to conduct its business cost effectively and competently. Anglo American Platinum has the six core company values as illustrated in Figure 5-1.



Figure 5-1: Anglo American Platinum core company values

5.1.2 Anglo American Platinum Environmental Policy

Der Brochen is committed to the implementation of the Anglo American Platinum policy towards environmental management, with specific focus on water related issues. The policy states that: "Anglo American Platinum Corporation Limited, as the world's leading primary producer of platinum group metals, commits itself to the creation of a safe and healthy environment for all our employees and the citizens of the communities with which we interact".

In order to give practical expression to their commitments and to measure their progress, Anglo American Platinum has the following aims with regard to the environment:

- Conserve environmental resources.
- Prevent or minimise adverse impacts arising from our operations.
- Demonstrate active stewardship of land and biodiversity.
- Promote good relationships with, and enhance capacities of, the local communities of which we are a part.
- Respect people's culture and heritage.

5.1.3 Anglo American Biodiversity Strategy

The Anglo American Biodiversity Strategy and Standards are intended to define minimum requirements to manage biodiversity in all phases of Anglo American's operations to achieve Net Positive Impact (NPI) and maximise biodiversity opportunities wherever they operate. Anglo American Biodiversity Strategy is illustrated in Figure 5-2.




ANGLO'S GLOBAL SUSTAINABILITY PILLARS	GLOBAL STRETCH GOALS AND VISIONS		
 TRUSTED CORPORATE LEADERS	Accountability To transform the relationship between mines and communities, and wider society	Ethical value chains To be a part of a value chain that supports and reinforces positive human rights and sustainability outcomes	Policy advocacy To take a lead on issues that affect our business in a way that is collaborative and aimed at society's wider goals
 THRIVING COMMUNITIES	Education Anglo's vision is for all children in host communities to have access to excellent education and training	Health and well-being Anglo's vision is for the SDG targets for health to be achieved in all our host communities	Livelihoods Anglo's vision is shared, sustainable prosperity in our host communities
 HEALTHY ENVIRONMENT	Biodiversity To deliver Net Positive Impact (NPI) across Anglo American through implementing the mitigation hierarchy and investment in biodiversity stewardship	Climate Change To operate carbon neutral mines	Water To operate waterless mines in water scarce catchments

Figure 5-2: Anglo American Biodiversity Strategy

Anglo American's biodiversity stewardship is obtained and maintained by the implementation of a responsible approach to effectively conserve the biodiversity of the areas within which they operate by:

- Conserving critical habitat, threatened/endemic species, significant feature/s & priority ecosystem services;
- Collaborating with conservation authorities & Non-Governmental Organisations (NGOs);
- Contributing towards achieving protected area targets; and
- Promoting biodiversity knowledge & building capacity.

Where residual impacts on significant biodiversity features remain after the application of the mitigation hierarchy, and in pursuit of NPI, Anglo American will implement biodiversity offsets/compensation and invest in biodiversity stewardship programmes aligned with relevant local, regional and/or national landscape initiatives.

5.1.4 Anglo American Socio-economic Assessment Toolbox

The Anglo American Socio-economic Assessment Toolbox (SEAT) is intended to improve an operation's understanding of their socio-economic impacts, both positive and negative, to build a more structured dialogue with stakeholders, to create greater internal capacity in the management of social issues, and to be a step forward in transparency and local accountability. As an assessment methodology the SEAT provides tools that are applicable to all stages of mine development.

The overarching objectives of the SEAT process are as follows:

- Provide guidance and support for achieving full compliance with the Anglo American Social Way;
- Identify key social and economic impacts and issues that need to be managed and thereby, improve risk management;
- Assess existing social performance initiatives and identify where improvements are required;
- Facilitate the capture and sharing of best practice;
- Improve the operation's understanding of the full range of local stakeholders, their views and interests, provide guidance on developing and updating Stakeholder Engagement Plans and increase trust and goodwill among host communities;
- Support sustainable socio-economic development in host communities.

5.1.5 Anglo American Social Way

The Anglo American Social Way describes Anglo's Social Vision, which is to make a lasting positive contribution to the communities associated with Anglo American's operations, and to be a partner of choice for host governments and communities as well as an employer of choice. It is based on the International Finance Corporation (IFC) Performance Standard (PS) 1 (2012), which deals with the assessment and management of environmental and social risks and impacts. Underpinning this vision are four core principles:

- Engage respectfully with host communities throughout the project cycle, and be accountable to stakeholders;
- Host communities should experience a lasting benefit from the presence of Anglo American operations and Anglo must seek to maximise the benefits flowing from an operation in addition to traditional social investment;
- Take the necessary steps to spread the application of good practice, and to learn from negative social impacts, complaints, incidents, audit findings and other non-conformances to prevent their recurrence. In addition, put in place appropriate mechanisms for handling and resolving grievances; and
- Common, non-negotiable performance standards and procedures shall be applied throughout the Group as a minimum requirement. Anglo American seeks to assure compliance with the Social Way standards through the Good Citizenship Business Principles letters of assurance process; regular self-assessments; peer review; community consultation; implementation of the SEAT process at relevant operations; and third-party audits.

5.2 Other environmental planning and management guidelines

A number of planning and management guidelines have been developed that need to be considered as part of the process, including:

- Limpopo Provincial Biodiversity Conservation Plan;
- DWS, 2010. Operational Guideline: Integrated Water and Waste Management Plan. Resource Protection and Waste;

- Department: Water Affairs and Forestry, 2007. Best Practice Guideline A2: Water Management for Mine Residue Deposits;
- Department: Water Affairs and Forestry, 2007. Best Practice Guideline A4: Pollution control dams;
- Department of Water Affairs and Forestry, 2008. Best Practice Guideline A6: Water Management for Underground Mines;
- Department of Water Affairs and Forestry, 2006. Best Practice Guideline G1 Storm Water Management;
- Department of Water Affairs and Forestry, 2006. Best Practice Guideline G2: Water and Salt Balances;
- Department of Water Affairs and Forestry, 2006. Best Practice Guideline G3. Water Monitoring Systems;
- Department of Water Affairs and Forestry, 2008. Best Practice Guideline G4: Impact Prediction;
- Department of Water Affairs and Forestry, 2008. Best Practice Guideline H1: Integrated Mine Water Management;
- Department of Water Affairs and Forestry, 2006. Best Practice Guideline H3: Water Reuse and Reclamation;
- DEAT. 2002. Integrated Environmental Management, Information series 2: Scoping. Department of Environmental Affairs and Tourism (DEAT. 2002);
- DEAT. 2002. Integrated Environmental Management, Information series 3: Stakeholder Engagement. Department of Environmental Affairs and Tourism (DEAT. 2002);
- DEAT. 2002. Integrated Environmental Management, Information series 4: Specialist Studies. Department of Environmental Affairs and Tourism (DEAT. 2002);
- DEAT. 2002. Integrated Environmental Management, Information series 12: Environmental Management Programmes. Department of Environmental Affairs and Tourism (DEAT. 2002);
- DEAT, 2004. Integrated Environmental Management, Information series 7: Cumulative Effects Assessment. Department of Environmental Affairs and Tourism (DEAT. 2004);
- DEA. 2012. Companion to the EIA Regulations 2010, Integrated Environmental Management Guideline Series 7, Department of Environmental Affairs; and
- DEA. 2017. Guideline on Need and Desirability, Department of Environmental Affairs (DEA), Pretoria, South Africa.

6 Need and desirability of the proposed activities

The need and desirability of the proposed Der Brochen Amendment Project, as summarised in Table 6-1, have been compiled in line with the Integrated Environmental Management Guideline on Need and Desirability (DEA, 2017).

Table 6-1: Need and desirability of the proposed Der Brochen Amendment Project

Need and desirability aspect and comments
Securing ecological sustainable development and use of natural resources
Consideration of the ecological integrity of the area
<p>The Der Brochen Mine falls within the Sekhukhune Mountain Bushveld ecosystem of high ecological sensitivity and importance. The Sekhukhune Municipality District has developed an Integrated Environmental Management Plan that needs to be approved by Council. In absence of a formal Environmental Management Framework for the district, this EIA/EMPr report contains management measures for the proposed project activities based on specialist studies that took the ecological integrity of the surrounding environment into account.</p> <p>In order to reduce the impact on the ecological integrity of the area, some of the project related infrastructure will be located within areas already transformed by mining activities, whilst other infrastructure required will be placed within restricted footprint areas to minimise the area of disturbance.</p>

Need and desirability aspect and comments
<p>During the planning phase of the Der Brochen Amendment Project, the location of environmental sensitivity areas such as the two main rivers transecting the area (i.e. the Groot-Dwars River and Mareesburg Stream) and supporting tributaries were taken into consideration and the majority of project related infrastructure has been sited to avoid such areas as far as practically possible.</p> <p>RPM will also be responsible to apply for and obtain the necessary permits from the relevant departments to remove any protected species before construction of infrastructure takes place. The opportunity to relocate any protected species to the existing Der Brochen nursery will be investigated by RPM.</p> <p>RPM is committed to the development, implementation and maintenance of globally acceptable standards and procedures. RPM, as part of Anglo American Platinum, has developed Principles and Policy, an Environmental Management System ("EMS") Standard, a number of Environmental Performance Standards that cover key management areas (e.g. water, air, biodiversity, etc.). These standards are mandatory, high-level requirements set at corporate level. They support RPM's Environmental Vision, Principles and Policy, and outline the required approach to avoiding or minimising the potential adverse environmental impacts associated with their activities. The standards will also apply to the activities to be undertaken as part of the Der Brochen Amendment Project.</p>
Consideration of the use of non-renewable and renewable natural resources
<p>The mine uses refined fossil fuels (in the form of diesel and oil) as part of the mining and concentration operations. Electricity sourced from Eskom is also seen as an indirect use of non-renewable energy resource. For this reason, AAP/RPM is continuously investigating energy efficiency options to reduce the dependency on electricity in terms of the mining value chain. In terms of sustainable energy management, energy efficient equipment and processes designs together with monitoring of energy use will drive the identification of further gains.</p> <p>The use of renewable energy sources such as solar water heating and grid-tied PV systems is also considered for this proposed project and is driven not only by electricity cost, but also by the targets AAP have set itself for emission reductions and energy use. Economic feasibility and reliability are key factors influencing decisions to invest in alternative energy sources.</p>
Incorporation of a risk-averse and caution approach to the proposed project
<p>Extensive specialist studies have been conducted for the areas where the proposed project related infrastructure and activities will be placed, to understand the risk of the proposed activities in relation to the immediate and surrounding environment. Each specialist identified impacts/risks that may be associated with the proposed project and have developed practical and appropriate mitigation measures that can be implemented to minimise or even avoid potential ecological impacts.</p>
Consideration of the need to secure ecological integrity and a healthy biophysical environment
<p>The majority of the project related infrastructure will be placed within areas previously disturbed. However, the DMS stockpile, South decline shaft complex and ore conveyor system will be located on sites that are considered greenfield. Refer to Section 7 of this report for the site selection process considered during the project planning phase, which took into consideration the location of environmental sensitivity areas.</p>
Promoting justifiable economic and social development
<p>RPM embarked on a pre-feasibility study relating to a fit-for-purpose 320 ktpm mining strategy for the Der Brochen Mine Project. Through the pre-feasibility assessment, RPM found that Der Brochen is a high quality asset, lending itself to a combination of open-pit operation and fully mechanised bord and pillar mining (shallow dip and a mining cut suitable for low profile mining equipment), with the UG2 reef already being exploited successfully on neighbouring properties by Mototolo, Booyesdal and Two Rivers Mines.</p> <p>Der Brochen Mine can be developed via smaller investment phases, with the potential to ultimately expand to a large operation.</p> <ul style="list-style-type: none"> • Phase 1 (Stay in Business & Replacement Infrastructure) <ul style="list-style-type: none"> ○ Upgrade of the Mototolo Concentrator to 240 ktpm; ○ Change existing Chrome Recovery Plant to an inter-stage design; ○ Construction of North and South decline shafts to replace the Lebowa and Borwa shafts in the near future. • Phase 2 (Expansion Capital) <ul style="list-style-type: none"> ○ Construction of a DMS Plant to enable the implementation of a 320 ktpm plan; ○ Incorporate additional fleet and equipment; ○ Installation of a Mainstream Inert Grinding (MIG) Mill as part of the recovery enhancer strategy for the Mototolo Concentrator Plant. <p>Through the implementation of the Der Brochen Amendment Project, RPM will strive to meet the following business objectives:</p> <ul style="list-style-type: none"> • Extend the life of the Mototolo Operations; • Extract maximum value by achieving best-in-industry operational performance. <p>In addition, Platinum will be sold both locally and overseas and therefore, the mine becomes an earner of foreign exchange for South Africa. The mine will therefore have a positive impact on the economic growth of the Limpopo Province, particularly in the communities around the mine and through its rates and taxes to the national fiscus.</p>

Need and desirability aspect and comments
<p>Through the proposed amendment project, the Der Brochen Mine will continue with the mining activities for the LoM (2077).</p> <p>The project will also create temporary employment opportunities for local employees and local businesses during the pre-construction, construction and rehabilitation phases of the project, as the Der Brochen Amendment Project is mainly seen as a replacement project to supplement the future anticipated declining production profile of the current Borwa and Lebowa shafts, thereby reducing the impact of restructuring and downsizing of the current workforce when the Borwa and Lebowa shafts come to the end of their economic life.</p>

7 Motivation for the preferred development footprint and details of alternatives considered

The sections below describe reasons why the preferred development footprint was selected as well as the alternatives that were considered during the concept phase of the Der Brochen Amendment Project. Alternatives considered relate to the following aspects:

- Location of the project related infrastructure;
- Type of activity to be undertaken as part of the proposed project;
- Designs of project related infrastructure;
- Technologies to be used for the project; and
- Operational aspects relating to the proposed project.

7.1 Motivation where no alternatives were considered

The key infrastructure associated with the Der Brochen Amendment Project for which no alternatives were considered include:

- The South Decline Shaft complex;
- Ventilation shafts;
- DMS Plant;
- DMS Conveyor system;
- RoM stockpiles and silos;
- An explosive destruction bay; and
- Access, maintenance and haul roads.

Reasons for not considering alternative for the above listed infrastructure is provided in the sections below.

7.1.1 South decline shaft and ventilation shafts

Due to the location of the mineral resources and proven reserve, no alternative locations were considered in terms of the position of the proposed South decline shaft complex and the associated ventilation shafts, as the location of the ventilation shafts are directly linked to the extent and location of the underground workings.

7.1.2 Explosive destruction bay

No alternative locations were considered for the placement of the required explosive destruction bay area as this area was required to be located as close as practically possible to the South decline shaft area.

7.1.3 RoM stockpiles and silos

No alternative locations were considered for the placement of the project required RoM stockpiles and silos as these will be placed at strategic points along the conveyor corridor for the transportation of ore

from the North open-pit area and the South decline shaft operation to the Mototolo Concentrator Plant area. Cognisance was however taken to avoid or at least minimise the potential impacts of such infrastructure on environmental sensitive areas within the project area. Refer to Figure 25-1 for the Der Brochen Amendment Project's environmental sensitivity map.

7.1.4 DMS Plant and DMS conveyor system

In addition, RPM took the decision during the planning phase, to place some of the new proposed infrastructure within or along already disturbed/developed areas associated with the existing Mototolo Concentrator Plant and Mareesburg TSF pipeline system, respectively. Hence no alternative locations were considered for the proposed DMS Plant as the plant will need to be located in close proximity to the Mototolo Concentrator Plant. The location of the DMS conveyor was also finalised at the onset of the project to run parallel with the existing Mareesburg tailings pipeline system, as far as practically possible. A further motivation for placing the DMS Plant and DMS conveyor system at the proposed sites, is that no additional greenfield areas⁴ would be required to be disturbed.

7.1.5 Access, maintenance and haul roads

The placement of access, maintenance and haul roads were developed after the location of all the project related infrastructure were confirmed and defined. Therefore, no alternatives were considered in respect of the project required access, maintenance and haul roads. Care was however taken to avoid or at least minimise the potential impacts of such infrastructure on environmental sensitive areas within the project area.

7.2 Location and design alternatives

Alternative locations were considered for the following project related infrastructure:

- DMS Stockpile; and
- Ore conveyor system.

During the planning stage of the proposed Der Brochen Amendment, the following site selection criteria relating to environmental, social and engineering aspects (as summarised in Table 7-1) were taken into consideration when identifying suitable areas where the above listed infrastructure could be placed:

Table 7-1: Site selection criteria applied to the Der Brochen Amendment Project

Environmental Criteria	Public acceptance criteria	Economic and engineering criteria
<ul style="list-style-type: none"> • Interference of potential land use; • Loss of undisturbed land; • Risk to surface water catchment regimes; • Proximity to developed areas; • Environmental sensitive areas (i.e. biodiversity and heritage aspects) • Road Safety. 	<ul style="list-style-type: none"> • Displacement or disturbance of local inhabitants; • Wind direction in relation to sensitive receptors; • Distance to nearest residential areas. 	<ul style="list-style-type: none"> • Distance from the processing plant • Position of existing mining related infrastructure • Impact of a possible flow failure on the surrounding area/infrastructure/people • Position of reserves • Capital costs • Operating costs • Rehabilitation

The sections below provide details on the outcomes of the site selection process, as discussed above, in respect of the location of the proposed DMS stockpile area and the ore conveyor system.

⁴ Greenfields areas refers to vacant or undeveloped land.

7.2.1 DMS Stockpile

During the concept phase of the Der Brochen Amendment Project, five alternative location options were considered in respect of the proposed DMS stockpile area. The description of the various options are provided in Table 7-2 along with reasons for the elimination or acceptance of the options. Refer to Figure 7-1 for the location of the DMS stockpile options considered.

Table 7-2: Description of location options considered for the proposed DMS stockpile area

Option	Farm Name and Portion	Key aspects considered	Reasons for elimination or acceptance
Option 1	Helena 6 JT, Remaining Extent	<u>Environmental aspects:</u> <ul style="list-style-type: none"> - Watercourses - Area of natural disturbance (erosion) - Floral species of conservation concern <u>Social aspects:</u> <ul style="list-style-type: none"> - Graves <u>Engineering aspects:</u> <ul style="list-style-type: none"> - Location in relation to planned activities, i.e. the North open-pit operations. - Footprint area required in respect of the volume of DMS material to be placed. 	<p>The main reason why Options 1, 2 and 3 were <u>eliminated</u> as location options for the proposed DMS stockpile area, is the fact that the areas associated with each of the options were too small to accommodate the estimated volume of DMS material to be placed on surface.</p> <p>In addition to the above the following issues were also raised, with respect to Options 1 and 2 that contributed to the elimination of these options:</p> <p>Option 1: Located within the footprint area earmarked for the development of the approved North open-pit operation.</p> <p>Option 2: Located within the footprint area earmarked for the development of waste rock embankment facility (previously authorised co-disposal facility).</p> <p>Although the areas relating to Options 1, 2 and 3 contained heritage sites and plant species of conservation concern, these sensitivity aspects did not affect the outcome of the site selection as permits could be applied for from the relevant authorities for the removal and relocation of such structures and flora species.</p>
Option 2	Helena 6 JT, Remaining Extent	<u>Environmental aspects:</u> <ul style="list-style-type: none"> - Watercourses - Area of natural disturbance (erosion) <u>Engineering aspects:</u> <ul style="list-style-type: none"> - Location in relation to planned activities, i.e. the waste rock embankment facility. - Footprint area required in respect of the volume of DMS material to be placed. 	
Option 3	Mareesburg 8 JT, Portions 1 and 7	<u>Environmental aspects:</u> <ul style="list-style-type: none"> - Watercourses - Floral species of conservation concern <u>Social aspects:</u> <ul style="list-style-type: none"> - Graves - Surface rights not owned by RPM <u>Engineering aspects:</u> <ul style="list-style-type: none"> - Footprint area required in respect of the volume of DMS material to be placed. 	
Option 4	Mareesburg 8 JT, Portions 1 and 7	<u>Environmental aspects:</u> <ul style="list-style-type: none"> - Watercourses - Floral species of conservation concern <u>Social aspects:</u> <ul style="list-style-type: none"> - Graves <u>Engineering aspects:</u> <ul style="list-style-type: none"> - Hill side terrain - Close proximity to Mareesburg TSF and associated pipeline system. 	<p>Option 4 was seen as a <u>favourable</u> option in terms of the footprint size and, from an engineering point of view, in close proximity to the existing Mareesburg TSF pipeline system which presented an opportunity to locate the proposed DMS conveyor system along the existing pipeline route to minimise new areas of disturbance.</p> <p>Unfortunately, terrain limitations (i.e. a hill side located within the southern portion of Option 4) rendered the area unfit for the development of the proposed DMS stockpile area.</p>
Option 5	Mareesburg 8 JT, Portions 1 and 7	<u>Environmental aspects:</u> <ul style="list-style-type: none"> - Watercourses - Floral species of conservation concern 	<p>Based on the favourability of Option 4, RPM redesigned Option 4 (to become Option 5) taking into consideration the topography of the area. Option 5 therefore became the <u>preferred</u></p>

Option	Farm Name and Portion	Key aspects considered	Reasons for elimination or acceptance
		<p><u>Social aspects:</u></p> <ul style="list-style-type: none"> - Graves <p><u>Engineering aspects:</u></p> <ul style="list-style-type: none"> - Close proximity to Mareesburg TSF and associated pipeline system. 	<p>option to form part of the Der Brochen Amendment Project.</p> <p>From an engineering point of view the watercourses located within the area of Option 5 did not pose any limitations to the area, as suitable diversions would be included into the DMS stockpile design to adequately and effectively manage the impact of the DMS stockpile on the watercourses.</p> <p>The location of heritage sites and plant species of conservation concern, within the footprint area of Option 5, also did not affect the outcome of the site selection as permits will be applied for by RPM from the relevant authorities for the removal and relocation of such structures and flora species.</p> <p>In terms of the surface right of Portion 1 of the farm Mareesburg 8 JT, which belongs to Samancor, a lease agreement is currently being drafted between Samancor and RPM that will allow RPM to use a section of the said portion for the development of the DMS stockpile.</p>

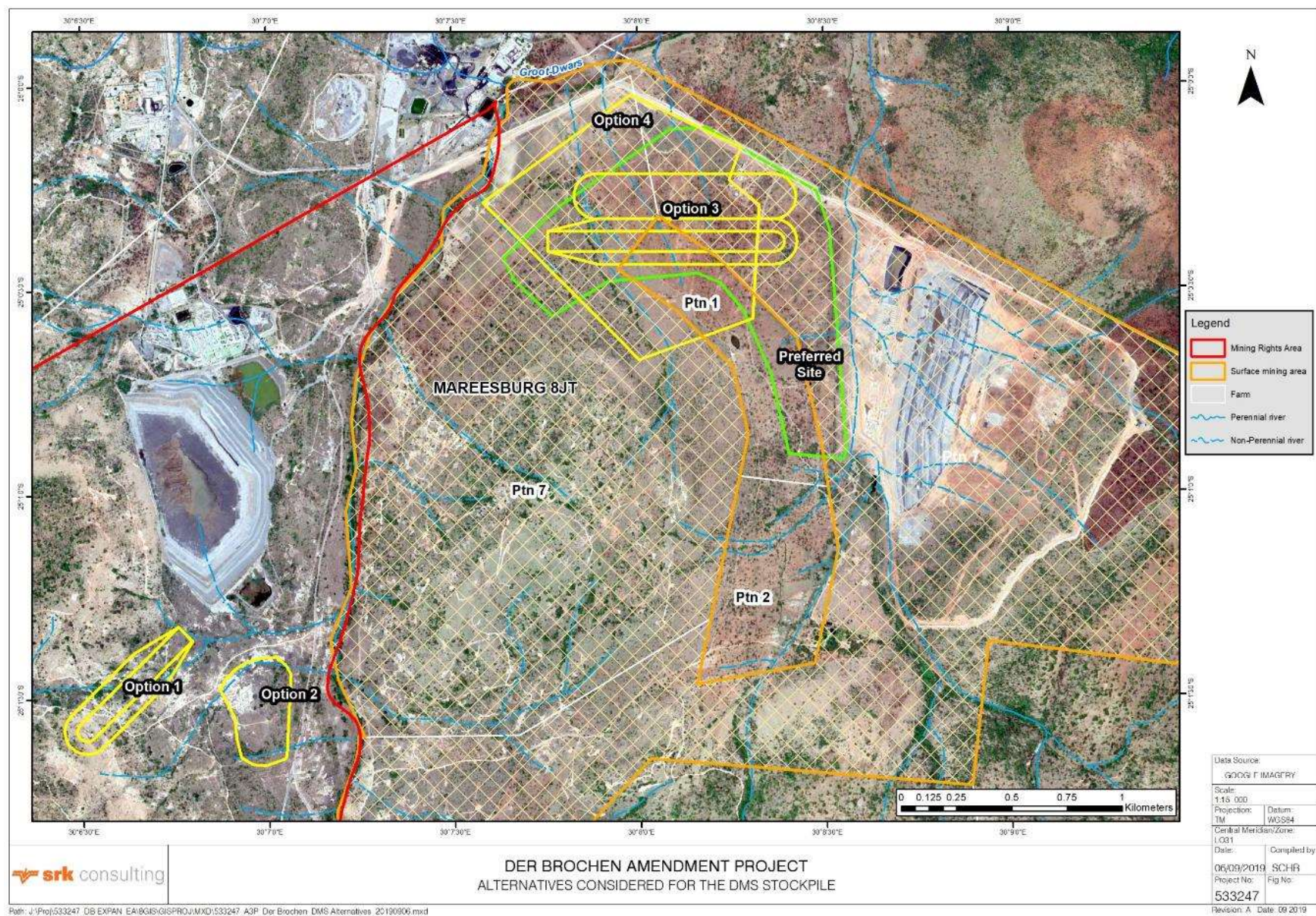


Figure 7-1: Location of the options considered for the proposed DMS stockpile area

7.2.2 Ore conveyor system

In terms of the location of the ore conveyor system, three locality options were considered. The description of the area associated with each of the options are provided in Table 7-3 along with reasons for the elimination or acceptance of the options. Refer to Figure 7-2 for the location of the DMS stockpile options considered.

Table 7-3: Description of location options considered for the ore conveyor system

Option	Farm Name and Portion	Key aspects considered	Reasons for elimination or acceptance
Option 1 & Option 2	<ul style="list-style-type: none"> Helena 6 JT, Remaining Extent; Helena 6 JT, Portion 3; and Der Brochen 7 JT, Remaining Extent 	<u>Environmental aspects:</u> <ul style="list-style-type: none"> - Watercourses - Floral species of conservation concern <u>Social aspects:</u> <ul style="list-style-type: none"> - Graves <u>Engineering aspects:</u> <ul style="list-style-type: none"> - Location in relation to planned activities, i.e. the waste rock embankment facility. - Down gradient of the Helena TSF. 	RPM <u>eliminated Options 1 and 2</u> based on the fact that the northern part of the ore conveyor options were located down gradient of the existing Helena TSF, which could potentially pose a safety risk to these options in the unlikely event of a failure of the Helena TSF.
Option 3	<ul style="list-style-type: none"> Helena 6 JT, Remaining Extent; Helena 6 JT, Portion 3; and Der Brochen 7 JT, Remaining Extent 	<u>Environmental aspects:</u> <ul style="list-style-type: none"> - Watercourses - Floral species of conservation concern <u>Social aspects:</u> <ul style="list-style-type: none"> - Graves <u>Engineering aspects:</u> <ul style="list-style-type: none"> - 	<p>Option 3 was designed to run to the west of the Helena TFS (upgradient), thereby avoiding the risk associated with a potential failure of the Helena TSF.</p> <p>This option also influenced the design of the waste rock embankment facility as a section of the conveyor will be located across the facility.</p> <p>The outcome of the site selection process indicated that <u>Option 3 would be the preferred option</u> to support the Der Brochen Amendment Project.</p>

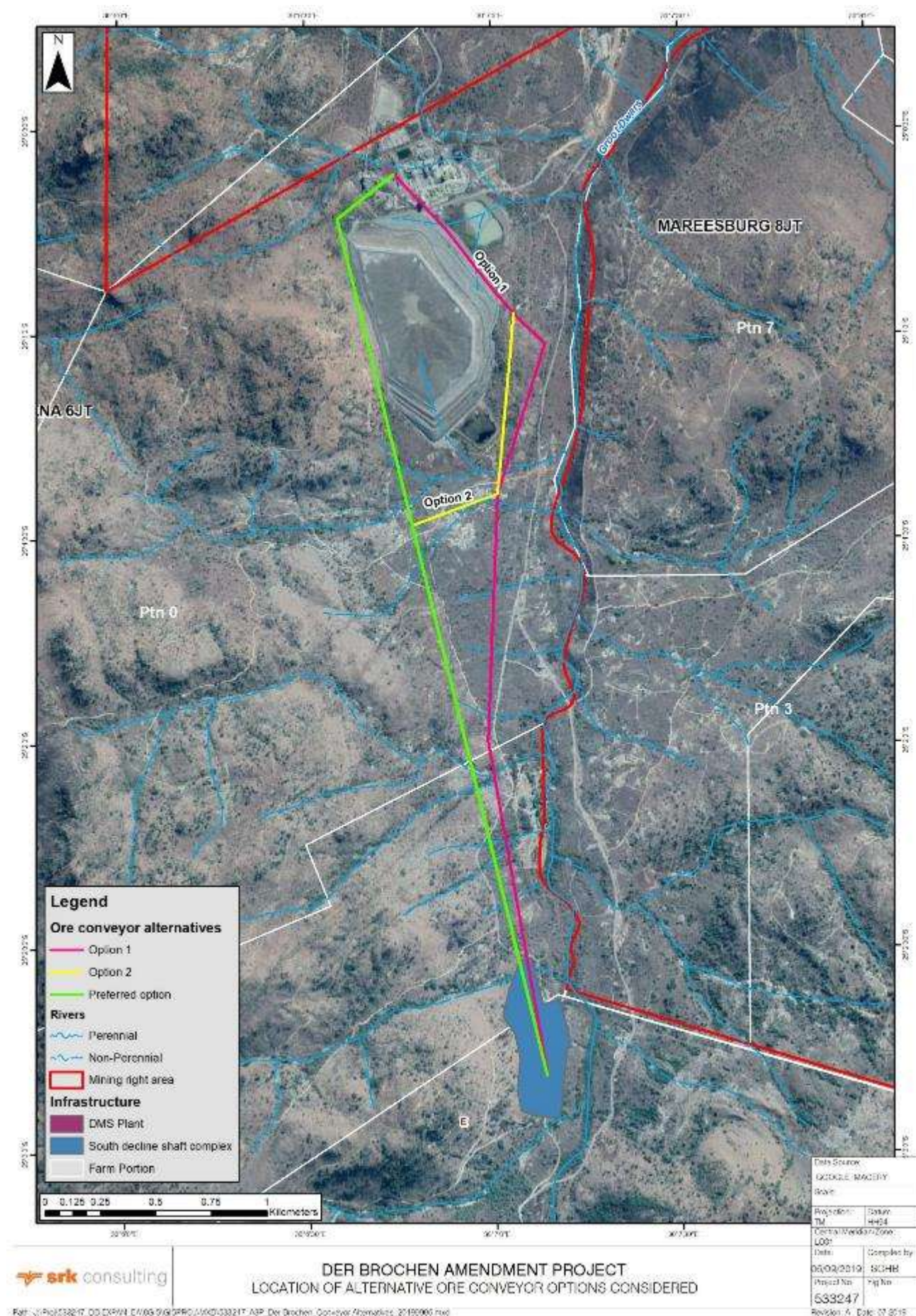


Figure 7-2: Location of the options considered for the proposed ore conveyor system

7.3 Type of activities to be undertaken

During the application and scoping phases of the Der Brochen Amendment Project's integrated environmental authorisation process, RPM considered the development of two decline shafts (i.e. a North and South decline shaft) in order to mine the platinum bearing reef via full mechanised underground mining operations.

However, during the impact assessment phase of the proposed project RPM decided to commence with the previously approved North open-pit operation as defined in the 2015 Der Brochen Consolidated Environmental Management Programme (EMPr) and approved through the relevant environmental authorisations received from DMR, LEDET and DWS. This rendered the proposed North decline shaft redundant for the Der Brochen Amendment Project.

The commencement of the previously approved open-pit operation will allow RPM the opportunity to investigate possibilities to access potential underground reserve via the open-pit area in future, currently excluded from the scope of this EIA/EMPr report.

Please refer to Section 19 for further details on the reasons for the deviations from the approved scoping report and plan of study.

Another activity/infrastructure considered during the concept phase of the Der Brochen Amendment Project, was the inclusion of an additional TSF for the overall Der Brochen Mine operation. However, as the project advanced through the various feasibility stages it was established by RPM that no additional TSF will be required at this stage. It is anticipated that the recent developed and commissioned Mareesburg TSF will provide for sufficient storage capacity to accommodate the tailings that will be generated as part of the Der Brochen Amendment Project.

7.4 Technology alternatives

During the feasibility phase of the Der Brochen Amendment Project, the following technology alternatives were considered:

- Surface Bulk Power – Utilise existing Der Brochen sub-station versus a new sub-station at Der Brochen. It was determined that the existing Der Brochen sub-station will have sufficient capacity to supply the energy required for the activities associated with the proposed project.
- Assessment of surface conveying versus hauling for overland transport of ore from the Der Brochen shaft to the Mototolo Concentrator. The trade-off study conducted by RPM indicated that the best option would be to include a haul road within the proposed corridor associated with the ore conveyor belt system to transport ore from the proposed South Decline Shaft to the Mototolo Concentrator Plant area as an interim measure, whilst the conveyor belt system is being constructed.

RPM anticipates that during the construction and start-up of the shaft operations, ore will be transported to the existing Mototolo Concentrator Plant by truck. Once the construction of the conveyor system is completed, there will be a transportation transition period where ore will be trucked and conveyed to the plant for processing, there after only the conveyor belt will be used for the transportation of the ore to the Mototolo Concentrator Plant.

7.5 Operational aspects of the activity

It is planned to extract the UG2 reef using a bord and pillar mining method with all excavations located on-reef. Various access options were considered during previous study phases. In addition, the geotechnical data indicated fair to good conditions around the reef and hanging wall excavation locations, except for areas adjacent to geological structures (faults, dykes and shear zones).

Layouts and support infrastructure requirements were designed to meet rock engineering requirements and based on current successful strategies employed at Mototolo Mine. The variable depth below the surface and associated stress regime caused by the mountainous terrain has been accounted for in the pillar designs.

7.6 Option of not implementing the activity

The aim of the Der Brochen Amendment Project is to provide a sustainable production rate of at least 240 ktpm, whilst providing a replacement opportunity for the Borwa and Lebowa shafts when these shafts near the end of their economic life.

Should the production fall below the required tonnages, the Der Brochen Mine will be unable to economically sustain its current and proposed workforce nor maintain its infrastructure.

The socio-economic impacts of cessation or restraining of operations at the Der Brochen Mine include local, regional and more than likely national impacts:

- Local and regional: planned socio-economic initiatives within the surrounding communities would not be able to go ahead and employees and contractors' workers would be impacted; more than half of whom are semi-skilled/unskilled and thus would not easily find alternative employment; and
- National: Reduction in foreign exchange for South Africa will be incurred due to the decrease in mine product sales internationally.

The cessation or curtailing of the Der Brochen Mine will also mean that ore reserves would remain underutilised, in addition to the employment and local economic opportunities and revenue that would be lost.

7.7 Statement motivating the preferred site

During the pre-feasibility stage of the Der Brochen Amendment Project, RPM appointed various specialists to investigate the area of interest and identify sensitive areas that needed to be taken into consideration during the infrastructure layout plan phase. The specialist aspects that were covered during the pre-feasibility stage included:

- Ecology (terrestrial and aquatic);
- Soil, land use and land capability;
- Surface water; and
- Archaeology.

The findings of these investigations were presented to RPM and based on the recommendation of the specialists and the site selection process, as detailed in Sections 7.2 to 7.5 above, some of the infrastructure locations and layouts were altered to reduce or where possible avoid potential negative impacts that may be associated with the Der Brochen Amendment Project.

The location of the proposed project is constrained to the location of the mineral resource and proven reserve, as well as the existing surrounding mining related infrastructure. As such, limited property alternatives were viable to be considered for this project. The preferred site currently being considered is a small footprint area located in close proximity to the existing infrastructure within the Der Brochen Mine's mining rights and surface rights areas.

8 Details of the public participation process followed to date

8.1 Objectives of public participation

The objectives of public participation during the various phases of the Der Brochen Amendment authorisation process are presented below.

8.1.1 During pre-application

The objectives of the stakeholder engagement during pre-application phase are to introduce the project to stakeholders and to inform them that an environmental authorisation process will be followed.

8.1.2 During scoping

The objectives of public participation during scoping phase is to provide sufficient and accessible information to Interested and Affected Parties (I&APs) in an objective manner to enable them to raise comments, issues of concern and suggestions for enhanced benefits. I&APs will also have an opportunity to provide input into the specialists' terms of reference (ToR) for the specialist studies, and to contribute relevant local and traditional knowledge to the environmental assessment.

8.1.3 During impact assessment

The objectives of public participation during the EIA phase is to verify that stakeholder issues have been considered in the specialist study and environmental impact assessment phase and to comment on the findings of the environmental assessment including the potential negative and positive impacts and the proposed management measures.

8.1.4 During the decision-making phase

Following the outcome of the decision-making process by authorities, registered I&APs will be notified of the outcome and how and by when the decision may be appealed, should they wish to.

8.2 Public participation process

Public participation processes that were and will be followed throughout the integrated environmental authorisation process is shown in Figure 8-1.

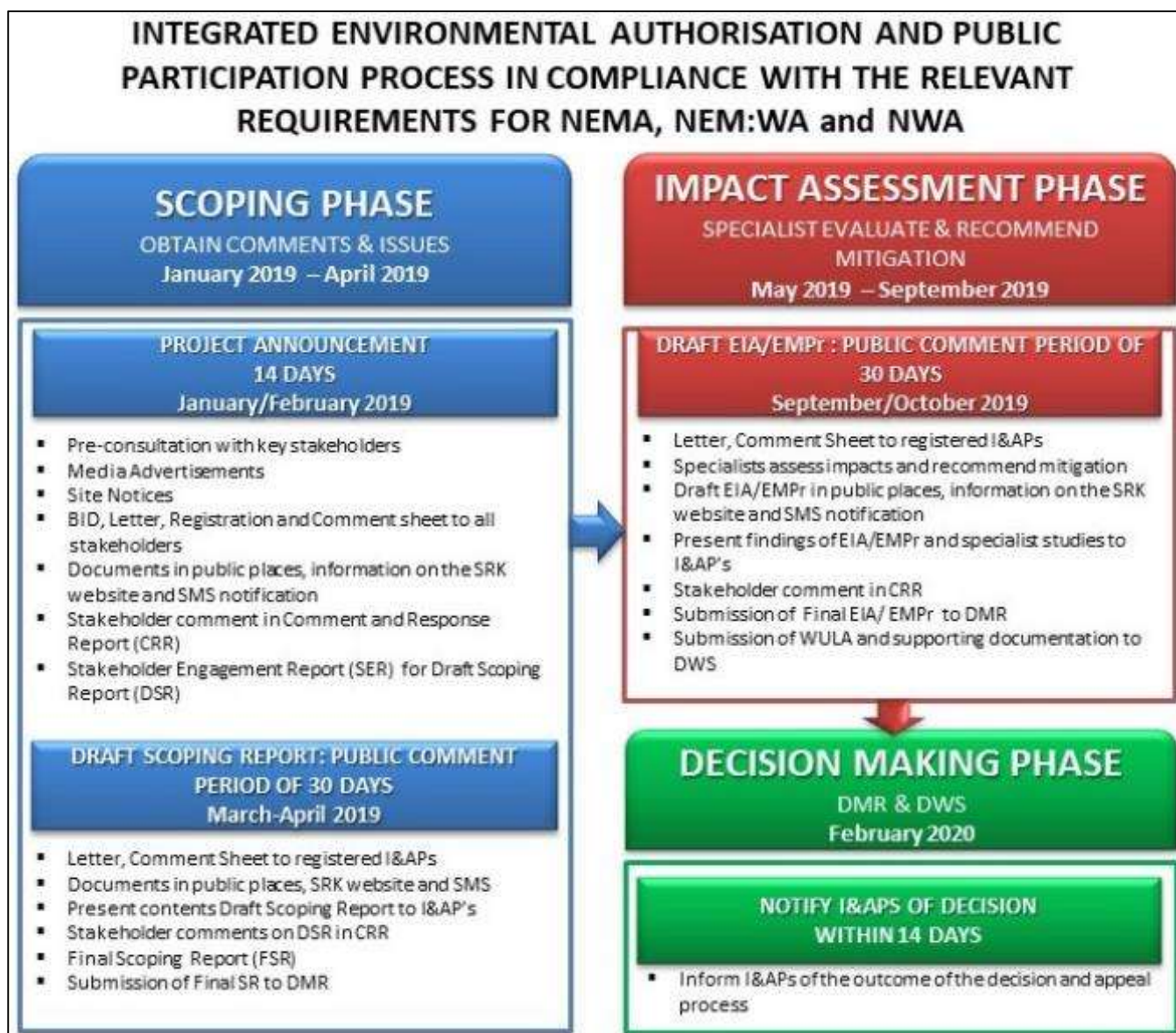


Figure 8-1: Public participation throughout the integrated environmental authorisation process

For the Der Brochen Amendment Project, SRK have been undertaking an integrated and public participation process that aligns with the requirements set out in the NEMA EIA Regulations of 2014 (GNR 982) as amended, and the Regulations regarding the procedural requirements for water use licence applications of 2017 (GNR 267).

Various engagement activities (as detailed below) have been undertaken throughout the different phases associated with the integrated environmental authorisation process of the Der Brochen Amendment Project (i.e. Pre-application, Scoping, Impact Assessment and Decision-making phases).

8.2.1 Pre-application phase

During the pre-application phase of the Der Brochen Amendment Project the following activities were undertaken:

- A pre-application meeting was held with the DMR Limpopo Regional Offices on 10 December 2018;
- Identification of affected land owners; and
- Identification of potential I&APs.

Identification of affected landowners

RPM has been identified as the landowner in respect of the Remaining Extent and Portion 3 of the farm Helena 6 JT, the Remaining Extent of the farm Der Brochen 7 JT and Portion 7 of the farm Mareesburg 8 JT, on which majority of the proposed infrastructure associated with the Der Brochen Amendment Project will be located.

The only farm portion that is not owned by RPM and which will be affected by the proposed project is Portion 1 of the farm Mareesburg 8 JT, which belongs to Samancor Chrome Ltd (Samancor). Samancor currently leases Portion 1 of the farm Mareesburg 8 JT to Lion's Head Platinum (Pty) Ltd (Lion's Head). RPM have been in consultation with Samancor and Lion's Head regarding Portion 1 of the farm Mareesburg 8 JT and RPM's intention to construct a DMS stockpile over a section of Portion 1 of the farm Mareesburg 8 JT. Refer to Appendix C1 for the letters of consent received from Samancor and Lion's Head in this regard.

Identification of potential Interested and Affected Parties (I&APs)

The Der Brochen Mine has developed a comprehensive I&AP database that consists of stakeholders from various sectors identified previous during environmental authorisation processes undertaken for the Der Brochen Project and stakeholders that RPM has regular contact with. This database has been used as the basis for the development of the stakeholder database in terms of the proposed Der Brochen Amendment Project.

The existing I&AP database was also updated based on a desktop assessment of the locality of the proposed project's in relation to the surrounding communities.

Pre-Application Meeting with the DMR

A pre-application meeting was held with the DMR Limpopo Regional Offices on 10 December 2018 which was attended by Mr TC Kolani from the DMR, Mr Frank Pieterse from AAP-Der Brochen Project and Mrs Selma Nel from SRK.

The purpose of the pre-application meeting was to introduce the proposed Der Brochen Amendment Project to the DMR, as the Competent Authority for environmental authorisations, and to discuss the authorisation requirements for the proposed project in terms of environmental and waste authorisations in respect of the current legislation, discuss the anticipated level of assessment that will be undertaken as part of the authorisation process, indicate which specialist studies will be undertaken during the EIA phase of the authorisation process and provide details of the anticipated public participation process that will be undertaken as part of the integrated authorisation process for the proposed Der Brochen Amendment Project.

Please refer to Appendix C2 for a copy of the minutes of the pre-application meeting including the presentation that was shared with the DMR and the attendance register for the pre-application meeting.

Pre-Application Meeting with the DWS

A pre-application meeting was held with the DWS Lydenburg Office on 28 January 2019 which was attended by Mr Stanford Macevele (DWS), Ms Marcia Malapane (DWS), Ms Ennica Ramachela (DWS), Ms Constance Nthangeni (DWS), Mr Jaco Fick (AAP), Ms Jacky Burke (SRK), and Ms Thumo Neluvhalani (SRK).

The purpose of the pre-application meeting was to introduce the proposed Der Brochen Amendment Project and its associated water uses to the DWS, as the Competent Authority for the WUL, to obtain guidance from the DWS on the WULA process going forward and confirm the specialist studies

required as per the WULA process. Refer to Appendix C3 for a copy of the minutes and attendance register from the DWS pre-application meeting.

8.2.2 Scoping phase

Project announcement and availability of Scoping Report for Public Review and Comment

The Der Brochen Mine has an established Social Performance Department through which information sharing between the mine and communities take place. Der Brochen's existing engagement forums were used to introduce the project and to give ongoing feedback on the progress of the proposed Der Brochen Amendment Project authorisation process to inform communities, residents and surrounding land owners/land occupiers of the proposed project and to provide them with the opportunity to raise any concerns or comments relating to the proposed project.

All project announcement documentation was made available in English and Sepedi.

A Background Information Document (BID), stakeholder letter and a I&AP Registration form and comment sheet have been distributed to the existing Der Brochen stakeholder database and additional identified stakeholders (via email and post) during the week of 07 January 2019. The purpose of these documentations are to introduce the project to the potential stakeholders by providing them with high level project information.

Through the distribution of the stakeholder letter and BID, stakeholders were invited to register as I&APs and to comment on the Scoping Report that will be available for a public comment period of more than 30 calendar days (from 25 January to 04 March 2019). The list of public venues where hard copies of the report have been made available are included in the stakeholder letter and BID. The stakeholder letter and BID also included a link to SRK's website where an electronic copy of the Scoping Report and all other project related documents, registration form and comment sheet can be sourced from. In addition, SMS notifications was sent out to existing stakeholders for whom no other contact details are available.

Advertisements were placed in the Sekhukhune Times newspaper (in Sepedi) on 10 January 2019 and the Platinum Gazette newspaper (in English) on 11 January 2019 announcing the availability of the Scoping Report for public review as well as the list of public venues where the report can be viewed.

Site notices were placed at the Der Brochen & Booysendal Duel Access Main Gate, and surrounding area (in English and Sepedi) on 08 January 2019.

Please refer to Appendix C for proof of the public participation undertaken in respect of the project announcement phase.

Conduct Scoping Phase Public Meetings

During the public review and commenting time period for the Scoping Report, SRK conducted focus group meetings with the surrounding mines and local communities to introduce the proposed project and the associated integrated environmental authorisation process to the stakeholders. The content of the Scoping Report was also discussed during these meetings.

The objective of these meetings was to provide sufficient and accessible information regarding the proposed project in an objective manner to enable stakeholders to:

- Raise any issues of concern and suggestions for enhanced benefits; and
- Contribute relevant local and traditional knowledge to the environmental assessment.

The focus group meeting with the surrounding mines took place on 28 February 2019 whilst the community meeting was held on 01 March 2019. In terms of the community meeting an Open House

Meeting was arranged from 12h00 till 18h00 that provide an opportunity to members of the local communities to attend the information sharing meeting at a time that suited them.

The main issues and concerns that were raised at the public meetings held during the Scoping Phase related to:

- Current and potential surface and groundwater contamination and reduction in volume available to the surrounding mines and communities;
- Current dust levels experienced by the community and the potential dust impacts anticipated with the proposed project;
- The need for regular meetings between the mine and the communities;
- The lack of opportunities available to local communities in terms of employment, training, skills development and education of the youth;
- The lack of educational facilities in the local communities that provides education levels beyond Grade 8;
- Current blasting impacts experienced by the local communities and the potential blasting impacts that may derive from the proposed project;
- Proper notification time periods for future stakeholder engagements;
- Potential opportunities for local communities to benefit from the water that will be abstracted from the underground workings for potential agricultural use; and
- The minerals allocated to Anglo for mining purposes.

Please refer to Section 8.3 of this report for all comments received and addressed at these focus group meetings.

A formal invite was also sent to the Acting Municipal Manager of the Fetakgomo Tubatse Local Municipality during the week of 25 February, requesting a meeting to discuss the proposed Der Brochen Amendment Project with the local municipality. The requested meeting with the local municipality did not take place as no feedback was received from the municipality.

8.2.3 Impact Assessment phase

The following public participation actions that will be undertaken during this phase include:

- Announce availability of the draft EIA/EMPPr to registered I&APs for public review, via stakeholder letters (English and Sepedi);
- Place copies of the EIA/EMPPr in public places as well as on SRK website; and
- Conduct focus group meetings and telephonic consultations to obtain stakeholder comments on the EIA/EMPPr report.

Availability of the draft EIA/EMPPr report for public comment

The draft EIA/EMPPr report (this report) will be made available for public comment from 01 October 2019 to 31 October 2019. The availability of the Draft EIA/EMPPr and details relating to the public engagement meetings will be announced as follows:

- Distribution of a letters to registered I&APs to notify I&APs of the availability of the Draft EIA/EMPPr and inviting registered I&APs to comment on the Draft EIA/EMPPr;
- Posting the draft EIA/EMPPr on the SRK website (<https://www.srk.co.za/en/za-der-brochen-mine-amendment-project>), and at public places (as listed in Table 8-1).

Table 8-1: Public places where the draft EIA/EMPPr will be made available for public review

Public Place	Locality	Tel No
Mapodile/Eerstegeluk Public Library	735 Kgahlanong Street, Mapodile	013 237 0039
Burgersfort Public Library	Cnr Kort & Eddie Sedibe Str, Burgersfort	013 231 7815

Public Place	Locality	Tel No
Kalkfontein CPA offices	Kalkfontein (Nokaneng)	No Landline
Pakaneng Community Trust Office	Schaapkraal Farm	No Landline
Gamawela Community Centre	St George Farm	No Landline

EIA phase public meetings

Various stakeholder engagement meetings will be held from 21 to 25 October 2019 to engage with SRK Consulting and the project team on the content of the draft EIA/EMPr report and raise any issues or concerns regarding the proposed project.

During the Impact Assessment Phase, stakeholders will be invited to comment on the EIA/EMPr Report in any of the following ways:

- By completing comments sheets available with the report at public places and on SRK's website, and by submitting additional written comments, by email, fax or by telephone, to SRK; and/or
- By attending the public meetings where additional opportunities will be provided to the public to raise any comments or concerns they may have relating to the proposed project.

All comments and issues raised during the 30 day public comment period will be incorporated into the final EIA/EMPr Report to be submitted to the DMR for consideration.

8.2.4 Outcomes of Decision Making Phase

All registered I&AP's will be informed of the DMR's decision via email, post or sms. Registered I&AP's will also be informed of the appeals process and the associated timeframes, should they wish to appeal the decision.

8.3 Summary of issues raised by I&APs

A summary of comments received during the Pre-Application and Scoping Phases relating to the Der Brochen Amendment Project are included in Table 8-2.

Table 8-2: Summary of issues raised by I&APs

Interested and Affected Parties <i>X indicate those who have been consulted with</i>	Date Comments Received	Issues raised	EAPs and applicant responses to issues	Section reference where issue were addressed
AFFECTED PARTIES				
Landowners or lawful occupiers on adjacent properties				
Mr Tebogo Leshaba (resident on the farm Welgevonden 9 JT)	X	01 March 2019	<p>Mr Leshaba stated that the relationship between the mine and the Gamawela community has deteriorated over the past years. He also stated that according to the 2015 EIA/EMPr it was determined that his family was located within the high-impact area in respect of the required Mareesburg TSF as a result of the Mareesburg TSF construction their water sources have been highly impacted, and that their stormwater drainage systems have been destroyed, which has resulted in a loss of their farming livelihoods. The construction of the Mareesburg TSF project did not benefit them, the tenders were given to large companies. Going forward he requested that Anglo please change their behaviour, otherwise disruptive actions will be undertaken.</p> <p>Water quality samples were taken from the Mareesburg Stream (the current water source for the Leshaba Community) to assess the claim of contamination. Based on the laboratory results that water was not contaminated and was still fit for use. However, it was acknowledged that due to sedimentation, discolouration of the water did initially take place. this has however cleared since the construction of Phase 1 has been completed. During the construction of the Mareesburg TSF alternative water sources were made available to the Leshaba Community.</p> <p>The proposed project and related activities have taken the location of the Leshaba Community into consideration during the impact assessment phase to determine what impacts can be expected including what mitigation measures can be put in place to reduce or eliminate such potential impacts.</p>	Not applicable
Mr Tebogo Leshaba (resident on the farm Welgevonden 9 JT)	X	01 March 2019	<p>Mr Leshaba stated that sufficient time needs to be provided to the communities when scheduling meetings. They require at least 15 days' notification prior to a meeting that will take place so that they can prepare for the meeting.</p> <p>All future public meeting will be scheduled in this manner.</p>	Not applicable
Ms Granny Kgole (Environmental officer from Booyesdal Mine)	X	28 February 2019	<p>Ms Kgole wanted to know how much groundwater will be abstracted as a result of the proposed underground mining activities.</p> <p>Based on the hydrogeological assessment, it is anticipated that 328 500 m³ of fissure water will need to be managed annually.</p>	Refer to Section 28 of Part B of this report and Appendix D1 for the hydrogeological study
Ms Poseletso Sebate (Environmental officer from Two Rivers Platinum Mine)	X	28 February 2019	<p>Mr Sebate wanted to know how will Der Brochen manage current and future tailings material.</p> <p>Tailings are deposited onto the existing Helena Tailings Storage Facility (TSF) as well as the recently constructed Mareesburg TSF, which was authorised in 2016. The Mareesburg TSF consists of 2 Phases, Phase 1 was</p>	Refer to Section 7.3.

Interested and Affected Parties <i>X indicate those who have been consulted with</i>		Date Comments Received	Issues raised	EAPs and applicant responses to issues	Section reference where issue were addressed
				constructed and commissioned in December 2018. It must be noted the Helena TSF is reaching its end of life and that all tailings associated with the Der Brochen Amendment Project will be deposited on the Mareesburg TSF.	
Ms Poseletso Sebate (Environmental officer from Two Rivers Platinum Mine)	X	28 February 2019	Ms Sebate wanted to know how much water is allocated to Der Brochen in respect of the Der Brochen Dam water source.	Der Brochen's current Water Use Licence Der Brochen is allocated less than 0.1 Mega litre a day from this source.	Not applicable
Ms Granny Kgole (Environmental officer from Booyseindal Mine)	X	28 February 2019	Ms Kgole requested clarity on the need for the Helena TSF buttress wall.	Due to seepage observed at the Helena TSF in April 2018, and through meetings held between the mine and the DMR it was agreed that a buttress wall could be constructed around the Helena TSF to contain and manage the risk impact to the Helena TSF. The DMR also agreed that the seepage situation and the mitigation thereof is deemed an emergency situation as defined in Section 30 of the National Environmental Management Act, Act 107 of 1998 (NEMA). Through the Der Brochen Amendment Project, the Der Brochen Mine's approved EMPr and associated EA is therefore also amended to include the construction of the buttress wall and filter press operation as per agreement with the DMR.	Refer to Section 4.1.1.
Mr January Leshaba (resident on the farm Welgevonden 9 JT)	X	28 February 2019	Mr Leshaba points out the there are opportunities where the mine can provide the community with experiential learning. He stated that the ABET training is not sufficient, as it is only available for current employees. He further provided an example that mines in the Rustenburg area provide practical skills training, not only for current employees but also for local community members.	The ABET programme was specifically requested from the Gamawela leadership and hence included in the mine's Social Labour Plan (SLP) as a project. The ABET level 4 provided by the mine is equivalent to Grade 11 education level. According to the mine's SPD, the mine can provide additional support to people who want to be involved in the ABET programme.	Not applicable
Mr Tebogo Leshaba (resident on the farm Welgevonden 9 JT)	X	01 March 2019	Mr Leshaba wanted to know whether Anglo is applying for Platinum and can the other minerals be given to the community for beneficiation.	Anglo was granted a mineral right for the extraction and beneficiation of all minerals relating to the PGM classification including chrome. No additional mineral is required to be applied for in respect of the Der Brochen Amendment Project.	Not applicable
Organs of state					
South African Heritage Resources Agency - Nokukhanya Khumalo	X	08 July 2019	The SAHRA Archaeology, Palaeontology and Meteorites (APM) Unit notes that the development area contains numerous sites of archaeological significance (burial	SRK and RPM noted SAHRA's request. A HIA was undertaken as part of the impact assessment phase of the Der Brochen Amendment Project.	Refer to Sections 9.12 and 10, along with Appendix

Interested and Affected Parties <i>X indicate those who have been consulted with</i>		Date Comments Received	Issues raised	EAPs and applicant responses to issues	Section reference where issue were addressed
			and graves sites, colonial feature, along with Middle Stone Age and Iron Age Sites) which have been recorded. The APM unit therefore requests that a Heritage Impact Assessment (HIA) be conducted, by a suitably qualified archaeologist, in terms of section 38(3) and 38(8) of the National Heritage Resources Act (NHRA), Act 25 of 1999 as part of the integrated EA process. The draft Environmental Impact Assessment (EIA) must be submitted with its appendices in order to make an informed decision. Further comments will be made when the requested documents have been attached to the case for review.	SRK will submit a copy of the draft EIA to SAHRA as per their request for consideration and comment.	D8 for the outcomes of the HIA.
Communities					
Ms Tiny Mangke (Secretary of the Gamawela CPA)	X	01 March 2019	Ms Mangke indicated that the Gamawela Community are currently experiencing impacts of blasting activities undertaken by Two River Platinum Mine and requested that the mine investigate the extend of the blasting impact relating to the Der Brochen Amendment Project.	A noise and vibration study was conducted as part of the impact assessment phase of the proposed project. The Camawela Community was identified as a noise and vibration receptor located within the proposed project area.	Refer to Section 9.10 and Appendix D6 for the outcomes of the noise and vibration study.
Ms Tiny Mangke (Secretary of the Gamawela CPA)	X	01 March 2019	Ms Mangke suggested that the number of pupils accepted for the mines learnership should increase and emphasised that the community requires targeted mining related training. She also highlighted that a request for Cadet Training was also previously made to the mine as this could lead to future employment.	According to the mine's SPD, the mine does not have a Cadet training program, however several training programs including learnerships are being implemented. The learnerships that are currently provided are based on the commitment made to the DMR in line with original SLP submissions to the DMR.	Not applicable
Mr Jacob Magane	X		Mr Magane stated that the issues relating to the upcoming mine must be resolved with the communities on a regular basis. He emphasised that unemployment of the youth is a big issue due to the lack of educational facilities in the area. Therefore, there is a serious need to upskill the local community.	According to the mine's SPD, upskilling opportunities of the local communities is included in the mine's SLP, such as ABET programme. He further noted that by the third quarter of 2019, training for career development will be developed by the mine. He added that monthly meetings with the relevant communities are scheduled.	Not applicable

Interested and Affected Parties <i>X indicate those who have been consulted with</i>		Date Comments Received	Issues raised	EAPs and applicant responses to issues	Section reference where issue were addressed
Ms Tiny Mangke (Secretary of the Gamawela CPA)	X	01 March 2019	Ms Mangke stated that people on the St. George farm are older 35 and have no access to education. Therefore, she requested that ABET training be provided to them.	As part of the SLP Commitments, AAP has committed to provide Adult Education and Training (AET) for the communities. AAP will engage the community regarding the selection and training of community members on AET.	Not applicable
Ms Tiny Mangke (Secretary of the Gamawela CPA)	X	01 March 2019	Ms Mangke enquired whether a lease agreement between the mine and the communities can be set up in terms of the mine accessing property through their land parcels.	According to the mine's SPD, the matter of a possible lease agreement with the GaMawela CPA has been escalated to Group Legal who have advised that they will revert back for a further engagement with the community.	Not applicable
Ms Tiny Mangke (Secretary of the Gamawela CPA)	X	01 March 2019	Ms Mangke stated that there are concerns regarding the underground mining with regards to water resources. The Gamawela Community on the St George farm currently utilise three (3) boreholes to provide water to the community. She requested that the opportunity be assessed whereby the community can benefit from the water that will be abstracted from the underground workings for the use of agricultural purposes.	A groundwater study (known as the hydrogeological study) was conducted as part of the impact assessment phase of the proposed project. As part of the hydrogeological study a groundwater model was run to determine the extent of the groundwater table drawdown should the Der Brochen Amendment Project be implemented.	Refer to Section 10.3.2 and Appendix D1 for the outcomes of the hydrogeological study.
Ms Tiny Mangke (Secretary of the Gamawela CPA)	X	01 March 2019	Ms Mangke wanted to know whether the mine can consider taking kids from Grade 8 to go to a good boarding school to further their education. She is of the opinion that through such an initiative the mine can provide the learners with support to further their education and provide a better future. She further highlighted that such initiative will also make it easier for the children to gain access to tertiary education institutions. She suggested that a trust fund is set up by the mine to accomplish the initiative.	Anglo American Platinum has a bursary facility that is accessible to all those that apply and meet the requirements. These bursaries are open to all host communities within the Zone of Influence (Zol). As regards a special arrangement to take learners to a boarding school, AAP can report that the company has no policy provision for such an arrangement. The company however has adopted schools in Operational areas through which they fund the schools to support all learners in each of those schools. AAP will continue to support educational programs at schools including Saturday classes, winter school programmes, spring educational programmes and provide teaching and learning aids driven through technology (Computers, overhead projectors, etc), to support the education of host community learners. The request has however been escalated to Head of Human Resource Development at AAP.	Not applicable
INTERESTED PARTIES					
Mr Trollex Mashilangwako (local community member)		01 March 2019	Mr Mashilangwako requested clarification on what minerals will be mined. He stated	No additional minerals are applied for in respect of the proposed project as the Der Brochen Mine's approved mining	Not applicable

Interested and Affected Parties <i>X indicate those who have been consulted with</i>	Date Comments Received	Issues raised	EAPs and applicant responses to issues	Section reference where issue were addressed
		that Anglo is a platinum company, and that the other minerals mined by Anglo should be left for the community to benefit.	right includes all platinum group metals (PGM's) and related minerals which includes chrome.	
Mr Trollex Mashilangwako (member of the Pakaneng community)	01 March 2019	Mr Mashilangwako wanted to know where will the shafts will be located, and how will underground blasting affect the surrounding households on surface.	A noise and vibration study was conducted as part of the impact assessment phase of the proposed project. The Pakaneng Community was identified as a noise and vibration receptor, but will be less affected as this community is located outside the project related footprint area.	Refer to Section 9.10 and Appendix D6 for the outcomes of the noise and vibration study.
Mr Amos Magane (local community member)	01 March 2019	Mr Magane wanted to know how will the project benefit the local community. It was previously stated that the projects at Mareesburg could lead to the several applications for jobs, however the education requirements for those jobs were for Grade 12 and higher. Most of the people in the area does not meet those requirements.	Anglo has revamped the Nokaneng school and are in discussion with the Department of Education to enable to school to teach learners up to Grade 12. The SPD also have numerous training and educational programmes in place to provide further education and training. Contact details of the SPD was provided to the attendees in order to obtain further details of the current educational and training programmes the mine has to offer.	Not applicable
Mr Pitso Mawela	01 March 2019	Mr Mawela stated that the community is not happy with how the learnership process and allocation are undertaken, as some of the people selected is not from the affected community.	According to the mine's SPD, anyone can apply for the learnership programme, as long as they originate from the mine's zone of influence, which is based on a 50km radius around the mining area. Some of the current participants selected for the learnership programmes are from the mine's zone of influence, and that as part of the learnership application process a stamped letter from the community leader within the zone of influence is required when a person was successfully accepted into the programme. According to the mine's SPD, the selection of an individual to partake in the learnership programme is done through a selection committee/panel that consists of members from the mine's Human Resource Development (HRD), and Human Resources (HR) and talent management departments. The selection is therefore based on a group decision and not by individual selection.	Not applicable
Ms Monica Moretsele	01 March 2019	Ms Moretsele enquired about how the mine can assist the community members in gaining relevant skills, as they do not qualify for the jobs based on the current	The Der Brochen Mine's SPD have numerous training and educational programmes in place to provide further education and training. Contact details of the SPD are provided in this report.	Refer to Section 2.3.

Interested and Affected Parties <i>X indicate those who have been consulted with</i>	Date Comments Received	Issues raised	EAPs and applicant responses to issues	Section reference where issue were addressed
		skills requirements. She suggested that the children from the community be provided with skills that will enable them to access jobs at the mine.		
Mr Makodi Madigwe	01 March 2019	Mr Madigwe wanted to know what opportunities are available to people who are not within the 18- 35 bracket.	According to the mine's SPD, AAP/RPM does not utilise "age" as a determinant for opportunities. All opportunities (education, training, bursaries, supply chain, etc.) are made available to host community members based on their needs and requirements. Specific criteria are set which participants / applicants must comply with to be considered for these opportunities.	Not applicable

9 Environmental Attributes Associated with the development footprint alternatives

This section of the EIA/EMPr Report provides a description of the environment aspects that may be affected by or could affect the proposed Der Brochen Amendment Project. This information has been sourced from existing information as well as previous and current specialist investigations attached as Appendices.

9.1 Geology

NOTE: A geohydrological specialist study was conducted as part of the impact assessment phase. The information contained in this section of the EIA/EMPr report is sourced from the Geohydrological specialist study attached as Appendix D1.

The regional geology of the Der Brochen Amendment Project that forms the basis of the conceptual groundwater model is summarised below.

The Project area overlies intrusive rocks of Bushveld Complex (BC) which intruded into the Transvaal Supergroup on the Kaapvaal Craton at about 2 060 Ma. Of the various layers within the BC, the Project area is underlain by the upper portion of the Critical Zone (Dwars River Sub-suite) (Figure 9-1), which in this area consists of alternating layers of pyroxenites, norites and anorthosites. The igneous layering dips in the order of 9° to 12° to the west. Economic zones of interest include the platiniferous Merensky reef and the UG2 chromitite reef. The former outcrops with a N-S strike on the Der Brochen farm, occupying the mid-slope section west of the Groot-Dwars River. The UG2 lies some 180m to 210m below the Merensky reef and outcrops in the gently sloping lower-slope section of the Groot-Dwars River valley.

West dipping quartzites, siltstones and shales of the Pretoria Group underlie the intrusive rocks of the BC and daylight 5 to 8km east of the project area. The generally massive nature of the BC rocks underlying the Project area suggests that they are likely to be devoid of primary discontinuities. Secondary discontinuities such as joints, shear joints and fault surfaces in addition to intrusive dykes are therefore more likely to be an important control on the direction of groundwater flow. Unconsolidated alluvial sediment deposits are present along the lower reaches of the Groot-Dwars River, particularly on Helena, Mareesburg and Der Brochen Farms where they are moderately well developed, being up to 25m thick. Scree deposits have developed at the base of the steep valley sides.

A series of prominent N-S to NNE-SSW trending lineaments, namely the St George and Helena Faults, dominate the structural setting of the Project area and provide the locus for the north flowing Klein-Dwars and Groot-Dwars Rivers (Figure 9-1). Other extensively developed structural features include NW-SE to NNW-SSE, as well as locally developed ENE-WSW, lineaments. The St. George fault, believed to be a first order sub-vertical fault zone, has a down-throw towards the east of approximately 50 m and an apparent left lateral horizontal displacement of 575m. Using remote sensing and aeromagnetic images, several dyke swarms were delineated. Four of these dyke swarms are NNE trending, whilst the others have trends of NE, NW and N-S. All dykes are of a dolerite/diabase composition and vary in thickness from less than 15 m to up to 70m. These dykes have generally a low permeability below the weathered zone and strongly influence the ground water flow.

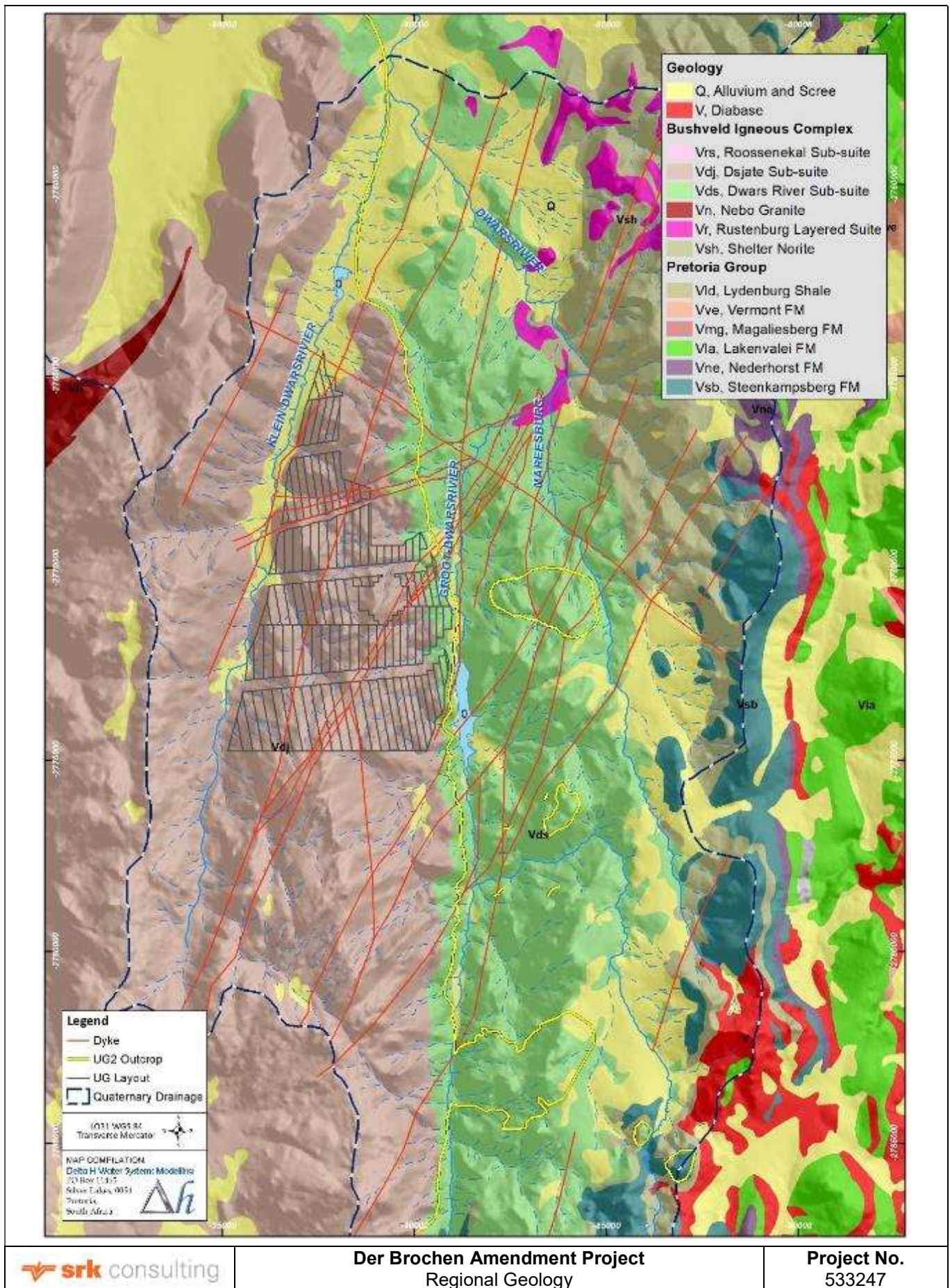


Figure 9-1: Regional Geology Setting (Delta H, 2019)

9.2 Topography

The area is characterised by a rugged topography with the relief measuring between 940 m and over 2 000 m above mean sea level (mamsl). The prominent north-south trending Steenkamps Mountains extend across the study area, with two deeply incised valleys lying in a north-south direction between the mountain ranges. Within these valley floors are the Groot-Dwars River in the east and the Klein-Dwars River in the west (both flowing northwards through the area).

The highest elevation of 2 300 mamsl is located to the extreme south of the project area, and the lowest elevation of 1 035 mamsl is located to the northern drainage path of the Groot Dwars River.

9.2.1 Visual character

Visual character is descriptive and non-evaluative and is based on defined attributes. The visual character of the area is influenced by the geology, vegetation and land use of the area, giving rise to a predominantly mountainous landscape under predominantly natural cover with limited rural activities but with significant influence from mining activities. Most of the area can be defined as a natural transition landscape as it is mostly natural scenery but mining elements and, to a lesser degree, rural elements, are visible in the landscape.

The proposed Der Brochen Mine however, is a substantially modified landscape with significant visual impacts caused by earthmoving, scarring and associated infrastructure and activities. This results in a highly transformed landscape visual character.

9.3 Climate

NOTE: An air quality and surface water specialist study was conducted as part of the impact assessment phase. The information contained in this section of the EIA/EMPr report is sourced from both the surface water specialist study attached as Appendix D2 (for rainfall and evaporation data), and the air quality study, attached as Appendix D3 (for temperature and wind data).

9.3.1 Temperature

The Der Brochen project area falls within the Highveld climatic region. This climatic region is associated with warm temperature and summer rainfall. The average daily maximum temperature for the region is 28°C in January and 21.6°C in July.

Table 9-1: Monthly temperature summary (Airshed, 2019)

Monthly Minimum, Maximum and Average Temperatures (°C)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	14.8	15.0	13.4	11.2	8.3	6.1	6.2	7.4	10.9	13.1	13.5	15.5
Maximum	28.7	28.9	28.4	26.3	24.3	21.6	21.5	24.3	27.2	27.9	28.0	29.5
Average	21.4	21.4	20.3	17.8	15.1	12.5	12.6	14.9	18.3	20.2	20.5	22.2

9.3.2 Mean monthly maximum and minimum temperatures

The average daily maximum temperature at Der Brochen (based on Mashishing information) is 22.9°C and the minimum 9.5°C. Temperature extremes of 34.5°C have occurred in summer and 5.9°C in winter.

9.3.3 Prevailing wind direction

The slope of the terrain accounts for the increased frequency of occurrence of northerly and north-westerly wind during the day-time and increased south-easterly winds during the night-time. The differential heating and cooling of the air along a slope typically results in down-slope (katabatic) flow at night, with low-level up-slope (anabatic) airflow occurring during the day (Airshed, 2014).

The vertical dispersion of pollution is largely a function of the wind field. The wind speed determines both the distance of downward transport and the rate of dilution of pollutants. The generation of mechanical turbulence is similarly a function of the wind speed, in combination with the surface roughness.

The wind roses comprise 16 spokes, which represent the directions from which winds blew during a specific period. The colours used in the wind roses below, reflect the different categories of wind speeds; the yellow area, for example, representing winds in between 4 and 5 m/s. The dotted circles provide information regarding the frequency of occurrence of wind speed and direction categories. The frequency with which calms occurred, i.e. periods during which the wind speed was below 1 m/s are also indicated.

The flow field is dominated by south-easterly winds with a >20% frequency of occurrence (Figure 9-2). Thermo-topographical induced flow is anticipated to represent an important component in the airflow over the study area with significant differences evident between day-time and night-time wind field characteristics. The slope of the terrain accounts for the increased frequency of occurrence of northerly and north-westerly wind during the day-time and increased south-easterly winds during the night-time. The differential heating and cooling of the air along a slope typically results in down-slope (katabatic) flow at night, with low-level up-slope (anabatic) airflow occurring during the day.

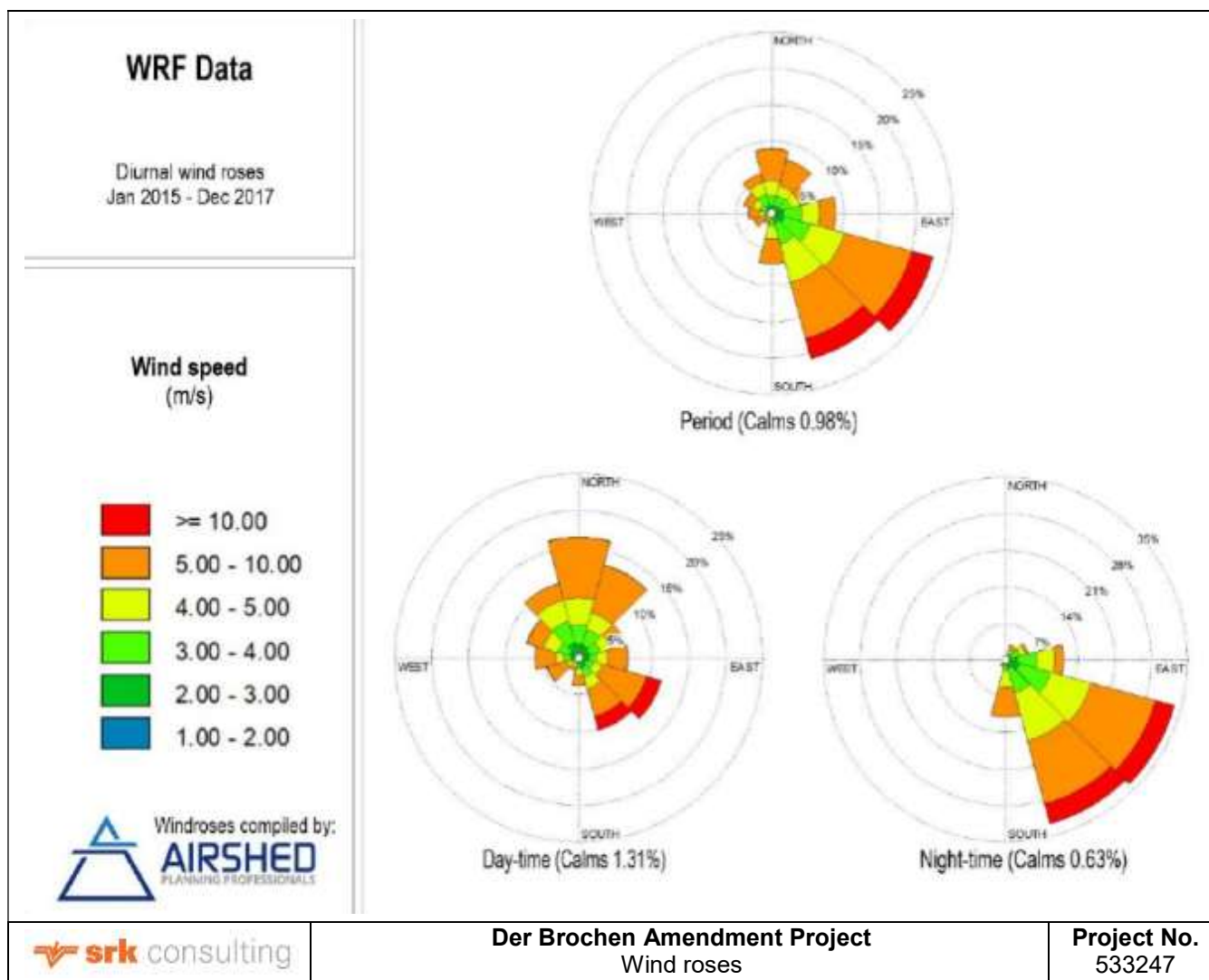


Figure 9-2: Period, day- and night-time wind roses (Airshed, 2019)

9.3.4 Rainfall and evaporation

The average annual rainfall for this climatic region varies from 900 mm in the east to 680 mm in the west. The rainfall pattern for the Der Brochen Project area has been obtained from the South African Weather Service for station 593419 (Maartenshoop: Lat. 24°98', Long. 30°23'), which lies about 12 km from the site. Rainfall data from the SAWS station 554516 (Beetgeskraal: Lat. 24°06', Long. 30°18'), located 19.7 km from the project area, has also been obtained.

Table 9-2: Regional rain station information

Name of rainfall station	Rainfall Station No.	Distance (km)	Lat	Long	Record (years)	Record period	MAP (mm)
Maartenshoop	593419	12	24°98'	30°23'	40	1915-1999	682
Beetgeskraal	554516	19.69	25° 06'	30° 18'	42	NR5	697

There are, in addition, five manual rainfall stations located in and around the Der Brochen Project area from which rainfall has been captured since September 2015 (refer to Table 9-3). Rainfall and evaporation are also recorded at the Helena TSF. The manual gauges are located at the Der Brochen dam wall; Top House yard; Office; Mareesburg house; and Anglo house – Richmond.

Monthly rainfall and evaporation data are presented in Table 9-3 and data for the wettest ten years are presented in Table 9-4.

Table 9-3: Site rainfall (mm) for 2017 and 2018

Year	Der Brochen stations						Mototolo
	Mareesburg house	Geology Office	Der Brochen dam wall	Anglo house Richmond	Top House Yard	Average	Helena TSF
2017	605	883	685	867	709	749	683
2018	410	516	435	404	522	460	563

The average annual rainfall for this climatic region varies from 900 mm in the east to 680 mm in the west and the average annual rainfall for the Maartenshoop and Beetgeskraal stations is 687 mm and 697 mm, respectively. This aligns with the ten-year average recorded at the Helena TSF of 624 mm (2010-2018). The average rainfall for 2018 based on the five site rainfall gauges was 460 mm compared to much higher rainfall of 749 mm in 2017. This range is similar to that observed at the Helena TSF of 683 mm in 2017 and 560 mm in 2018. Rainfall occurs mostly in the summer (85%) from October to March, with a maximum in December. Monthly data in Table 9-4 show that a net water loss prevails in the region. Evaporation data were obtained from the Station B4E003 (SRK 527471, 2018 and Knight Piésold Consulting's Report DB-2018B-09-01, 2019) which is the closest evaporation station to the site. The average annual S-pan evaporation is 1 703 mm. Evaporation data for the integrated water balance (SRK 533247 WB, 2018) was obtained from WR2012 for the Quaternary catchment (B41G) and provided a similar average annual S-Pan evaporation of 1 601 mm.

The water balance model includes monthly evaporation factors and a conversion of the S-Pan data to lake evaporation, in line with best practice. This is presented in Table 9-4 below.

⁵ NR: The record period was not provided by Knight Piésold Consulting for Beetgeskraal. Evaporation data record for this station is indicated as 1972-2001, (SRK Report 469113, 2014).

Table 9-4: Rainfall and evaporation (SRK, 2019)

Month	Rainfall data (mm)							Evaporation record						
	Station WB 593419 (Maartenshoop) (1915-1999) ^[6]			Average for site stations		Site record at Helena TSF ^[7]		Station B4E003 (1972 to 2001)		Quaternary B41G ^[1]	Model input ^[1]		Helena RWD (A- Pan) ^[3]	
	Average	Maximum	Minimum	2017	2018 ⁸	2017	2018	A-pan	S-pan	S-Pan (mm)	Evaporation factor	Lake evaporation (mm)	2017	2018
January	112.2	447.0	0	176.8	62.5	225	58	224	183	176	0.84	148	200	160
February	89.5	365.7	0	247.8	65.0	142	113	196	157	147	0.88	129	295	148
March	79.8	217.5	0	44	97.8	85	91	188	150	145	0.88	127	224	118
April	44.8	169.0	0	34	36.3	7	45	159	123	111	0.88	98	155	86
May	14.1	108.6	0	0	5.5	45	32	143	108	94	0.87	82	193	92
June	6.8	54.5	0	0	0	0	2	125	92	76	0.85	65	86	158
July	6.0	74.5	0	0	0	0	5	133	99	83	0.83	69	141	166
August	7.3	61.8	0	0	0	0	0	158	122	110	0.81	89	98	168
September	22.4	121.5	0	0	0	0	0	193	154	143	0.81	116	233	150
October	58.8	245.5	0	75	28.9	34	15	214	174	173	0.81	140	170	150
November	117.8	319.0	2.5	36	47.6	12	69	204	165	163	0.82	133	189	144
December	122.7	306.5	26.2	135.7	116	134	Pending	216	176	179	0.83	149	144	Pending
Totals	682			749	460	683		2153	1703	1601		1348	2128	

⁶ Data based on the hydrological year commencing in October and ending September the following year. Data period simulated up to September 2017. Intergrated Water Balance Report, SRK 533247, 2018.

⁷ Data received from Fraser Alexander for the station at Helena TSF.

⁸ Data received from Mr B Redmead of AngloAmerican, 24 January 2019.

Table 9-5: Rainfall and evaporation data (mm) (data obtained from SRK 469113, 2014)

The wettest years from 1915-1999	Wettest Year		Wettest 6 Months		Total evaporation for six months (Station B4E001)	Relevant Year
	Year	Total Rainfall for wettest year	Year of wettest six months	Total rainfall for wettest six months (Station 593419)		
Wettest Year	1938	1 185.5	1917	1002.1	1137	1972/73
2nd wettest	1929	1 120.3	1938	1058.4	1132	1991/92
3rd wettest	1917	1 103.5	1929	957.4	1120	1982/83
4th wettest	1922	982.4	1922	927.8	1114	1985/86
5th wettest	1924	948.6	1979	885.5	1093	1976/77
6th wettest	1979	945.0	1936	843.7	1069	1975/76
7th wettest	1959	926.9	1924	822.4	1053	1974/75
8th wettest	1956	913.7	1959	818.5	1043	1992/93
9th wettest	1936	909.8	1920	812.7	1033	1977/78
10th wettest	1954	891.8	1999	788.7	1030	1983/84

9.4 Soil, land use and land capability

NOTE: A soils, land use and land capability specialist study was conducted as part of the impact assessment phase. The information contained in this section of the EIA/EMPr report is sourced from the soils, land use and land capability specialist study attached as Appendix D4.

9.4.1 Soil

The focus area is dominated by shallow soils of Mispah/Outcrop, Milkwood, Glenrosa, Bonheim and Mayo soil forms which collectively constitute of approximately over 60% of the total investigated area, whilst moderately deep soils of Hutton/Mispah occupies less than 5% of the total investigated focus area. The shallow nature of the dominated soil forms can be largely attributed to limited rock weathering or rejuvenation through natural erosion on steeper, convex slopes. The remainder of the focus area is occupied by mine associated structures (i.e. Mine plant complex, PCD, office areas, tar roads), Witbank (Anthrosols) as well as soil types which are associated with freshwater features and these include Kroonstad, Katspruit and Willowbrook. Witbank soil forms were also identified within the proposed focus area. These soils have been extensively disturbed such that no recognisable diagnostic soil morphological characteristics, particularly in the topsoil, could be identified, corresponding to Anthrosols in the international soil classification terminology.

The spatial distribution of all identified soil forms within the focus area is presented in Table 9-6, Figure 9-3 and Figure 9-4.

Table 9-6: Identified soil forms and respective land capability associated with the Der Brochen Amendment Project area

Soil Form	Land Capability	Total Area (Ha)	% Areal Extent
Hutton/Mispah	Arable (Class III)	17.9	3.88
Mispah/Outcrop	Grazing (Class VII)	102.69	22.27
Glenrosa/Mayo/Mispah		89.26	19.35
Bonheim/Valsrivier		14.46	3.14
Steendal/Immerpan		60.88	13.2
Witbank (Anthrosols)	Wildlife/Wilderness	12.44	0.36
Freshwater Features (Kroonstad/Katspruit/Willowbrook)	Wetland Class VIII	39.8	2

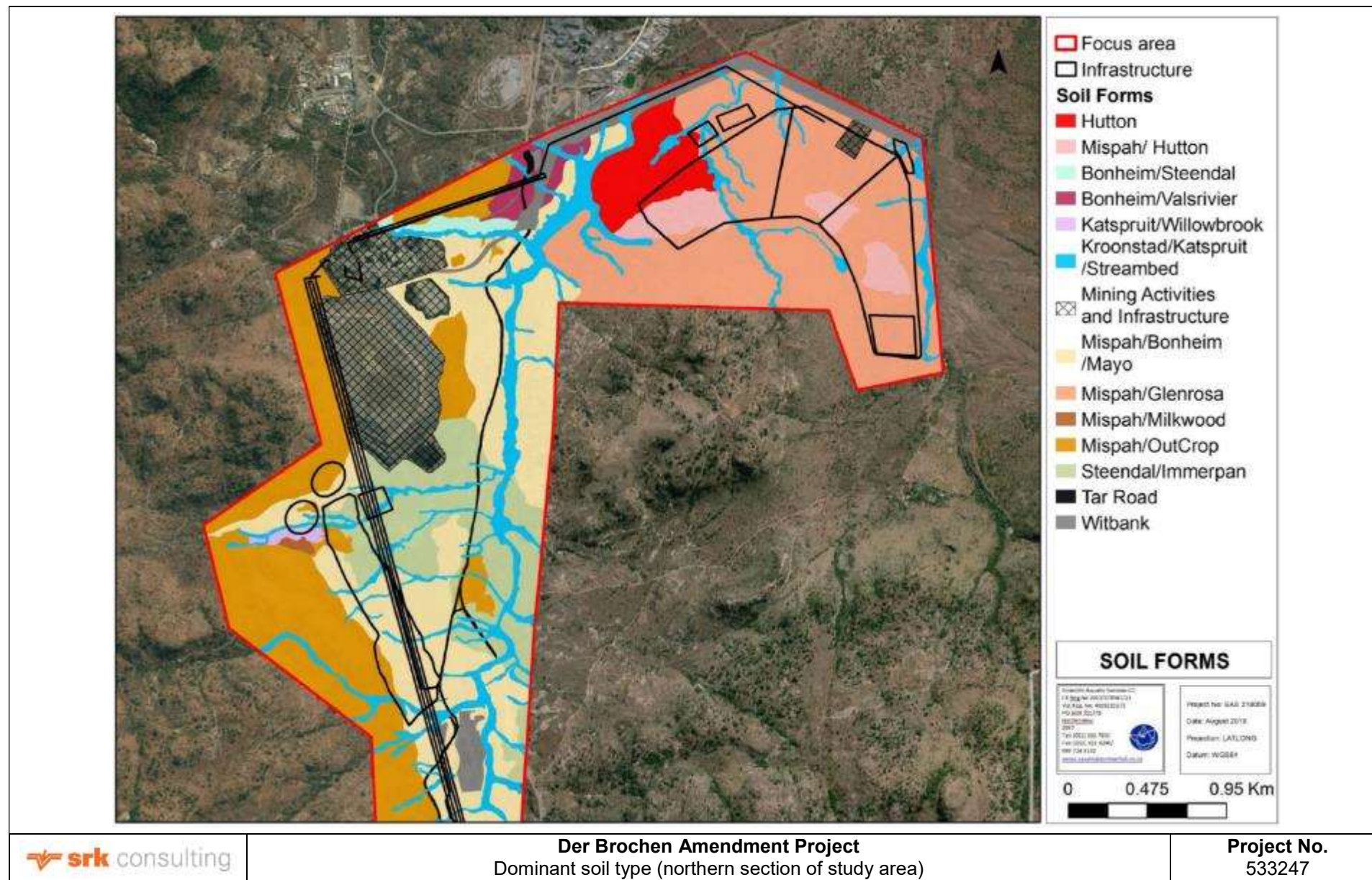


Figure 9-3: Der Brochen Dominant Soil Types (Northern Section) (STS, 2019)

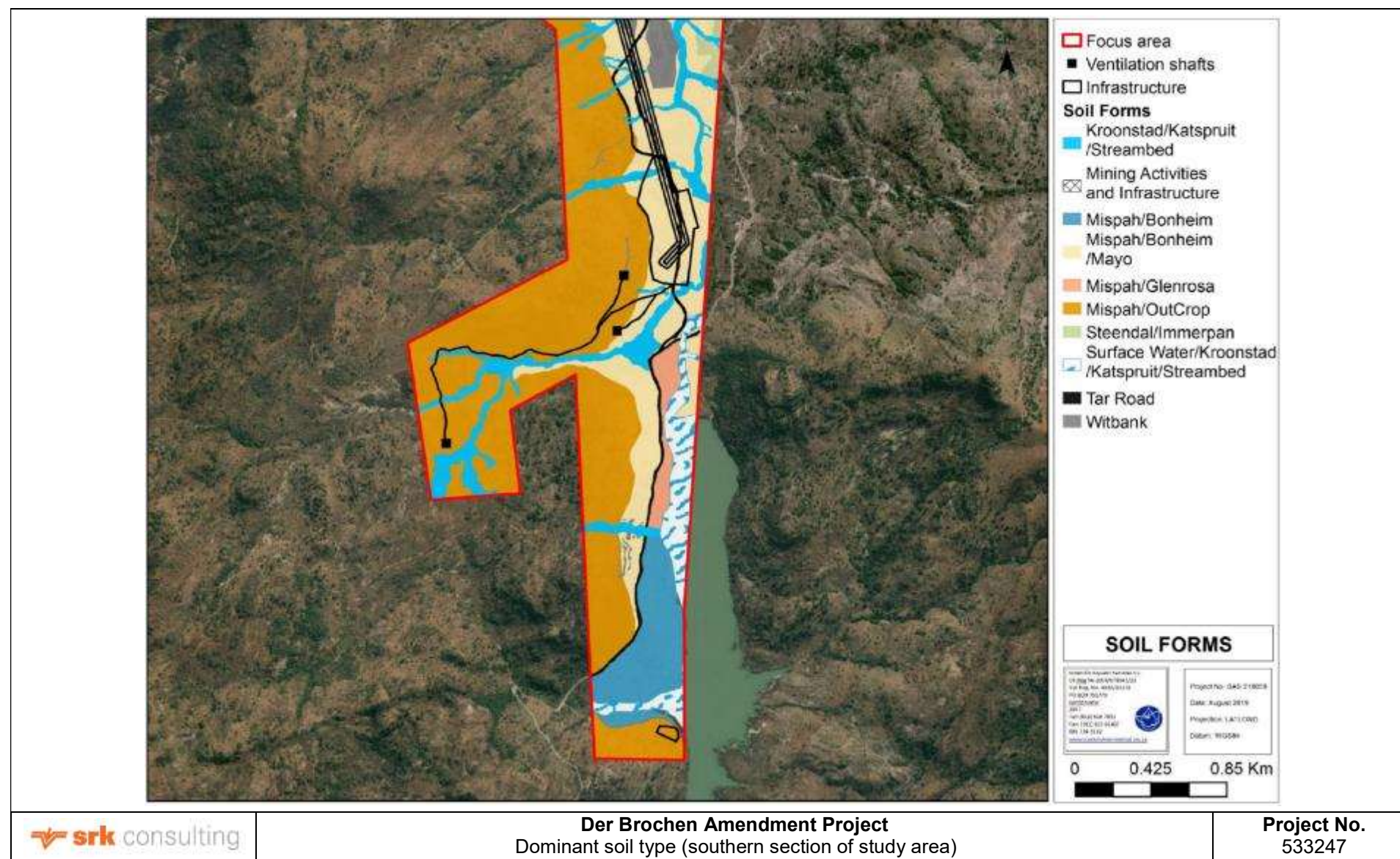


Figure 9-4: Dominant Soil Types (Southern Section) (STS, 2019)

9.4.2 Land Capability

Even within similar climatic zones, different soil types typically have different land use capabilities attributed to their inherent characteristics. High potential agricultural land is defined as having the soil and terrain quality, growing season and adequate available moisture supply needed to produce sustained economically high crops yields when treated and managed according to best possible farming practices (Scotney et al., 1987). For this assessment, land capability was inferred in consideration of observed limitations to land use due to physical soil properties and prevailing climatic conditions. Climate Capability (measured on a scale of 1 to 8) was therefore considered in the agricultural potential classification. The focus area falls into Climate Capability Class 5, with moderately restricted growing season due to low temperatures, frost and/or moisture stress. Suitable crops may be grown at risk of some yield loss. The identified soils were classified into land capability classes using the Scotney et. Al. Land Capability Classification system (Scotney et al., 1987).

The spatial distribution of the land capabilities identified within the focus area is presented in Table 9-7, Figure 9-5 and Figure 9-6.

Table 9-7: Der Brochen Land Capability

Soil Form	Land Capability	Total Area (Ha)	% Areal Extent	Land Capability
Hutton/Mispah	Arable (Class III)	17.9	3.88	The identified Hutton/Mispah soil forms are considered prime agricultural soils of high (class III) land capability, suitable to arable agricultural land use. Therefore, these soils are considered to contribute significantly to provincial and/or national agricultural productivity if used for crop cultivation, and are essentially also well-suited for other less intensive land uses such as grazing, forestry, etc. However, emphasis is directed to their agricultural crop productivity due to the scarcity of such soil resources on a national scale and food security concerns.
Mispah/Outcrop	Grazing (Class VII)	102.69	22.27	These soils, at best, suited for grazing and/or wilderness practices. This is due to the relatively shallow parent rock and lithocutanic material. The impact of the proposed mining activities on the land capability of these soils is anticipated to be low after mitigation. As much as these soils are not considered as prime agricultural soils, these soils are important for potential grazing opportunities. Therefore, implementation of rehabilitation and the proposed integrated mitigation measures is recommended to reinstate the natural topography of the area post mining.
Glenrosa/Mayo// Mispah		89.26	19.35	Shallow effective rooting depth is the primary limitation of the land capability of the Glenrosa/Mispah soil forms, which is due to the occurrence of a rocky layer at relatively shallow depth, which would hinder penetration of plant roots. The identified Glenrosa/Mispah soil forms are considered to be of poor (class VII) land capability and are not suitable for arable agricultural land use. These soils are, at best, suitable for natural pastures for light grazing. Therefore, these soils are considered to make a substantial contribution to extensive subsistence farming on a local scale.
Bonheim/Valsrivier		14.46	3.14	These soils were found to be somewhat shallow with an approximate effective rooting depth of 40 cm before reaching the layer of refusal. The identified soil forms are of limited land capability and are not considered as prime agricultural soils. These soils, at best, are suited for grazing, however with terrain constraints where these soils occur disqualify these soils for being suitable for commercial livestock farming.
Steendal/Immerpan		60.88	13.2	These soils were found to be somewhat shallow with an approximate effective rooting depth of 30 cm before reaching the layer of refusal. These soil forms are of limited land capability and are not considered as prime agricultural soils. These soils, at best, are suited for grazing, however the soil and terrain constraints attributed to shallow depth relatively steep slopes of the area disqualify these soils for being suitable for commercial farming.
Witbank (Anthrosols)	Wildlife/ Wilderness	12.44	0.36	Comprises of significantly disturbed areas due from anthropogenic activities to an extent that no recognisable diagnostic soil horizon properties could be identified. These soils are characterised by various limitations, primarily the absence of soil as a growth medium for arable agriculture. These identified Witbank soils have very poor (class VIII) land capability attributed to the potential leakages from vehicles transporting material from the forestry and mining areas. In addition, some of these soils have been subjected to long term compaction and erosion. This land capability class also includes area where the original soil has been buried and/or extensively modified by anthropogenic

Soil Form	Land Capability	Total Area (Ha)	% Areal Extent	Land Capability
				activities. These soils are therefore not considered to make a significant contribution to agricultural productivity even on a local scale.
Freshwater Features (Kroonstad/Katspruit/Willowbrook)	Wetland Class VIII	39.8	2	<p>Plant root development and water infiltration are largely impeded by the clayey, slowly permeable soft plinthite and/or G horizon occurring at extremely shallow depths of less than 10 cm below ground surface (bgs). Prolonged saturation of these soils are typically induced anoxic (oxygen deficiency) conditions which hamper root development of most arable crops.</p> <p>These soil forms were classified as class VIII land capability due to land use limitations related to prolonged waterlogging attributed to inherently poor internal drainage of the G-horizon encountered at extremely shallow depth. The prolonged waterlogging of these soils limits their land use largely to wetland habitats for various wetland plant species that are inherently tolerant and/or obligate to anoxic conditions. These soils are therefore not considered to contribute significantly to provincial and/or national agricultural productivity.</p>

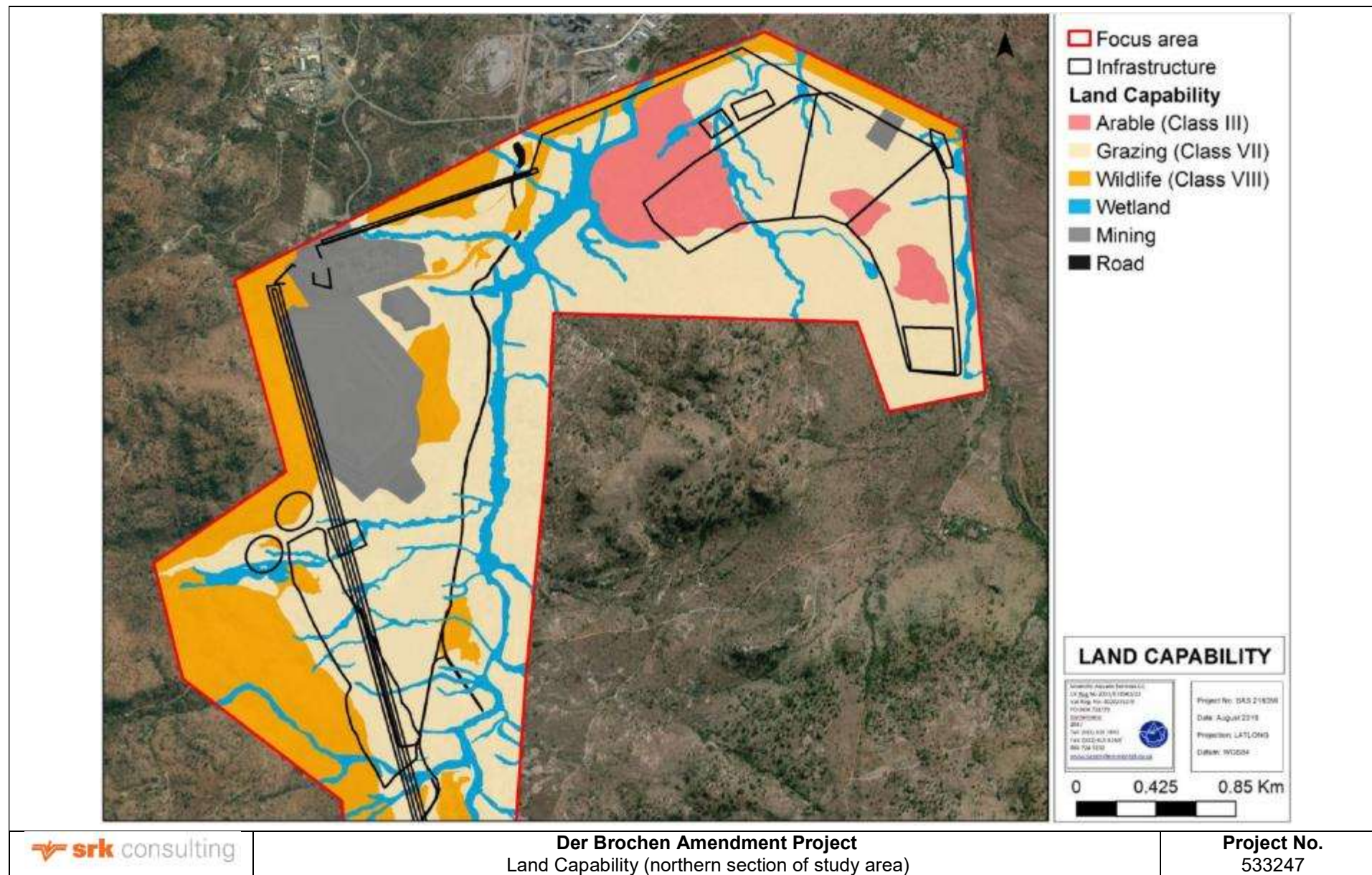
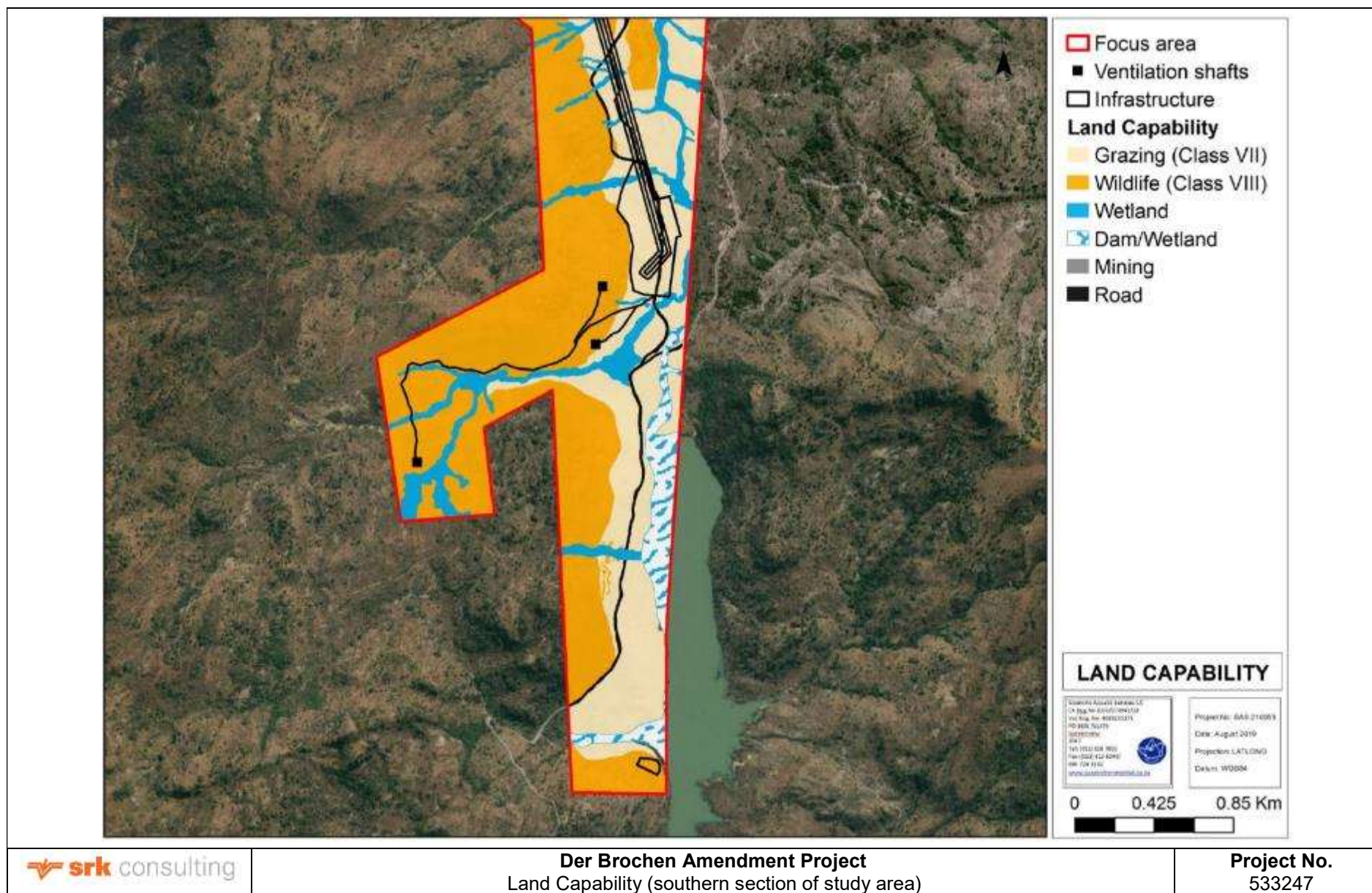


Figure 9-5: Der Brochen Land Capability (Northern Section) (STS, 2019)



9.4.3 Land Use

Current land use activities associated with the focus area are largely dominated by wildlife and wilderness, with some mining operations in the surrounding areas along with limited game farming and cattle grazing activities occurring. Refer to Figure 9-7 and Figure 9-8 below.

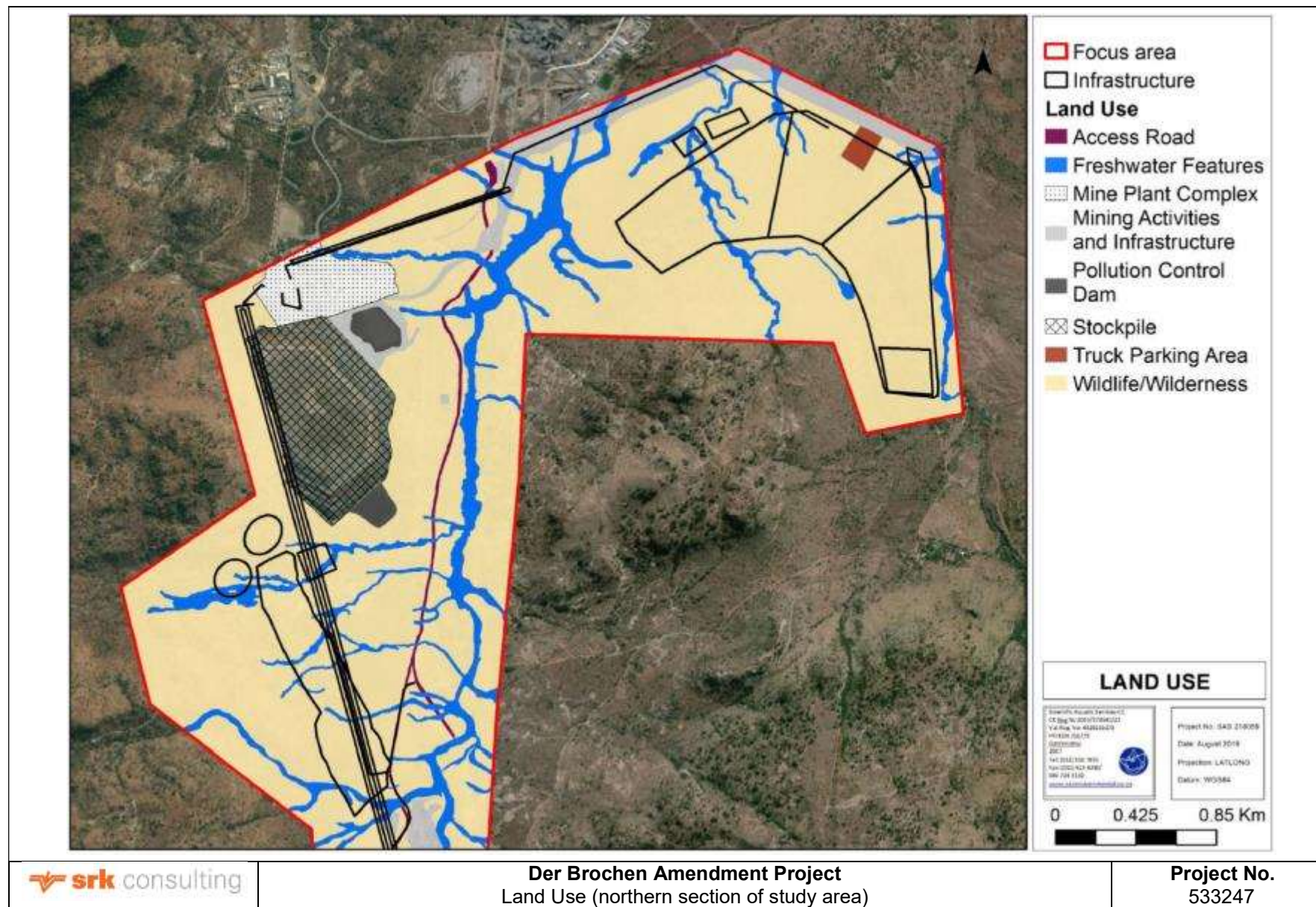


Figure 9-7: Der Brochen Land Use (Northern Section) (STS, 2019)

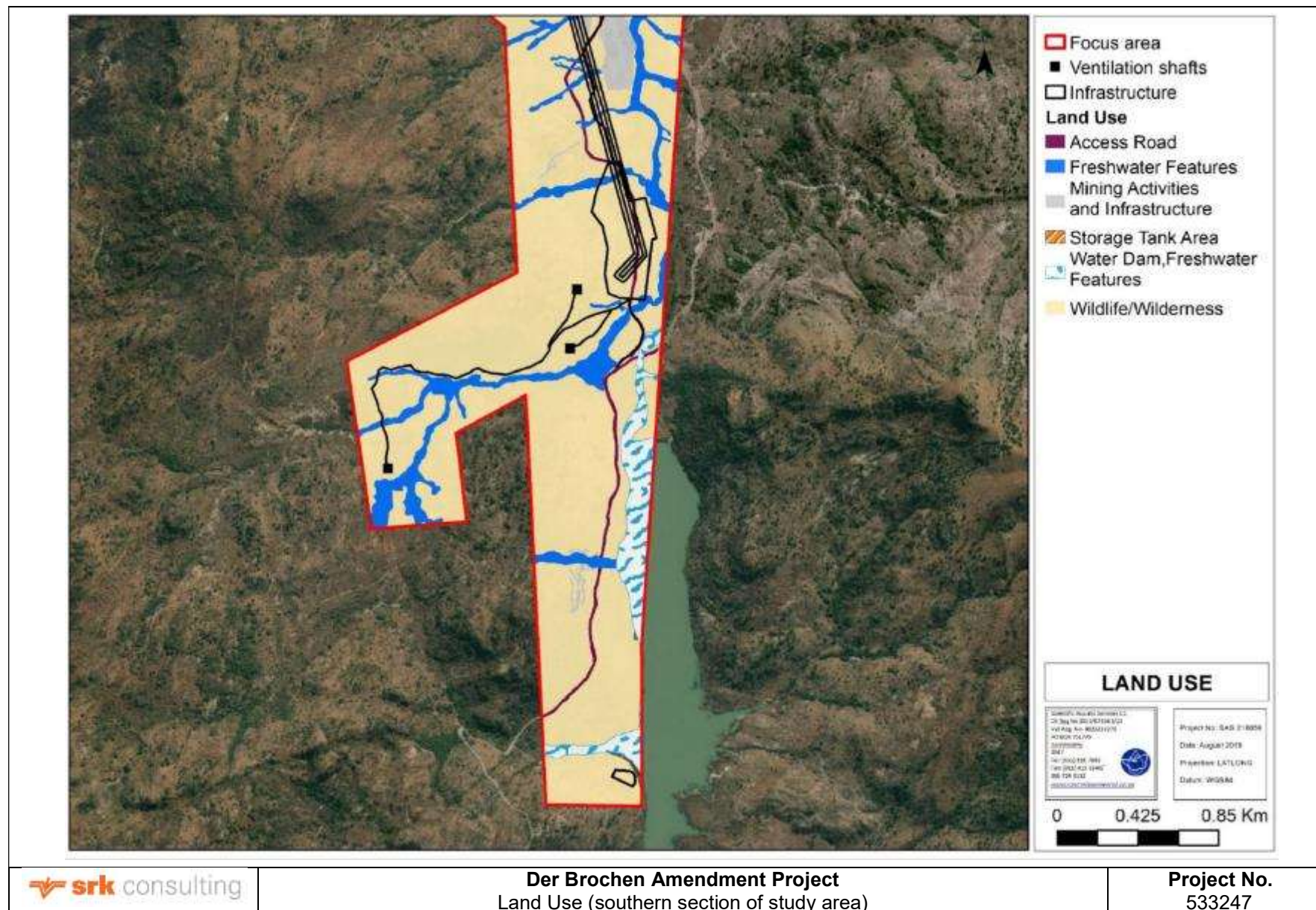


Figure 9-8: Der Brochen Land Use (Southern Section) (STS, 2019)

9.5 Surface Water

NOTE: A surface water specialist study was conducted as part of the impact assessment phase. The information contained in this section of the EIA/EMPr report is sourced from the surface water specialist study attached as Appendix D2.

The Der Brochen site falls in the extreme south of the Eastern Limb of the Bushveld Complex within the Klein and Groot Dwars River catchments of the B41G quaternary catchment. This catchment falls within the Olifants River Water Management Area B4.

The Der Brochen Project area is characterised by rugged topography with prominent north-south trending mountain ranges (the Steenkampsberge) extending across the project area. Two deep valleys extend in a north-south direction between the Steenkampsberge mountain ranges and the Groot-Dwars River (in the east) and the Klein-Dwars River (in the west) are contained within these valley floors.

Surface water from the Der Brochen Project area flows via a number of unnamed ephemeral tributaries and drainage lines into the perennial Groot-Dwars River. The Der Brochen dam is situated on the Groot-Dwars River upstream of the Der Brochen Project area and proposed activities. The main tributary of the Groot-Dwars River in the project area is the ephemeral Mareesburg Stream, which is adjacent to the partially constructed Mareesburg TSF. The Groot-Dwars River together with the Klein-Dwars River joins the Dwars River on the farm Dwarsrivier 372 KT approximately 10 km north-northwest of Der Brochen. The Dwars River then joins the Tubatse River (formerly Steelpoort River), which in turn feeds into the Olifants River.

9.5.1 Water Management Area

The site falls within the Dwars River catchment within the B41G quaternary in Water Management Area B4. The Der Brochen project area is characterised by rugged topography with prominent north-south trending mountain ranges (the Steenkampsberge) extending across the project area. Two deep valleys extend in a north-south direction between the Steenkampsberge mountain ranges and the Groot-Dwars River (in the east) and the Klein-Dwars River (in the west) are contained within these valley floors. The main sub-catchments in the Der Brochen Project area are the Groot-Dwars River sub-catchment and Mareesburg stream sub-catchment.

Surface water from the Der Brochen Project area flows via a number of unnamed ephemeral tributaries and drainage lines into the perennial Groot-Dwars River. These rivers all drain to the north and are reportedly associated with major north / south striking fault zones (SRK 527471, 2018).

The Der Brochen dam is situated on the Groot-Dwars River upstream of the Der Brochen project area. The main tributary of the Groot-Dwars River in the project area is the Mareesburg Stream. The proposed DMS Stockpiles and associated PCDs are located to the east of the Mareesburg Stream and the Mareesburg TSF (currently under construction) located to the west of this stream.

The Groot-Dwars River together with the Klein-Dwars River joins the Dwars River on the farm Dwarsrivier 372 KT approximately 10 km north-northwest of Der Brochen. The Dwars River then joins the Steelpoort River (also known as the Tubatse River), which in turn flows into the Olifants River.

There are a number of small drainage lines and tributaries associated with the proposed South Portal, similar to that identified previously for the open pit section (SRK, 2014), and the Mareesburg TSF area. The DMS Investigation area is situated on the watershed between the Groot-Dwars and Mareesburg stream sub-catchments whilst the North pit area, conveyor and Mototolo Concentrator are all located within the Groot-Dwars sub-catchment.

9.5.2 Normal dry weather flow

The normal dry weather flow is defined as the flow that occurs 70% of the time in the three driest months (June, July, and August). The dry weather flow is presented in Table 9-8.

Table 9-8: Dry weather flows within and downstream of the area

Catchment	Dry weather flow (m ³ /month)
Groot Dwars River catchment	107 947
Mareesburg catchment	19 510
Klein Dwars River catchment	60 304

Flood peaks for the 1:20, 1:50, 1:100 and 1:200 year storms were determined using the Rational method, with the final selected peak being the most representative value based on best experience. Flood volumes for the same return periods were calculated using the Soil Conservation Service method. The 1:50 and 1:100 year flood peaks used in floodline modelling year flood peak used in floodline modelling for Der Brochen Dam were determined using Regional Maximum Flood (RMF) method with a K region of 4.

Table 9-9: Summary of Catchment Characteristics

Catchment description	Area (km ²)	Longest watercourse (km)	10-85 slopes (m/m)	Time of concentration (hrs)
Groot Dwars River Catchment	176.5	27.9	0.017	4.1
Der Brochen Dam Catchment	150	24	0.034	2.81
Mareesburg sub-catchment	31.9	17.57	0.04	1.9
Klein Dwars River	98.6	20.0	0.047	2.2

The definitions of the terms described above are listed below:

- 10-85 slopes denote the slope of the catchment from a point, 10% from the end point and 85% of the distance to the furthest point.
- Time of concentration denotes the length of time it takes for a raindrop to travel from the furthest point of the catchment to the outlet point.
- Longest watercourse denotes the longest length of the watercourse from the furthest point of the catchment to the outlet.

9.5.3 Floodlines

The 1:50 and 1:100 year natural floodlines were previously determined for the Groot and Klein-Dwars Rivers and Mareesburg Stream, the main tributary of the Groot-Dwars River in the Der Brochen project area. There is a gap in the floodline data where the Groot-Dwars River turns east upstream of the confluence of the Mareesburg Stream. This section of the river was assessed by Knight Piesold (KP) (Report DB-2018B-09-01, 2019) on the basis of the flood break scenario and is included in Figure 9-9 (yellow line). A raised floodline estimated around Der Brochen Dam also included in the figure.

The floodlines indicate the following:

- The proposed DMS stockpiles and PCDs will be located immediately adjacent to but outside the 1:50 and 1:100 year floodline or 100m buffer zone, whichever is the greatest, of the Groot-Dwars. Similarly, the eastern edge of the DMS (Phase 3) is located outside of the floodline of the Mareesburg Stream, as indicated in Figure 6-3 below;
- The eastern boundary of the Southern Portal Investigation falls within the 1:50 and 1:100 year floodline and 100 m distance from the watercourse edge but the infrastructure has been designed to be located outside of this area;

- The Staff accommodation which is located west of Der Brochen Dam will be located outside the the 1:50 and 1:100 year floodline or 100m buffer zone, whichever is the greatest, of the Der Brochen Dam;
- The remaining infrastructure will be developed within or immediately adjacent to the Mototolo Concentrator Plant located to the west of the Groot-Dwars River and outside the floodline extent. A small drainage line historically ran through this area to the Groot-Dwars River but is diverted upstream;
- The DMS conveyor crosses the Groot-Dwars River floodline to the north. Both the DMS and the ore conveyor are outside the floodline area elsewhere.

As noted by KP; following detailed design of potential crossings (pipeline, powerlines, conveyors and roads), the floodlines for the post-development situation should be updated. This has particular relevance to the Southern portal and the DMS stockpile, which currently fall within the natural (pre-development) riparian zone.

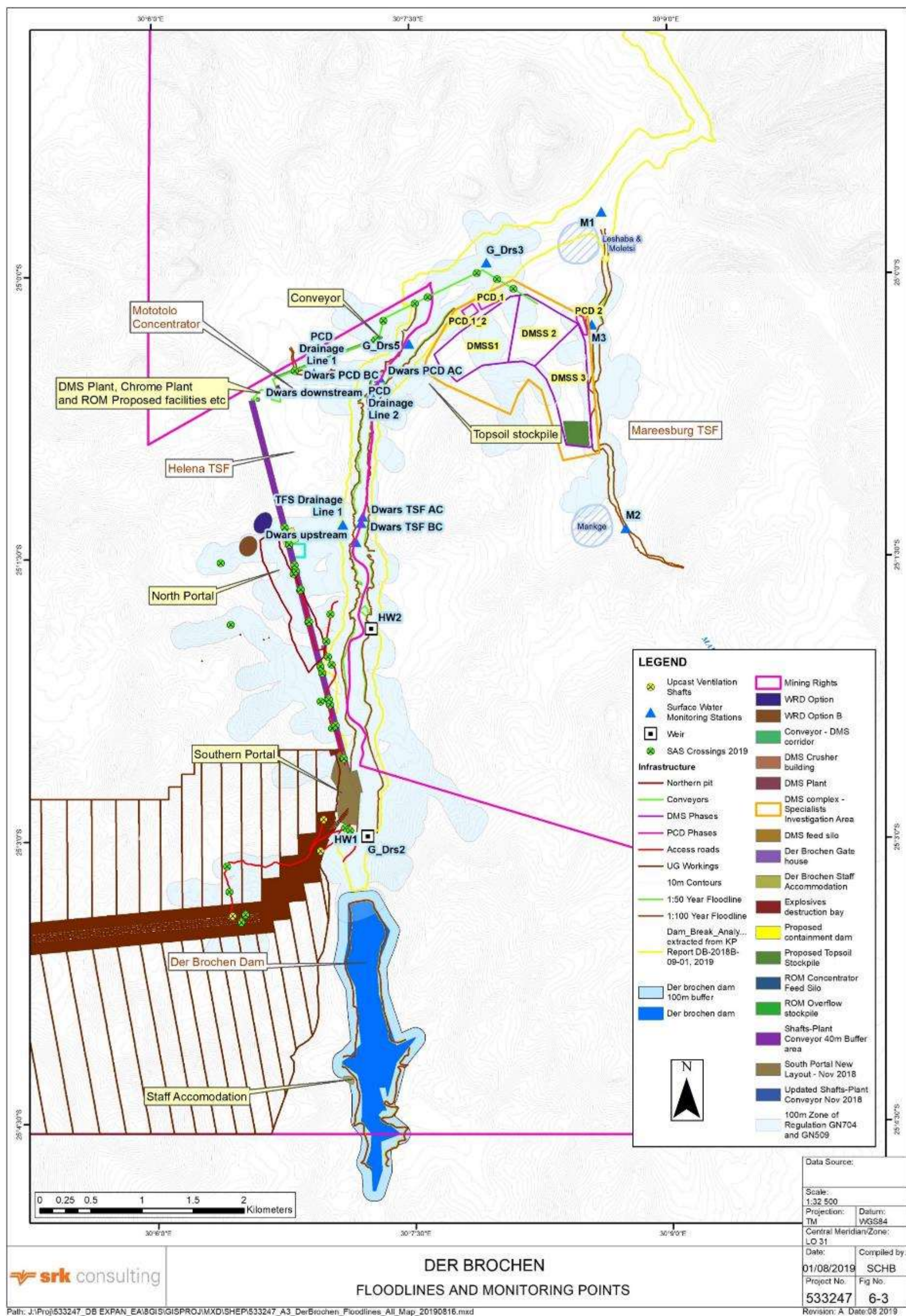


Figure 9-9: Der Brochen Amendment Project's associated watercourses and floodlines

9.5.4 Surface Water Quality

Monthly surface water quality monitoring is undertaken in the Der Brochen project area by Groundwater Consulting Services (GCS). Additional information was provided by Delta-H, 2019 and GCS, 2019. The monitoring point locations are indicated in Table 9-10 with the relative locality of the monitoring points in the area of the proposed infrastructure indicated. G-Drs 5 is located at the upstream flow monitoring weir HW1. The downstream monitoring station (G-Drs3) is located in line with the proposed DMS stockpile.

Three new surface water monitoring points (M1, M2 and M3) were included on the Mareesburg Stream in 2017, in compliance with the 2017 WUL, to monitor any impacts associated with current construction and future operation of the Mareesburg TSF. These are also located up and downstream of the proposed DMS Stockpile.

Table 9-10: Surface water monitoring points from south (upstream) to north (downstream) of the Der Brochen Project Area

Site Name	River Name	Latitude (X co-ord)	Longitude (Y co-ord)	Site description (new points are indicated with date of initiation)
Groot-Dwars Catchment				
G_Drs2	Groot-Dwars River	-25.04964	30.12057	Groot Dwars upstream at weir HW1 (but downstream of the Der Brochen Dam). Located Upstream of the Proposed Southern Portal.
Dwars upstream		-25.02360	30.11963	Surface water upstream of current operations and Helena TSF drainage line. (West of North Open Pit and downstream of HW2)
TSF Drainage Line 1	TSF Drainage line	-25.02206	30.11835	Downstream (south) of the Helena TSF along the Der Brochen access road; initiated June 2015. Drainage line is located to the north of the planned North Open Pit.
Dwars upstream TSF BC	Groot-Dwars River	-25.02192	30.12013	Surface water upstream of TSF drainage line; initiated October 2016
Dwars downstream TSF AC		-25.02137	30.12029	Surface water downstream of TSF drainage line; initiated October 2016
Dwars downstream		-25.01064	30.12122	Surface water downstream of existing operations (Helena TSF etc) but upstream of PCD drainage line at the Mototolo Concentrator
PCD Drainage Line 1	PCD Drainage Line	-25.00864	30.11565	Surface water drainage line downgradient of the existing PCD at the Mototolo Concentrator; initiated June 2015
PCD Drainage Line 2		-25.00888	30.12093	Surface water drainage line downgradient of the existing PCD at the Mototolo Concentrator; initiated June 2015.
Dwars upstream PCD	Groot-Dwars River	-25.00998	30.12193	Surface water upstream of PCD drainage line; initiated October 2016. (Upstream of the Mototolo Concentrator activities)
Dwars downstream PCD AC		-25.00907	30.12201	Surface water downstream of PCD drainage line; initiated October 2016. (Downstream of the Mototolo Concentrator activities)
G_Drs5		-25.00608	30.12488	Groot Dwars River downstream of the Mototolo Concentrator. (Immediately downstream of

Site Name	River Name	Latitude (X co-ord)	Longitude (Y co-ord)	Site description (new points are indicated with date of initiation)
				proposed Topsoil stockpile but pstream of proposed DMS stockpile and the proposed PCD's)
G_Drs3		-24.99895	30.13244	Downstream of G_Drs5 before the confluence of the Groot Dwars River and the Mareesburg Stream. (Located adjacent to the proposed DMS stockpile)
G_Drs4		-24.96257	30.13767	Groot Dwars about 5.2 km downstream of confluence with the Mareesburg Stream
Mareesburg Catchment				
M1		-24.99450	30.14362	Mareesburg Stream before the confluence with the Groot Dwars River. Downstream of the Mareesburg TSF.
M3	Mareesburg Stream	-25.00446	30.14262	Immediately downstream of the Mareesburg TSF and RWD, within the Mareesburg Stream. (Adjacent to the proposed PCD2 for Phase 3 of the DMS Stockpile)
M2		-25.02252	30.14583	Upstream of the Mareesburg TSF and RWD, within the Mareesburg Stream. (Also located upstream of the proposed DMS Stockpile)
Dwars River (DWS monitoring station)				
B4H009	Dwars River	-24.91205	30.10327	DWS Monitoring Station located after the confluence of the Groot-Dwars and Klein Dwars Rivers

Note: Monitoring positions on the Klein-Dwars River are excluded from the above table as the proposed activities are located within the Groot-Dwars and Mareesburg Stream catchments

Water quality guidelines and limits

Water quality monitoring data are compared to the WUL quality limits, SAWQG (DWAf, 1996) for general fitness for use and SANS241:2015 to assess potential health impacts if the water were to be used for drinking purposes.

The quality component of the EcoSpecs provided for EWR Site 9, located on the Steelpoort River downstream of the confluence with the Dwars River, as provided in the reserve determination for the water resources for the Olifants and Letaba Catchments (Government Gazette No 41887, No 932, 2018), is included for comparison. These limits are presented together with the median and 95th percentile of the surface water quality data obtained in Table 9-11.

Pre-mining quality data

The pre-mining baseline water quality data is extracted from the IWWMP Report, (SRK 527471, 2018). The pre-mining surface water quality was determined through sampling at various locations along the Groot Dwars River. The general water quality profile in the site area, obtained during surveys in 2001 and 2002, was described as very good with pristine conditions prevailing. The water is suited for all uses if compared against the SAWQG (DWAf, 1996) and the SANS 241, 2015 for drinking water (excluding bacterial content). The water quality profile also revealed limited temporal variation over these periods (Eco-Risk and ERM, March 2006).

Long term and current data

The water quality upstream of mine activities in the Groot-Dwars River, as represented by the water quality at the monitoring points G_Drs2 and Dwars Upstream (u/s), remains of good quality with all concentrations reportedly below the guidelines and limits used for comparison.

The water quality upstream of the Mareesburg TSF, represented by the water quality at the monitoring point M3, comprises naturally higher concentrations of calcium magnesium and alkalinity. Whilst concentrations of calcium (95th percentile) are elevated above the WUL limit; these concentrations are well below the SANS 241-2015 and EWR 9 PEC and REC concentrations. The calcium/magnesium dominance for the cations is most likely due to the underlying geology with magnesium and calcium rich gabbroic norites (Delta-H, 2019). Due to the low concentrations observed in the rivers, and based on the selected analyses considered, these concentrations are unlikely to represent a risk to water users.

The long term trends are presented in the Annual Water Quality Report submitted to DWS in March/April each year (GCS, 2018) and the median and 95th percentile data provided in Table 7-2 below. The data range is also provided in the table. Total dissolved solids (TDS), as a general indicator of overall water quality, has been assessed over the long term (May 2009 – November 2018) for the existing operations. The long term trend for TDS is provided in Figure 9-10. The spatial trend for total dissolved solids (TDS) along the Groot-Dwars River up and downstream of the proposed and existing operations is presented in Figure 9-11.

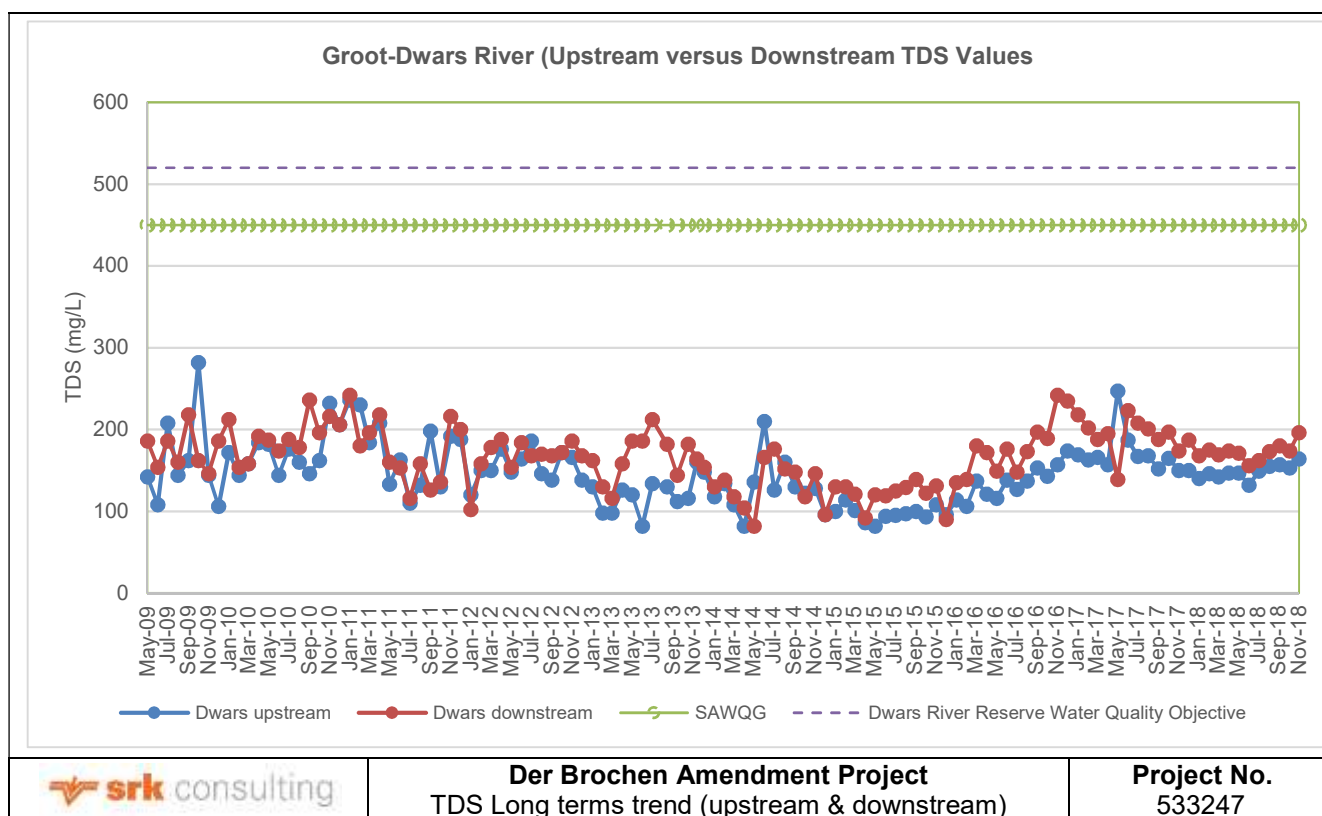


Figure 9-10: Long term trend for TDS up and downstream of current activities (Mototolo Concentrator)

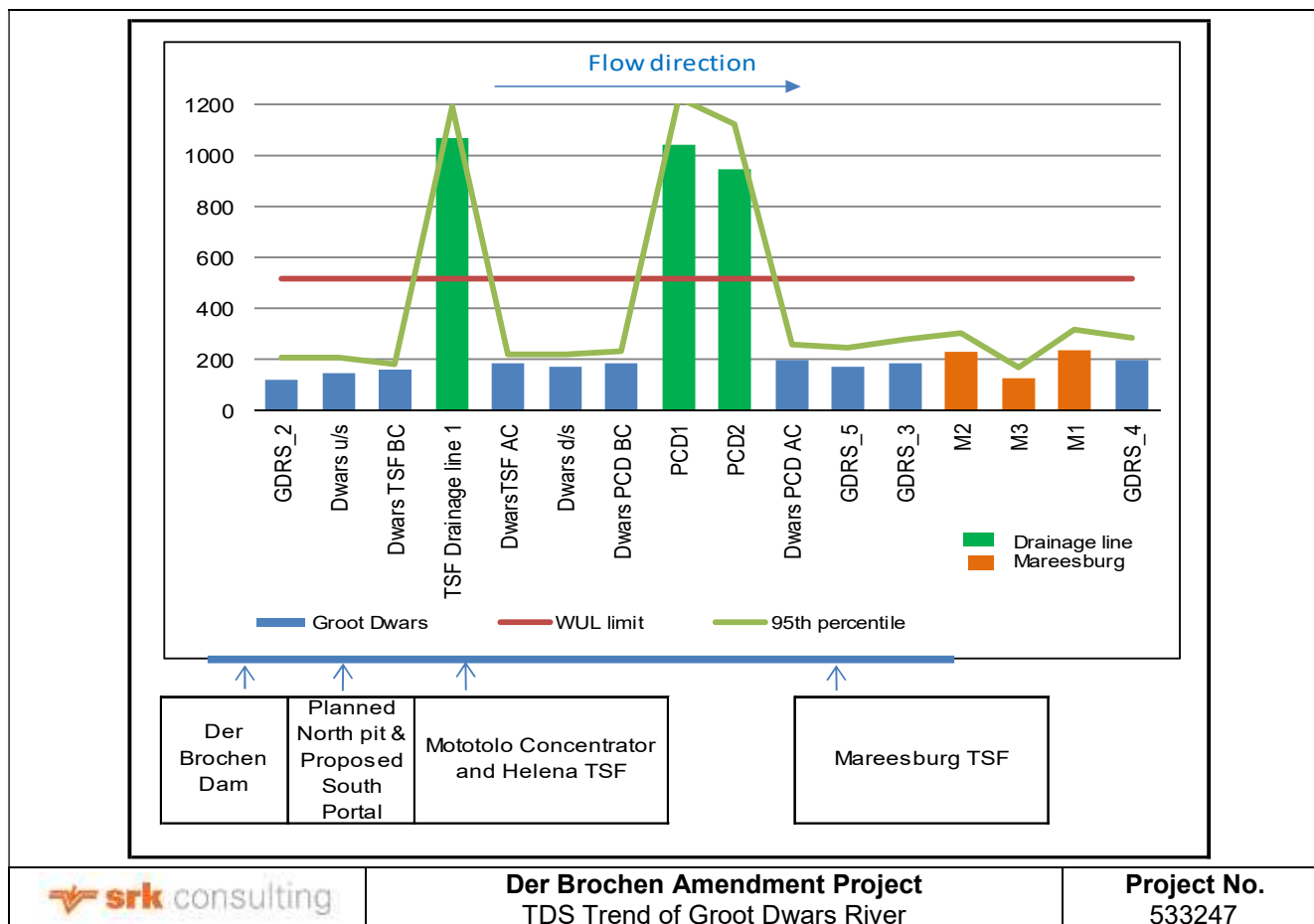


Figure 9-11: Spatial trend for the median and 95th percentile of TDS in mg/l along the Groot-Dwars River

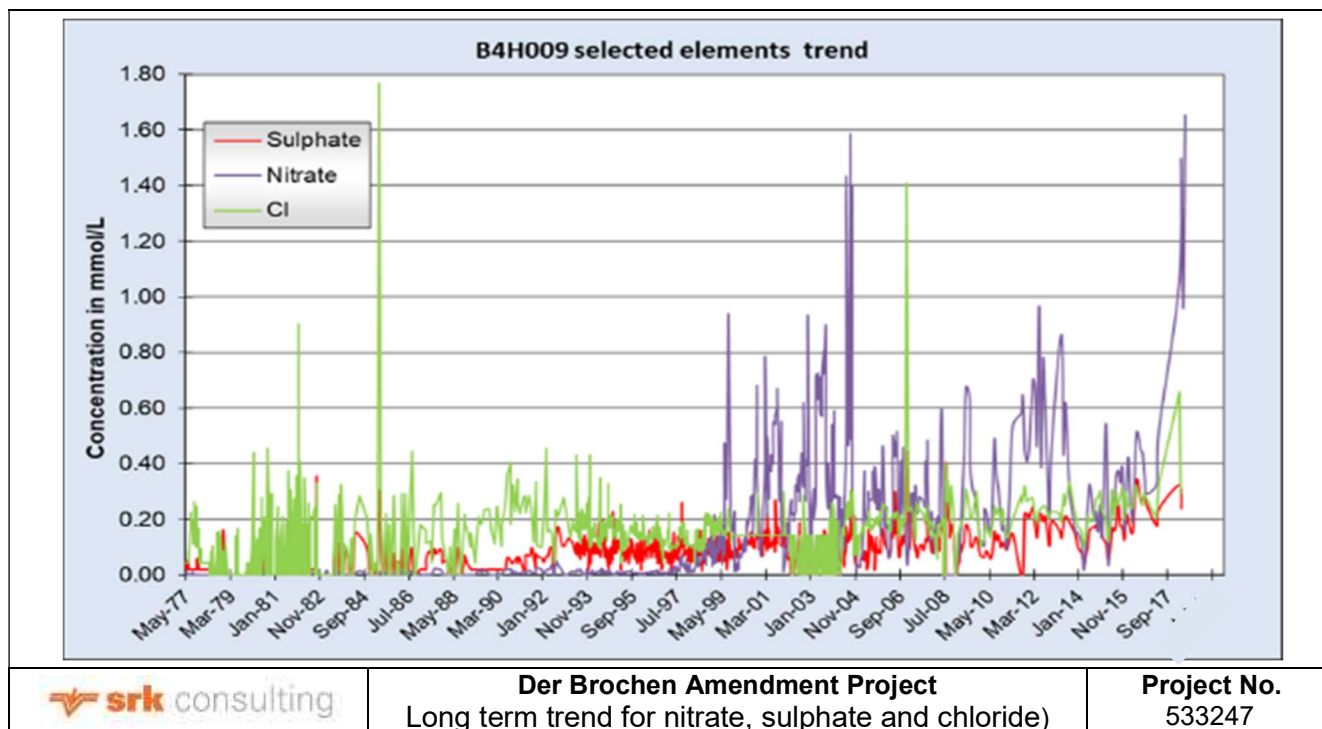


Figure 9-12: Long term trend for nitrate, sulphate and chloride at B4H009 downstream of the B41G catchment, graph extracted from Delta h, 2019

The assessment of the annual median water quality for 2018 against the WUL limits provided similar observations to those noted in 2017 as follows:

- Calcium, and occasionally magnesium, concentrations are naturally elevated above the WUL limit for calcium and magnesium of 25 mg/l but the 95th percentile data does not exceed the EWR 9 concentrations of 80 mg/l for calcium and 70 mg/l for magnesium.
- Sodium (95th percentile) concentrations exceed the WUL limit of 9 mg/l in the Mareesburg Stream (M2 and M3) and in the Groot-Dwars river following the confluence of the TSF Drainage line (Dwars River TSF AC, Dwars River Downstream (d/s), Dwars River PCD BC, G_Drs 5, G_Drs_3 and G_Drs4).
- Elevated concentrations were observed locally in the drainage lines downgrade of the the Mototolo Concentrator (PCD Drainage line 1 and 2) and the Helena TSF (TSF Drainage Line 1) which, although not included in Table 7-2, comprise higher concentrations of salinity (TDS of around 1 110 mg/l) due to elevated concentrations of sodium, chloride, sulphate, and nitrate. The low flows of the tributaries are largely assimilated into the Groot Dwars River but it is noted that salinity is slightly higher after the respective confluences (95th percentile for TDS of <210 mg/l at Dwars u/s compared to around 280 mg/l as G_Drs3). This is presented by the TDS profile along the river in Figure 9-11.

Delta-H, 2019, sourced data from the DWS gauging station B4H009 located on the Dwars River downstream of the confluence of the Groot-Dwars and Klein-Dwars rivers. Delta H stated that: "The deterioration of water quality observed at the DWS B4H009 gauging and water quality monitoring station downstream of the B41G catchment can be attributed to a number of mining related sources within the catchment. Both nitrate and sulphate are associated with contaminants emanating from mine residue deposits, PCDs and other process water facilities, which also tend to increase chloride (evaporative and/or the discharge of deeper mine water). The long-term trend for nitrate, sulphate and chloride, supplied by Delta H, are included in Figure 9-12 for reference.

Table 9-11: Surface water quality for the Groot Dwars and Mareesburg Stream

Analytical Variable (mg/L unless specified)	Limits and Guidelines				Mareesburg Stream						From upstream (left) to downstream (right) along the Groot-Dwars River																					
	SAWQG Target Values	SANS 241-2015	EWR 9 Steelpoort EcoSpec: PES and REC	WUL Limit	M3		M2		M1		G_Drs 2		Dwars River u/s		Dwars River TSF BC		Dwars River TSF AC		Dwars River D/s		Dwars River PCD BC		Dwars River PCD AC		G_Drs 5		G-Drs 3		G-Drs 4			
					Median	95 th	Median	95 th	Median	95 th	Median	95 th	Median	95 th	Median	95 th	Median	95 th	Median	95 th	Median	95 th	Median	95 th	Median	95 th	Median	95 th	Median	95 th	Median	95 th
					Dec16- Dec18	Dec16-Dec18	Feb07-Dec18	Feb07-Dec18	May09-Dec18	Sep16- Nov18	Sep16- Nov18	May09-Dec18	Sep16- Nov18	Sep16- Nov18	May09-Dec18	Sep16- Nov18	Sep16- Nov18	Jun09-Dec18	Feb07-Dec18	Feb07-Dec18												
pH Value @ 20°C	6.0-9.0	5.0-9.7	5 to 10*	5 - 9.5	8.3	8.6	8.4	8.7	8.3	8.7	8.0	8.4	8.2	8.5	8.3	8.5	8.3	8.6	8.1	8.5	8.3	8.6	8.3	8.6	8.2	8.6	8.1	8.5	8.2	8.6		
Conductivity mS/m @ 25°C	70	170	≤ 85 mg/L	NLG	20	30	39	49	35	52	18	23	21	28	24	27	26	33	25	32	26	36	27	39	25	35	27	39	29	42		
Total Dissolved Solids	450	NLG	NLG	520	125	168	230	305	240	317	124	206	144	209	161	182	189	222	170	218	185	232	196	259	174	246	188	278	199	286		
Calcium, Ca	32	NLG	≤ 80 mg/L	25	19	26	31	40	26	37	18	23	21	26	25	27	29	34	25	31	28	37	29	40	25	32	26	36	26	35		
Magnesium, Mg	30	NLG	≤ 70 mg/L	25	16	22	39	52	28	51	11	14	13	16	14	16	16	19	15	18	16	20	17	22	15	20	16	22	19	29		
Sodium, Na	100	200	≤ 115 mg/L	9	6	8	9	11	8	12	5	7	6	9	6	7	7	10	7	10	7	10	8	12	7	12	7	12	7	12		
Potassium, K	50	NLG	NLG	46.0	0.6	1.5	0.7	1.6	0.5	1.6	0.7	2.1	0.8	1.8	1.0	2.1	1.0	1.7	0.8	1.9	0.9	1.4	1.0	1.8	0.7	1.7	0.8	1.7	0.7	1.7		
Total Alkalinity as CaCO ₃	NS	NLG	NLG	NLG	121	164	225	294	180	281	92	121	106	138	121	136	127	141	112	146	129	144	129	149	114	148	117	152	133	185		
Chloride, Cl	100	300	≤ 175 mg/L	62	4	6	6	8	5	10	3	7	3	7	4	6	7	11	5	9	6	11	7	14	6	14	6	15	6	14		
Sulphate, SO ₄	200	500	≤ 250 mg/L	70	4	8	9	14	9	17	4	8	6	14	7	13	19	34	13	25	15	30	20	47	14	29	14	31	12	29		
Nitrate as N	6.0	11.0	< 4 mg/L of TIN**	6.0	0.3	1.1	0.4	1.2	0.4	1.6	0.4	1.2	0.5	1.6	0.5	1.0	0.5	1.0	0.5	1.3	0.5	0.9	0.6	1.1	0.5	1.9	1.4	5.2	1.0	4.3		
Fluoride, F	1.0	1.5	≤ 3.52 mg/L	NLG	0.3	0.3	0.3	0.3	0.2	0.7	0.1	0.4	0.1	0.6	0.3	0.3	BD	0.2	0.1	0.7	0.3	0.3	BD	BD	0.1	0.5	0.1	0.6	0.1	0.6		
Chemical Oxygen Demand		NLG	NLG	NLG	25	77	27	69	24	79	20	62	42	60					48	72					25	71	22	72	26	67		
Suspended Solids	NLG	NLG	NLG	NLG	8	30	14	29	10	55	8	31	5	16					6	41					9	63	9	46	9	111		
Iron	0.1	NLG	NLG	NLG	0.05	0.1	0.02	0.02	0.15	0.52	0.07	0.3	0.08	0.2					0.08	0.2					0.08	0.2	0.08	0.3	0.1	0.3		
Managenese	0.05	NLG	NLG	NLG									0.01	0.08	0.01	0.01			0.01	0.04			BD	BD								

Shaded: exceeds WUL **Bold:** exceeds SANS241:2015 **Red:** exceeds EWR 9 (none) **NGL:** No limit given **BD:** Below detection **Blank cells:** No data

NOTE: The Steelpoort River Ecological Water Requirement (EWR) (Olifants EWR9 – Steelpoort) EcoSpec: PES and REC limits are based on the 95th percentile for all except pH which the range is indicated as between the 5th to 95thpercentiles and nitrate where the EWR is provided for 50% percentile of TIN (Total Inorganic Nitrogen)

9.6 Groundwater

NOTE: A geohydrological specialist study was conducted as part of the impact assessment phase. The information contained in this section of the EIA/EMPr report is sourced from the Geohydrological specialist study attached as Appendix D1.

The Der Brochen Mine Project (and associated farms) falls within quaternary catchment (B41G), where numerous other mining activities and water authorisations /uses occur. The groundwater use within the catchment at present is estimated at 2.9 ML/d (1.06 Mm³/a), excluding the current and future Der Brochen Project authorization/demand. Due to the high groundwater contribution to baseflow within the catchment, the groundwater Reserve is set at 17.78 ML/d (6.49 Mm³/a), while the average groundwater recharge (input) is 42.9 ML/d (15.66 Mm³/a).

While a surplus recharge (inflow of 19.61 ML/d or 7.16 Mm³/a) exists for allocation, most of the groundwater potential (availability) is limited to the valley bottoms and hillslopes of the Groot- and Klein Dwars Rivers.

9.6.1 Groundwater levels

The groundwater levels were collated from the Der Brochen monitoring programme as well as the hydrocensus. Average groundwater levels of around 6 mbgl in the area reflect shallow water levels within the upper weathered aquifer. Based on the distribution diagram (Figure 9-13), only a few deeper water levels within the fractured bedrock aquifer were observed.

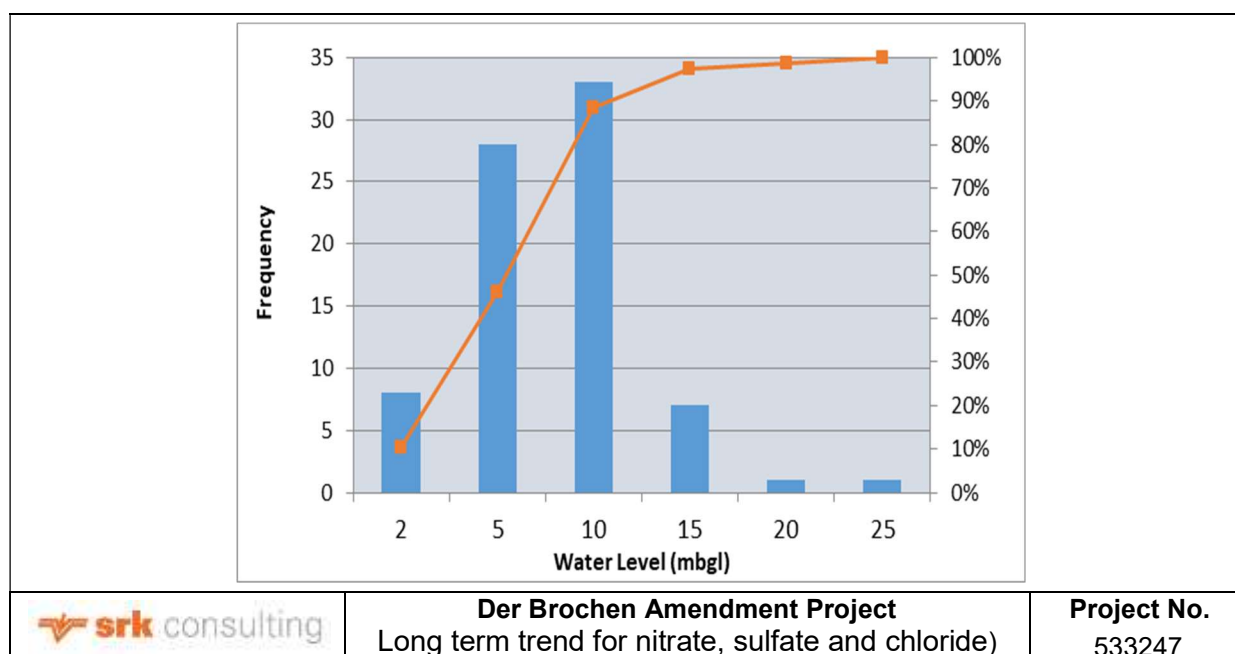


Figure 9-13: Frequency distribution of water levels within the project area (Delta H, 2019)

The potentiometric surface therefore mimics surface topography, and regional groundwater flow is from higher lying ground towards lower lying valleys, where it accumulates in the alluvial deposits and contributes potentially to river baseflow. Note that local flow patterns may differ due to the fractured and partially compartmentalised nature of aquifers in the area.

9.6.2 Aquifer characterisation

Primary aquifers are present in locally distributed unconsolidated alluvial sediment deposits along the lower reaches of the Klein-Dwars River, Groot-Dwars River and Mareesburg stream. Alluvial sediment development in the Groot-Dwars valley consists of mixed boulders, cobbles, gravel and sand. In

general, the thickness is less than 6 m due to recent active channel incision and erosion, although remnant pockets of sediment may exceed this. Lateral distribution of the alluvial sediment in the Groot-Dwars River is restricted to the immediate banks of the current active channel (SRK, 2012).

These aquifers provide groundwater storage and recharge to the underlying secondary weathered bedrock aquifers with which they are in hydraulic continuity, as well as interacting and contributing to the baseflow of the main rivers. Due to their limited size and/or probable low transmissivity and connectivity to the river baseflow, the primary aquifers are not considered suitable groundwater production targets (SRK, 2012).

Due to their generally limited distribution in the Groot-Dwars River valley, these aquifers have limited extraction potential. They do interact and provide a baseflow contribution to the main rivers of the catchment. They are classified as Minor Aquifer Systems (SRK, 2012).

According to the Hydrogeological Map (1:500 000) series, the regional hydrogeology is characterized as an 'intergranular and fractured aquifer' with a typical potential yield of 0.1 to 2.0 litres per second (Figure 9-14).

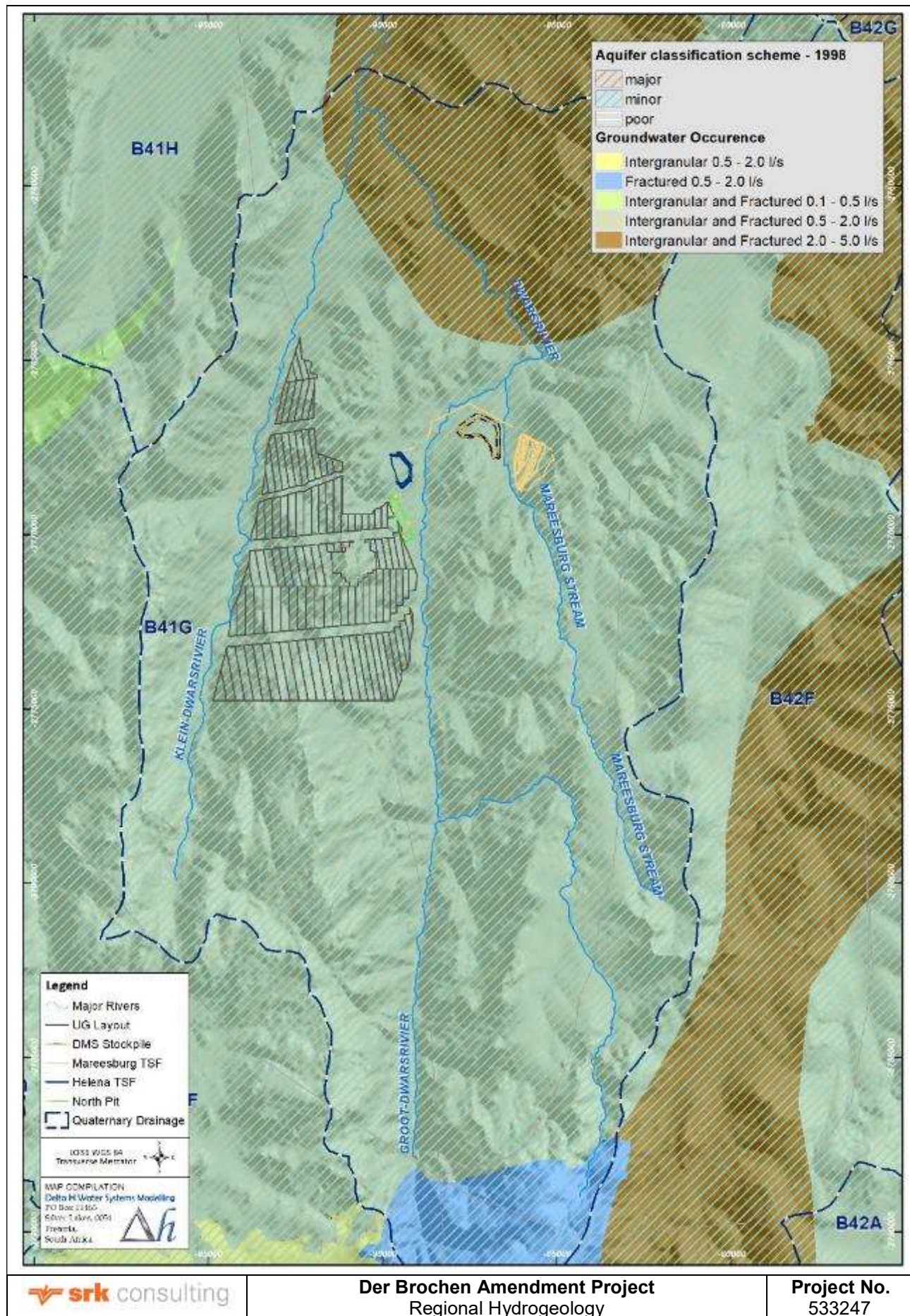


Figure 9-14: Project area's aquifers (Delta H, 2019)

A micro-fractured matrix in the fractured aquifers provides the storage capacity with limited groundwater movements, while secondary features such as fractures / faults and bedding planes enhance groundwater flow. The intergranular aquifer is associated with the weathered zone, river alluvial and quaternary sand deposits. Despite a relatively low groundwater potential classification for the region, the extensive drilling programmes throughout the Upper Dwars-River catchment achieved median and average blow yields of 1.8 and 3.6 l/s respectively (Delta-H, 2014). Based on the aquifer classification map (Parsons and Conrad, 1998), the aquifer system underlying the site is regarded mainly a “minor aquifer”(Figure 9-14). A summary of the classification scheme is provided in Table 9-12. In this classification system, it is important to note that the concepts of Minor and Poor Aquifers are relative and that yield is not quantified. Within any specific area, all classes of aquifers should therefore, in theory, be present.

Table 9-12: Aquifer Classification Scheme

Aquifer	Description
Sole source aquifer	An aquifer used to supply 50% or more of urban domestic water for a given area, for which there are no reasonably available alternative sources, should this aquifer be impacted upon or depleted.
Major aquifer region	High-yielding aquifer of acceptable quality water.
Minor aquifer region	Moderately yielding aquifer of acceptable quality or high yielding aquifer of poor-quality water.
Poor aquifer region	Insignificantly yielding aquifer of good quality or moderately yielding aquifer of poor quality, or aquifer that will never be utilised for water supply and that will not contaminate other aquifers.
Special aquifer region	An aquifer designated as such by the Minister of Water

9.6.3 Groundwater Levels

The groundwater levels were collated from the Der Brochen monitoring programme as well as the hydrocensus. Average groundwater levels of around 6 mbgl in the area reflect shallow water levels within the upper weathered aquifer. Based on the distribution diagram (Figure 9-15), only a few deeper water levels within the fractured bedrock aquifer were observed.

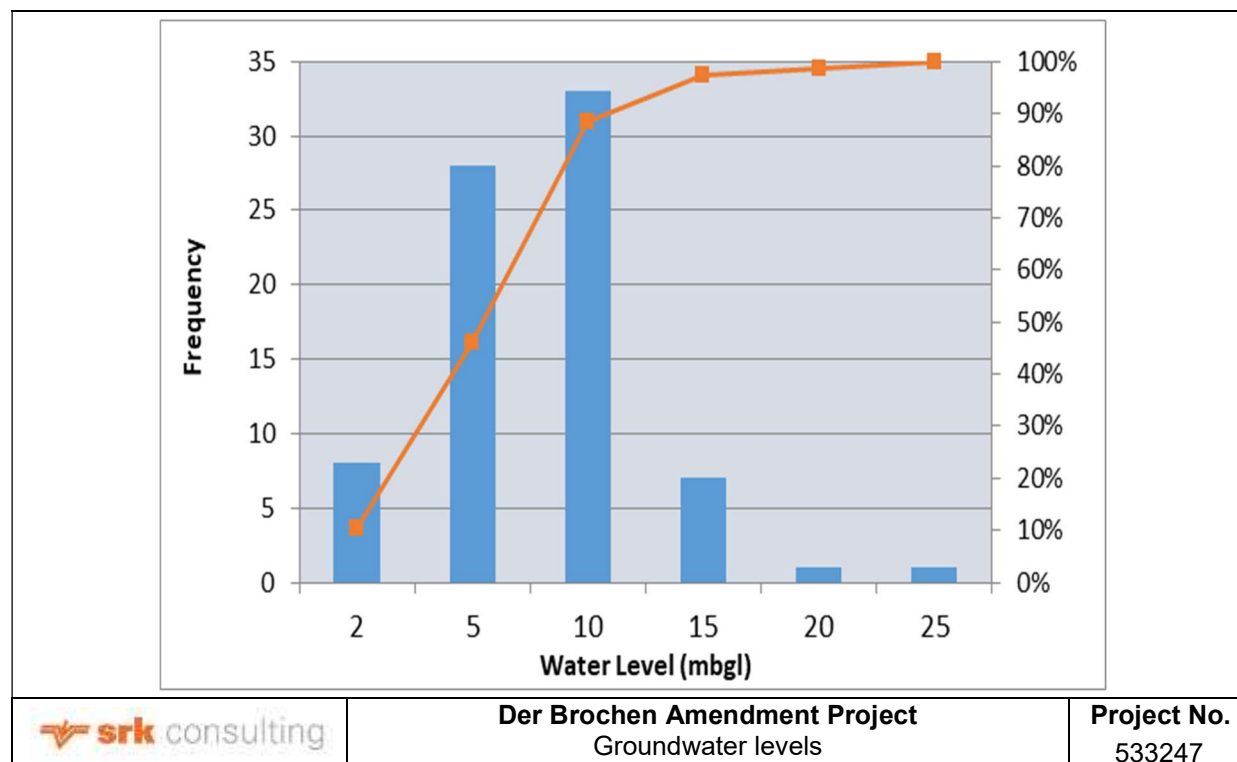


Figure 9-15: Groundwater Levels (Delta H, 2019)

9.6.4 Surface and Groundwater interaction

Groundwater contributes to baseflow throughout the lower Dwars River catchment via sub-surface seepage into surface water courses. The Groot- and Klein-Dwars River floodplain is characterised by a relatively thick alluvial layer either replacing the upper overburden/weathered aquifer or overlying the upper overburden/weathered aquifer. The alluvial and overburden/weathered aquifer is largely in hydraulic continuity, while the regional (deeper fractured) aquifer only exchanges water with the river indirectly via the alluvial and/or the weathered aquifer. Where the alluvium/weathered aquifers are lacking, surface-groundwater exchange may occur directly from the regional aquifer via discrete fault or fracture zones linking it to the river. Recharge in the alluvial aquifer is primarily from the rivers during high flow periods and direct rainfall. Recharge of the shallow overburden/weathered aquifer is from the alluvium, interflow along the interface between overburden and weathered bedrock in the lower and mid-slopes of the valley side, as well as groundwater flow along the upper weathered portion of the bedrock across the catchment. A conceptual illustration of the hydrogeological setting of the Der Brochen underground workings is shown in Figure 9-16.

The surface-groundwater exchange between the alluvium and the Groot- and Klein-Dwars River occurs on a far shorter time scale in comparison to the interaction between the regional and alluvial/weathered aquifers. Surface-groundwater interaction is strongly seasonal, as both effluent / influent conditions can occur depending on the recharge period of the alluvium. This is illustrated in the weir hydrographs for both the Helena (HW1, HW2) gauging stations. The flow monitoring weirs have been installed to assess the impact on flow due to the Helena wellfield development for the Der Brochen Project which has not been yet been fully developed⁹. The average flow volume 2018 (oct-12 to Sep-18) is estimated as 4.9 Mm³/a at HW1 and 4.2 Mm³/a at HW2, which is slightly lower compared to the long-term median of 5.6 Mm³/a and 4.5 Mm³/a, respectively. This is largely in response to the lower rainfall for the year

⁹ Groundwater abstraction is currently limited to "pilot scale" of one borehole.

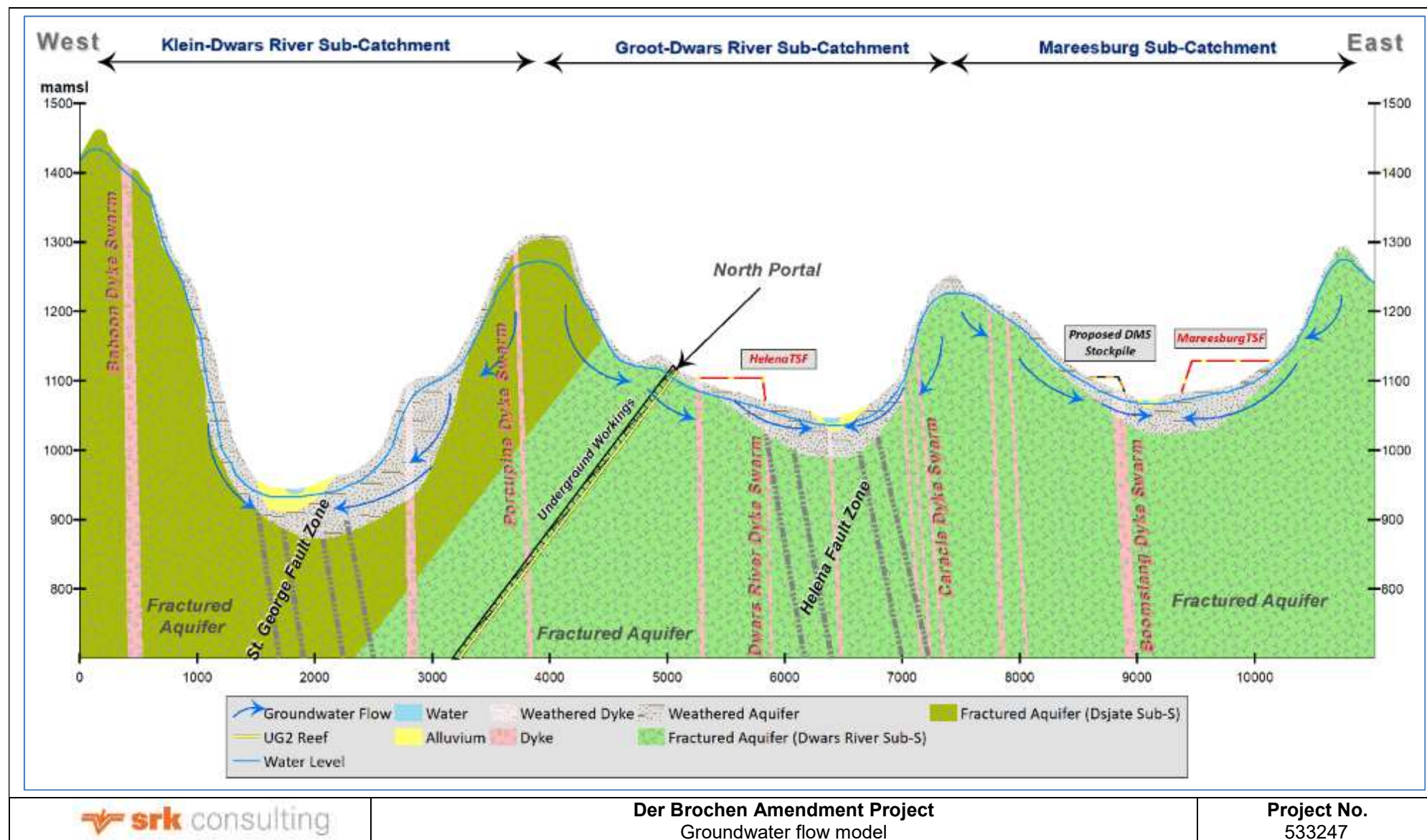


Figure 9-16: Conceptual regional groundwater flow model for the Der Brochen Project

9.6.5 Groundwater flow

The major flow paths in the study area are within the upper shallow overburden/weather aquifer, while the fracture zones and dykes across the site act as preferential flow paths for contaminants to travel. It is expected that contamination of the deeper aquifer will be limited due to limited hydraulic connectivity between the shallow and deep aquifers. Flow and transport are furthermore compartmentalized by the more competent dyke structures at depth.

9.6.6 Groundwater quality

An overview of the median concentrations of selected elements for the various monitoring sites (areas) since monitoring commenced is given in Table 9-13 below.

Table 9-13: Median concentrations for selected elements of the Der Brochen monitoring sites

Monitoring Site	Mon. Type	pH	EC	TDS	Ca	Mg	Na	K	HC O ₃	Cl	SO ₄	NO ₃
RWDA	Process Water	7.7	199	136 3	69	56	217	27	255	112	351	339
RWDB		8.1	165	112 0	84	54	188	13	228	142	419	7.8
SW01		8.1	154	107 8	135	75	114	2	534	116	275	7.6
SW02		8.3	157	114 4	106	89	122	1	343	143	363	1.5
PCD		7.9	146	107 5	128	71	75	5	255	98	307	128
PCD Drainage Line 1	Tributaries	8.2	141	102 8	139	88	74	2	309	95	350	55.6
PCD Drainage Line 2		8.3	134	946	124	78	78	1	285	96	355	27.4
TSF Drainage Line 1		8.3	144	105 7	175	87	52	1	279	118	457	6.0
Mototolo BH	Ground-water	7.9	131	884	117	63	81	1	476	98	151	3.1
Mareesburg BH		7.8	59	340	39	62	11	1	550	7	25	1.5
Der Brochen BH		7.7	55	320	58	35	16	1	348	6	9	1.0
Mareesburg River	Surface Water	8.3	25	156	24	21	7	1	174	5	7	1.2
Klein Dwars River		8.2	27	193	30	16	7	0	178	2	3	1.3
Groot Dwars River		8.2	26	182	24	16	7	1	138	5	9	2.4
Dwars River US		8.2	21	144	21	13	6	1	126	3	6	2.0
Dwars River DS		8.1	25	169	25	15	7	1	133	5	13	2.4
Dwars River PCD BC		8.3	27	185	28	16	7	1	158	6	16	2.3
Dwars River PCD AC		8.3	27	196	29	17	8	1	160	7	21	2.8
Dwars River TSF BC		8.3	23	160	24	14	6	1	145	4	7	2.2
Dwars River TSF AC		8.3	26	187	29	16	7	1	152	7	19	2.3

The groundwater type is generally calcium / magnesium – bicarbonate (Ca/Mg-HCO₃) rich, which is typical of shallow groundwater in the Bushveld Complex (BC). The magnesium and calcium dominance for the cations can be directly linked to the underlying geology (with magnesium and calcium rich gabbroic norites), while the bicarbonate anion dominance of the samples indicates

relatively young or fresh groundwater in equilibrium with carbon-dioxide in the atmosphere and soil zone.

Compared to the Klein- and Groot-Dwars River catchments, the Mareesburg catchment is characterised by a higher contribution of magnesium, which can be distinguished on a Piper Diagram (Figure 9-17). A more sodium (Na) rich water type is observed in a few boreholes in the Groot-Dwars sub-catchment, where the sodium replaces the calcium and magnesium in solution.

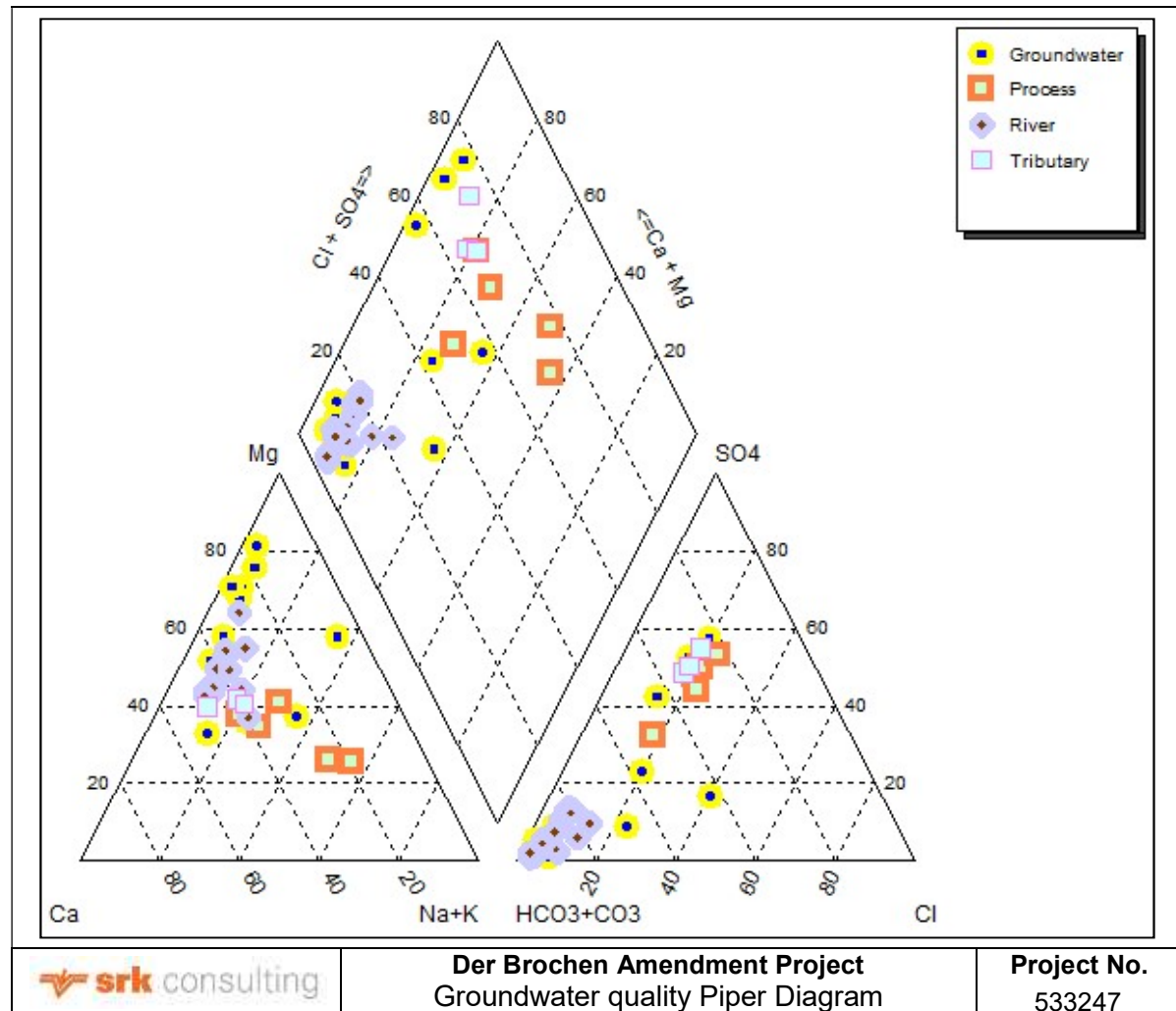


Figure 9-17: Groundwater quality Piper Diagram

9.7 Biodiversity

NOTE: A biodiversity specialist study was conducted as part of the impact assessment phase. The information contained in this section of the EIA/EMPr report is sourced from the biodiversity specialist study attached as Appendix D5.

The proposed project area is predominantly located in areas of high biodiversity and increased sensitivity. The Der Brochen Amendment Project area has four defined habitat units (Figure 9-18). These habitat units are:

- Freshwater Resources;
- Open Bushveld;
- Sekhukhune Mountain Bushveld; and
- Transformed areas.

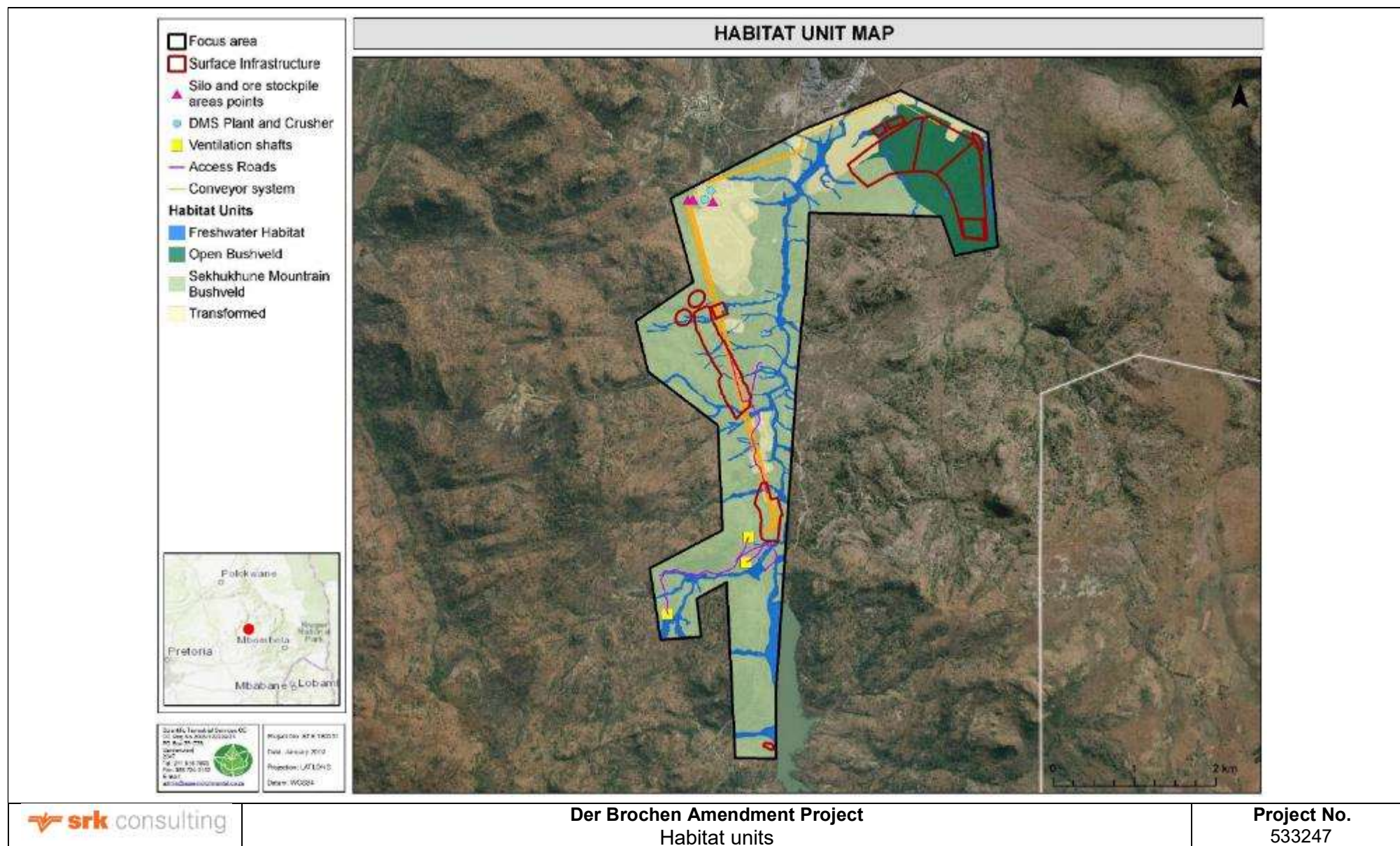


Figure 9-18: Conceptual illustration of the habitat units within the Der Brochen Amendment Project area

Refer to Table 9-14 for the sensitivities of each of the identified habitat units. The Sekhukhune Mountain Bushveld, Open Bushveld and Freshwater areas are located in areas of high diversity and increased sensitivity.

Table 9-14: A summary of the sensitivity of each habitat unit (STS, 2019)

Habitat Unit	Sensitivity	Development Implications
Freshwater Habitat Unit	High	The Freshwater Habitat Unit is of high ecological sensitivity and if any activities are to infringe upon this habitat unit there is likely to be a significant impact on floral Species of Conservation Concern (SCC) as well as the diverse floral communities associated with this habitat unit. If it is impossible to avoid placement of infrastructure within this habitat unit, the disturbance timeframes and footprint must be minimised, and any disturbed areas must be rehabilitated.
Open Bushveld Habitat Unit	High	The Open Bushveld Habitat Unit, with its high floral diversity and association with a high abundance of floral SCC, is considered to be of high ecological importance and sensitivity. This habitat unit remains largely undisturbed; however, edge effects from surrounding mining activities are evident and is compromising the habitat integrity of this habitat unit. Therefore, it is important that mining activities be restricted within this habitat unit, particularly within areas where floral diversity remains high e.g. where rocky outcrops are present. Due diligence must be taken to ensure that current and further edge effects are effectively mitigated. Permits should be obtained from LEDET and DAFF to remove, cut or destroy any protected species before construction of infrastructure takes place.
Sekhukhune Mountain Bushveld Habitat	High	From a floral perspective, the Sekhukhune Mountain Bushveld Habitat Unit is of high ecological sensitivity and importance. This habitat unit has the highest diversity of floral SCC; however, these species occur sporadically throughout the habitat unit, many of which being associated with the rockier habitats. The majority of the focus area falls within this habitat unit, which is considered to be in a natural, near-pristine state. As such, all proposed mining activities must be restricted to the project footprint area and these areas must remain as small as possible. Due diligence must be taken to ensure that edge effects are effectively mitigated. Permits should be obtained from LEDET and DAFF to remove, cut or destroy any protected species before construction of infrastructure takes place.
Transformed	Low	Any new development in this habitat unit must be optimised and limited to the existing disturbance footprint. Care must be taken to limit edge effects on the surrounding natural areas.

9.7.1 Flora

Floral Species of Conservation Concern Assessment

Threatened/protected species are species that are facing a high risk of extinction. Any species classified in the IUCN categories Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) is a threatened species. Furthermore, SCC are species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare and Declining.

The following protected species listed under the National Forest Act (Act 84 of 1998) were observed within the project related area during the baseline field assessment in November 2018:

- *Balanites maughamii* (Torchwood);
- *Catha edulis* (Bushman's tea);
- *Lydenburgia cassinoides* (Sekhukhuni bushman's tea); and
- *Sclerocarya birrea subsp. caffra* (Marula).

In terms of this act, protected tree species may not be cut, disturbed, damaged or destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold - except under licence granted by the DAFF a delegated authority. Applications for such activities should be made to the responsible official in each province. Each application is evaluated on merit (including field assessments) before a decision is taken whether or not to issue a licence (with or without conditions). Such decisions must be in line with national policy and guidelines.

Additionally, several species listed as protected under the LEMA (Act 7 of 2003) were observed during the field assessment namely:

- *Huernia sp.* (types of field succulent plant);
- *Jamesbrittenia macrantha* (Purple phlox);
- *Scadoxys puniceus* (Paintbrush lily).

If individuals or communities of these species will be disturbed by construction/operational activities, they must be relocated to suitable, similar habitat in close proximity to where they were removed from, but outside the disturbance footprint after obtaining the relevant permits from the Limpopo Department of Economic Development, Environment and Tourism (LEDET).

Alien and Invasive Plant Species

During the floral assessment, dominant alien and invasive floral species were identified and are listed in Table 9-15.

Table 9-15: Dominant alien vegetation species identified during the field assessment

Species	English name	NEMBA Category*
Succulents		
<i>Opuntia ficus-indica</i>	Prickly Pear	1b
<i>Agave americana</i>	Sisal	2
Trees/ shrubs		
<i>Melia azedarach</i>	Syringa	1b
<i>Flaveria bidentis</i>	Smelter's Bush	-
Forbs		
<i>Argemone ochroleuca</i>	Mexican Poppy	1b
<i>Bidens pilosa</i>	Common blackjack	NA
<i>Datura ferox</i>	Large Thorn Apple	1b
<i>Flaveria bidentis</i>	Smelter's bush	1b
<i>Jacaranda mimosifolia</i>	Jacaranda	1b
<i>Ricinus communis</i>	Castor-oil plant	1b
<i>Solanum elaeagnifolium</i>	Silverleaf bitter apple	1b
<i>Solanum mauritianum</i>	Bugweed	1b
<i>Tagetes minuta</i>	Tall khakiweed	NA
<i>Xanthium strumarium</i>	Large Cocklebur	1b
<i>Zinnia peruviana</i>	Redstar Zinnia	-
N/L = Not Listed and not categorised National Environmental Management: Biodiversity Act (Act 10 of 2004): Alien and Invasive Species Regulations, GN R864 of 2016: Category 1a – Invasive species that require compulsory control. Category 1b – Invasive species that require control by means of an invasive species management programme.		

Species	English name	NEMBA Category*
Category 2 – Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread.		
Category 3 – Ornamentally used plants that may no longer be planted. Existing plants may remain, except within the flood line of watercourses and wetlands, as long as all reasonable steps are taken to prevent their spread (Bromilow, 2001).		

From the above, it is clear that a low abundance and diversity of alien species occurs within the focus area. The majority of alien and invasive plant species was observed within disturbed areas. Alien species located in the focus area must be removed on a regular basis as part of maintenance activities according to the National Environmental Management: Biodiversity Act (Act 10 of 2004): Alien and Invasive Species Regulations, GN R 864 of 2016.

Medicinal Plant Species

Medicinal plant species are not necessarily indigenous species, with many of them regarded as alien invasive weeds. The table below presents a list of dominant plant species with traditional medicinal value, plant parts traditionally used and their main applications, which were identified during the field assessment. These medicinal species are all commonly occurring species and are not confined to the focus area.

A moderately high diversity of medicinal species is present with most of the species being common, widespread and not confined to the project related area Table 9-16. It is therefore unlikely that the proposed activities will pose a significant threat to medicinal species locally and regionally. If individuals or communities of these species will be disturbed by mining activities, they must be relocated to suitable, similar habitat in close proximity to where they were removed from, but outside the disturbance footprint after obtaining the required permits from the relevant departments.

Table 9-16: Dominant traditional medicinal floral species identified during the field assessment

Medicinal floral	Medicinal uses
Species <i>Agave americana</i> Name Sisal Plant parts used Sap	Sap can be taken internally in the treatment of diarrhoea & dysentery. The sap is antiseptic, diaphoretic, diuretic and a laxative. The plant itself is used in the treatment of indigestion, flatulence, constipation, jaundice and dysentery.
Species <i>Aloe marlothii</i> Name Mountain aloe Plant parts used Sap	Healing of sores.
Species <i>Balanites maughamii</i> Name Torchwood Plant parts used Stem bar, root bark	Used in ritual emetics. Bark is applied in the form of cutaneous implantations to strengthen the body. Fruits are lethal to freshwater snails and other organisms.
Species <i>Lydenburgia cassinoides</i> Name Sekhukhune Bushman's Tea Plant parts used Leaves, Bark	Various parts taken medicinally. General remedy. Stimulating effect when leaves are chewed or extract ingested as tea.
Species <i>Catha edulis</i> Name Bushman's tea Plant parts used Leaves	The plant is widely used against respiratory diseases. In tropical Africa and Arab countries it provides the habit-forming stimulant found in the leaves. The leaves are brewed as tea or chewed for this purpose. The effects include wakefulness and hyperexcitability, and suppressed hunger. In South Africa, this plant is regarded as a drug, since the drug cathinone, which is extracted from it, is listed in the Drug Act. It is however not widely used in this country, except by some groups of people from the Eastern Cape.
Species <i>Carissa bispinosa</i> Name Common Num - Num Plant parts used Fruit	Edible fruit and the berries are also used to make jams and jellies. Roots to treat toothache.

Medicinal floral	Medicinal uses
Species <i>Dichrostachys cinerea</i> Name Sickie Bush Plant parts used Roots, bark, leaves and fruit	Pods are very nutritious, and eaten by game and stock. The wood is hard and durable, used as fencing posts. Roots, bark, leaves and fruit used in traditional medicine.
Species <i>Euclea crispa</i> Name Blue Guarri Plant parts used Roots	Ripe berries are edible. Root infusions are used to treat epilepsy, stomach disorders, rheumatism, coughs and diabetes.
Species <i>Grewia flava</i> Name Velvet Raisin Bush Plant parts used Bark & fruit	The bark is used for making baskets, and an intoxicating drink is made from the fruit. Porridge is made from dried fruit
Species <i>Kirkia wilmsii</i> Name Mountain Seringa Plant parts used Roots	Thickened roots contain water that is used by humans during droughts. Used for goats fodder.
Species <i>Sansevieria hyacinthoides</i> Name Mother - in - law's - tongue	Used traditionally to treat earache, toothache, intestinal worms, haemorrhoids and as a protective charm.
Species <i>Schotia brachypetala</i> Name Weeping Boer - bean Plant parts used Bark and leaves	Bark and leaves used against heartburn, diarrhoea, hangovers and ulcers. Wood used in furniture - making
Species <i>Sclerocarya birrea</i> subsp. <i>caffra</i> Name Marula Plant parts used Bark	Bark widely used for medicinal purposes (proven antihistamine and anti-diarrhoea properties) and to obtain a pale brown dye. Fruit is edible, eaten fresh or made into a jelly.
Species <i>Ziziphus mucronata</i> Name Buffalo Thorn	Cough & chest problems, diarrhoea & dysentery; boils, sores & glandular swellings; pain relief

9.7.2 Fauna

Several faunal Species of Conservation Concern are known or likely to occur within the focus area, utilising the proposed infrastructure areas either permanently or temporarily for foraging. These faunal species are listed in Table 9-17.

Table 9-17: Faunal Species of Conservation Concern

Scientific name	Common Name	Conservation listing
Mammals		
<i>Panthera pardus</i>	Leopard	VU, TOPS listed
<i>Aonyx capensis</i>	Cape clawless Otter	NT
<i>Hyaena brunnea</i>	Brown Hyaena	TOPS listed
<i>Leptailurus serval</i>	Serval	TOPS Listed
<i>Connochaetes taurinus</i>	Blue Wildebeest	TOPS listed
<i>Equus quagga</i>	Plains Zebra	NT, TOPS listed
<i>Oreotragus</i>	Klipspringer	TOPS listed
<i>Alcelaphus buselaphus</i>	Red Hartebeest	TOPS listed

Scientific name	Common Name	Conservation listing
<i>Damaliscus pygargus phililpsi</i>	Blesbok	TOPS listed
<i>Chrysospalax villosus</i>	Rough-haired Golden Mole	VU
Avifauna		
<i>Gyps africanus</i>	White Backed Vulture	VU
<i>Falco biarmicus</i>	Lanner Falcon	VU
<i>Sagittarius serpentarius</i>	Secretary bird	VU
<i>Neotis denhami</i>	Denham's Bustard	NT
Arachnids		
<i>Hadogenes polytrichobothrius</i>	Flat Rock Scorpion	Not formally protected but endemic to the region
Reptiles		
<i>Python natalensis</i>	African Python	VU, Listed Limpopo State of Environment Report of 2004
<i>Homoroselaps dorsalis</i>	Striped Harlequin Snake	NT

9.7.3 Wetland and River Systems

There are numerous drainage systems occurring within the Der Brochen mine property, including the Groot Dwars River and an unnamed tributary of the Groot Dwars River, known locally as the Mareesburgspruit. Several of these drainage systems, including a portion of the Groot Dwars River, are within or partially within the focus area and were defined as ephemeral drainage lines (EDLs) with associated riparian vegetation.

Although hillslope seepage and bench wetlands were identified within the greater Der Brochen property, none were identified directly within the areas identified for development of the proposed mining infrastructure or within 500m of the proposed activities and were therefore not assessed during this study.

In addition to the ephemeral drainage lines, numerous smaller, poorly-defined preferential surface flow paths were identified. From an ecological perspective these are not considered to have riparian characteristics associated with true riparian zones; however, it must be noted that should it be determined by a suitably qualified hydrologist that floodlines are applicable to any of these features, they will be legally defined as watercourses and as such will enjoy legal protection. However, for the purposes of this study, the preferential surface flow paths were not assessed nor indicated on the figures within this report.

Due to the numerous drainage systems identified, as well as the relatively homogenous characteristics of these systems, for assessment and discussion purposes, the drainage systems were grouped according to their location in relation to the proposed focus area as follows:

- Group 1: all systems situated to the west of the Der Brochen dam and approximately 1.4km to 4.7km south of the Mototolo concentrator. These were previously assessed as Groups 1 and 2 by SAS (2014);
- Group 2: systems located immediately north, south and east of the Mototolo concentrator (previously included in Group 2 by SAS [2014]); and
- Group 3: systems located in the north-west of the property, on the Mareesburg farm, west of the Tailings Storage Facility (TSF) that is currently under construction.

The Groot Dwars River is considered to be unique on a national scale based on biodiversity, with biota and habitat sensitive to flow and habitat modifications. The results of the aquatic ecological assessment based on biomonitoring program is provided in Table 9-18.

Table 9-18: Summarised biomonitoring assessment results (SAS, 2019)

Criteria	Ecological Category classification achieved for the following sites:					
	GD2	GD3	GD4	GD5	Overall for the Groot Dwars River	T1 unnamed tributary on Mareesburg farm
SASS5	C	E/F	D	E/F	D	E/F
MIRAI	C	D	D	D	D	D
Instream IHI	B	B	B/C	B	B	B
Riparian IHI	B	C	C	C	C	C
FRAI	-	-	-	-	D	N/A
VEGRAI	-	-	-	-	C	
Ecological Integration Tool Result					C	
Ecological importance and sensitivity assessment					High	

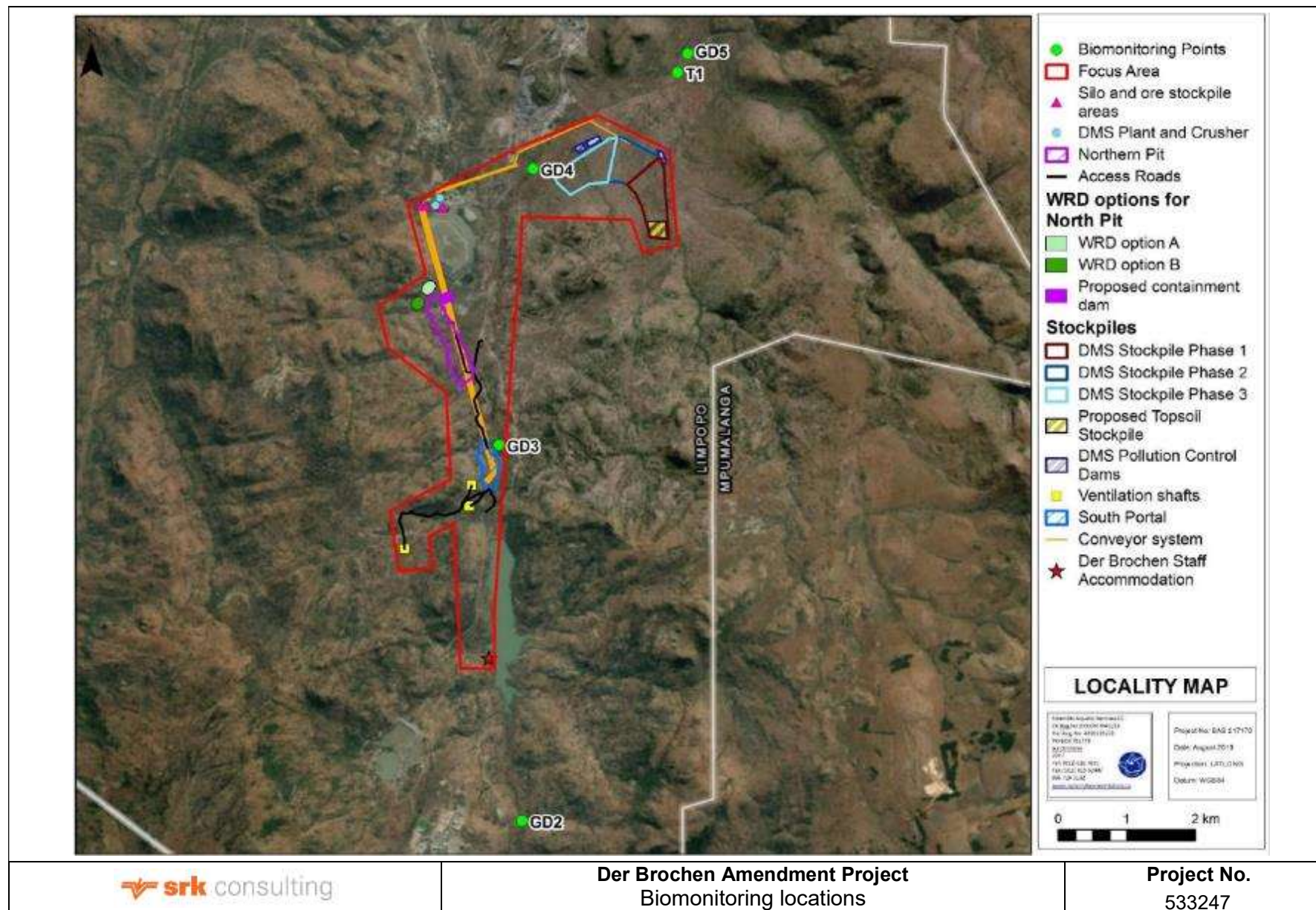


Figure 9-19: Biomonitoring locations

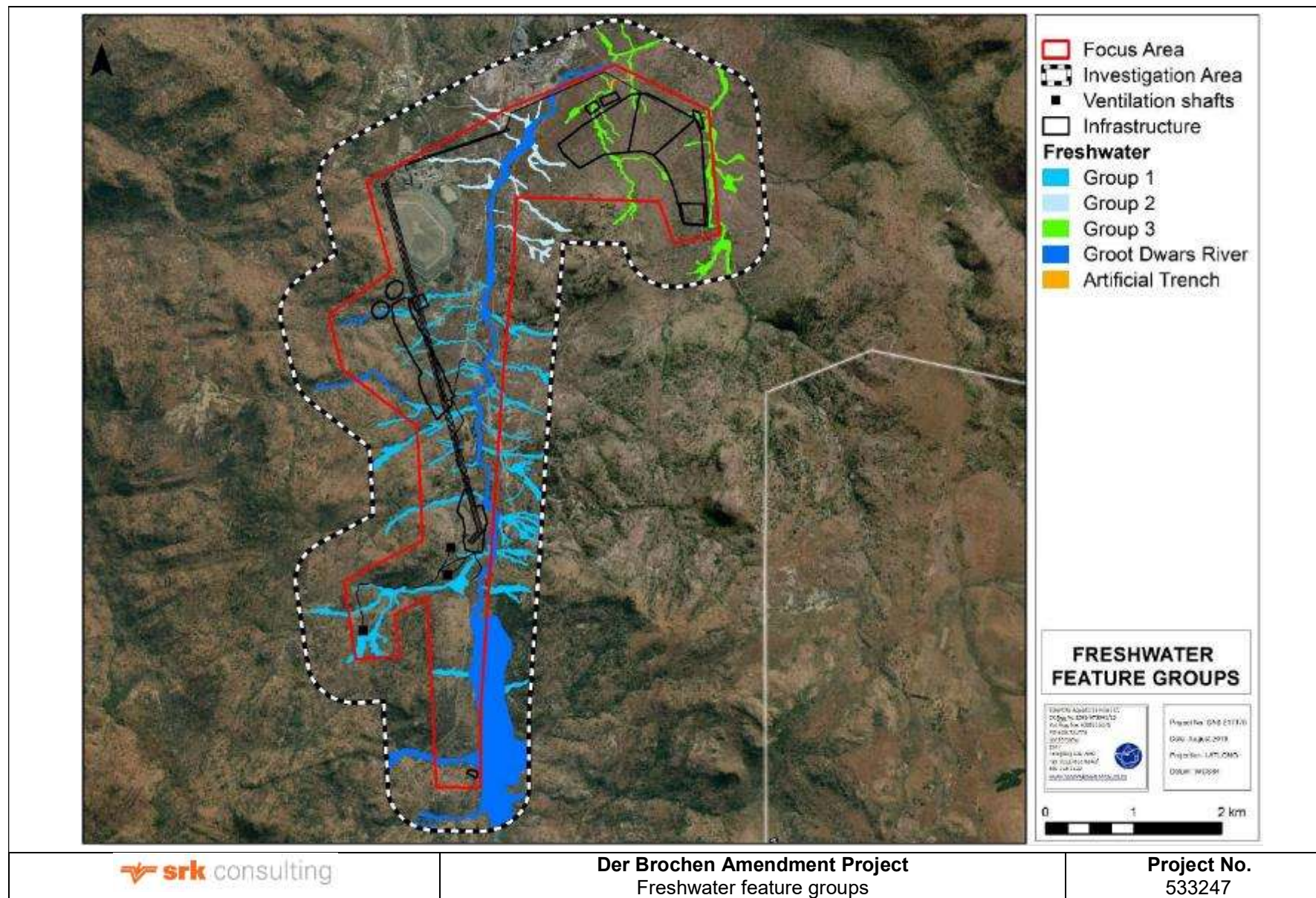


Figure 9-20: Freshwater Feature Groups

Present Ecological State (PES)

The Present Ecological State (PES) for the identified freshwater feature groups are provided for in Table 9-19 below.

Table 9-19: Present Ecological State

Freshwater Group	PES Score	Present Ecological State (PES)
Groot Dwars River	C	<p>The Dwars River has been subjected to a variety of impacts over several decades, most obviously impoundment (i.e. the Der Brochen Dam). This will have impacted flow regimes; however, the dam will also play a significant role in sediment trapping. Several road crossings of the Dwars River were observed, and although not observed during the site assessment, weirs were noted during analysis of digital satellite imagery approximately 1,3 km upstream and 2 km downstream of the Der Brochen Dam. Vegetation community composition remains largely natural, although alterations to species composition was also noted within the more disturbed areas (for example, around road crossings).</p> <p>In Government Gazette Number 39943 issued 22 April 2016, it is indicated that the Klein Dwars River at the confluence with the Groot Dwars River (quaternary catchment B41G), should be maintained at Ecological Category D. For the overall Steelpoort River (quaternary catchment B41K), it is also stated that an Ecological Category D should be maintained. It is thus clear that catchment wide impacts have occurred, and that the system is recognised as being a “working river”</p>
Group 1	B/C	<p>The most significant modifier of these systems is the access road, which runs north to south adjacent to the Der Brochen dam, as culverts have been installed under the road. Few other modifiers were observed in these areas, since active mining has not yet commenced, although some exploratory drilling has occurred in recent months. Various farm roads, which have subsequently been utilised by drill rigs, traverse the area and could potentially contribute to increased sedimentation of some of the drainage systems, however the impacts associated with such activities is minimal.</p>
Group 2	C	<p>The drainage systems in the vicinity of the Mototolo concentrator (i.e. between 100m to 1km away) have been subjected to a higher degree of disturbance. These impacts include clearing of vegetation during various construction and routine maintenance activities, regular disturbances to vegetation leading to altered floral species composition, increased impermeable surfaces leading to increase water inputs, and increased sedimentation.</p>
Group 3	C	<p>Historical agricultural activities have contributed to the alteration of hydrology, geomorphology and vegetation, along with current activities such as game farming and the construction of the new TSF</p>

Ecological Importance and Sensitivity (EIS)

The Ecological Importance and Sensitivity (EIS) for the identified freshwater feature groups are provided for in Table 9-20 below.

Table 9-20: Ecological Importance and Sensitivity

Freshwater Group	Ecological Importance and Sensitivity (EIS)
Groot Dwars River	<p>Although the river has been impacted by various activities such as agriculture and mining, it is nevertheless considered to be ecologically important from the perspective that it provides faunal migratory corridors, breeding and foraging habitat, and contributes to the functioning of downstream systems, as well as maintenance of key hydraulic processes within the assessment area (such as flood attenuation). Furthermore, as a “working system” it is considered important for the provision of water for economic use.</p>
Group 1	<p>These systems, being in a largely natural condition and in a generally inaccessible area due to the terrain, are considered to be ecologically important insofar as they contribute to sustaining populations of threatened species, such as <i>Resnova megaphylla</i>, <i>Catha sekhukhunensis</i> and <i>Vitex obovata</i>, the primary source of breeding habitat for the Critically Endangered <i>Pycna Sylvia</i> (a species</p>

Freshwater Group	Ecological Importance and Sensitivity (EIS)
	of cicada endemic to South Africa). Additionally, they provide important faunal migratory corridors and contribute to the continued ecological functioning of the catchment. They are likely to be sensitive to increased flood peaks, insofar as increased availability of water may influence changes in vegetation and utilisation by fauna.
Group 2	As with the systems included in Group 1, these systems are considered to be of increased ecological importance, despite decreased ecological integrity, as they nevertheless provide important faunal migratory corridors. Occurrence of threatened species is more likely to be diminished and restricted to the upper reaches, due to ongoing anthropogenic activity in the lower reaches of the systems, however it is likely that these drainage systems are still utilised by a number of faunal species. As the majority of these systems are ephemeral, they are likely to be sensitive to increased flood peaks (which may occur with an increase in impermeable surfaces in the area.)
Group 3	As with those systems in Group 2, despite the reduced ecological integrity, the drainage systems in Group 3 are nonetheless deemed to be ecologically important, largely due to their importance as breeding and foraging habitat, as well as providing faunal migratory corridors. Additionally, the ephemeral systems are likely to be sensitive to increased flood peaks.

9.8 Air Quality

NOTE: An air quality specialist study was conducted as part of the impact assessment phase. The information contained in this section of the EIA/EMPr report is sourced from the Air Quality specialist study attached as Appendix D3.

9.8.1 Existing sources of emissions

The Der Brochen Mine currently operates a dust fallout sampling network consisting of ten single dust fallout buckets. The sources of SO₂ and oxides of nitrogen (NO_x) that occur in the region include blasting operations at mines, veld burning, vehicle exhaust emissions and household fuel burning.

Various local and far-a-field sources are expected to contribute to the suspended fine particulate concentrations (which would include PM₁₀ and PM_{2.5}) in the region. Local sources include wind erosion from exposed areas, fugitive dust from agricultural and mining operations, vehicle entrainment from roadways and veld burning.

9.8.2 Sensitive receptors in the area

The closest residential developments to the Der Brochen Mine consist of:

- Ga-Masha (approximately 10 km north-west),
- Patantswane (approximately 20 km west-north-west),
- Eenzaam (approximately 20 km west),
- Matlakatle (approximately 25 km west-north-west),
- Ngwaritsi (approximately 25 km west),
- Syferfontein (approximately 30 km west),
- Dindela (approximately 40 km west),
- Mathula (approximately 35 km west-south-west),
- Sehlakwane (approximately 35 km south-west),
- Roosenekaal (approximately 25 km south-west),
- Mashishing (Lydenburg) (approximately 30 km east-southeast),
- Ga-Mampuru (approximately 13 km north), and
- Steelpoort (approximately 18 km northeast).

Individual farmsteads also surround the mine area.

9.8.3 Ambient air quality monitoring

Der Brochen operate a dust fallout network of ten single and 2 directional dust buckets. The location of the dust sampling sites are displayed in Figure 9-21. The results of the dust monitoring is displayed in Figure 9-22 overleaf.

From the dustfall sampled during the period April 2017 to November 2018, no exceedances of the NDCR non-residential standard of 1200 mg/m²/day and residential standard of 600 mg/m²/day (which allows for two exceedances in a year, not sequential months) was measured at Der Brochen. The highest dust fallout was measured at S10 during the period November 2018 (3090 mg/m²/day).

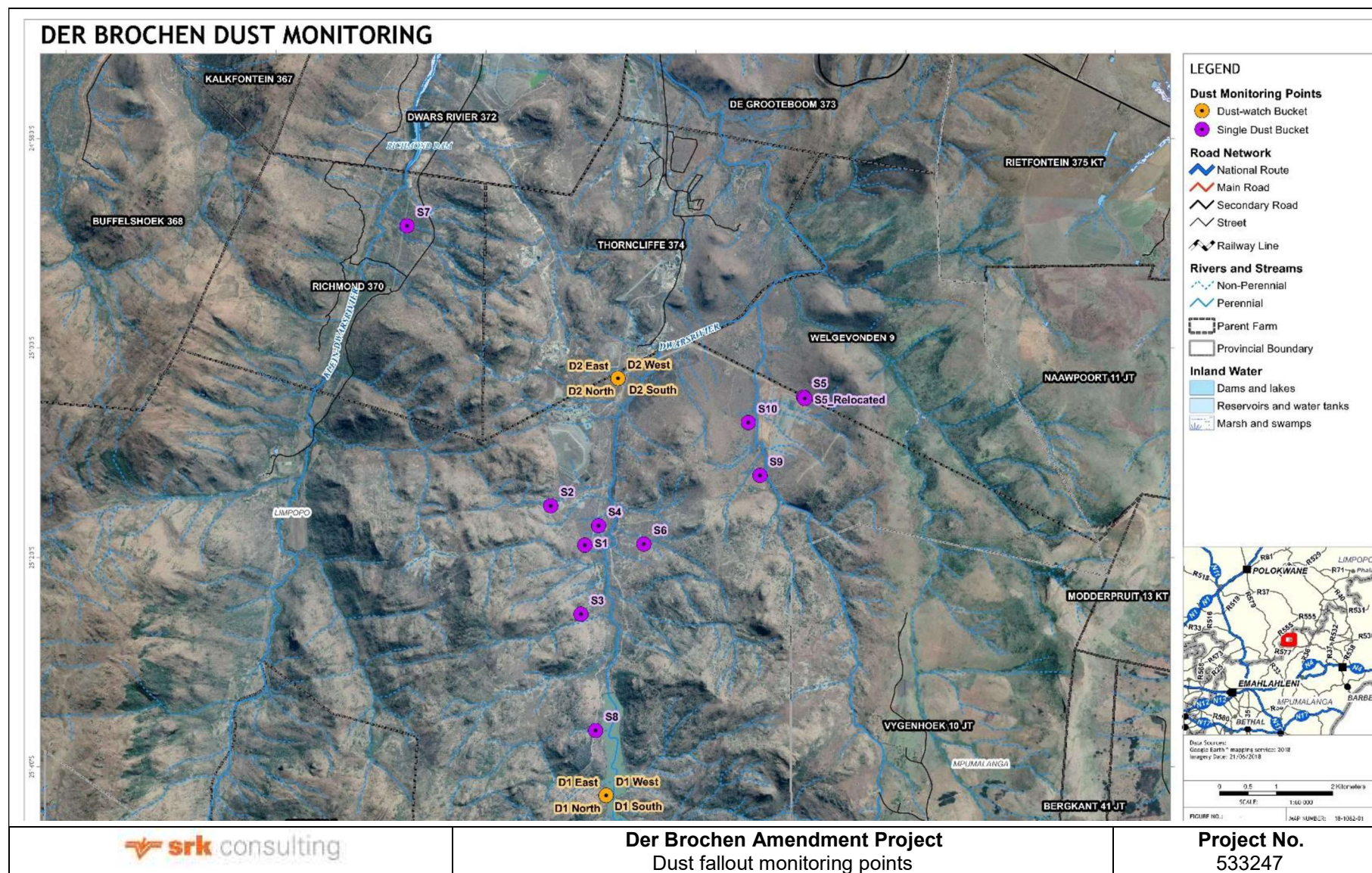


Figure 9-21: Dust monitoring point locations

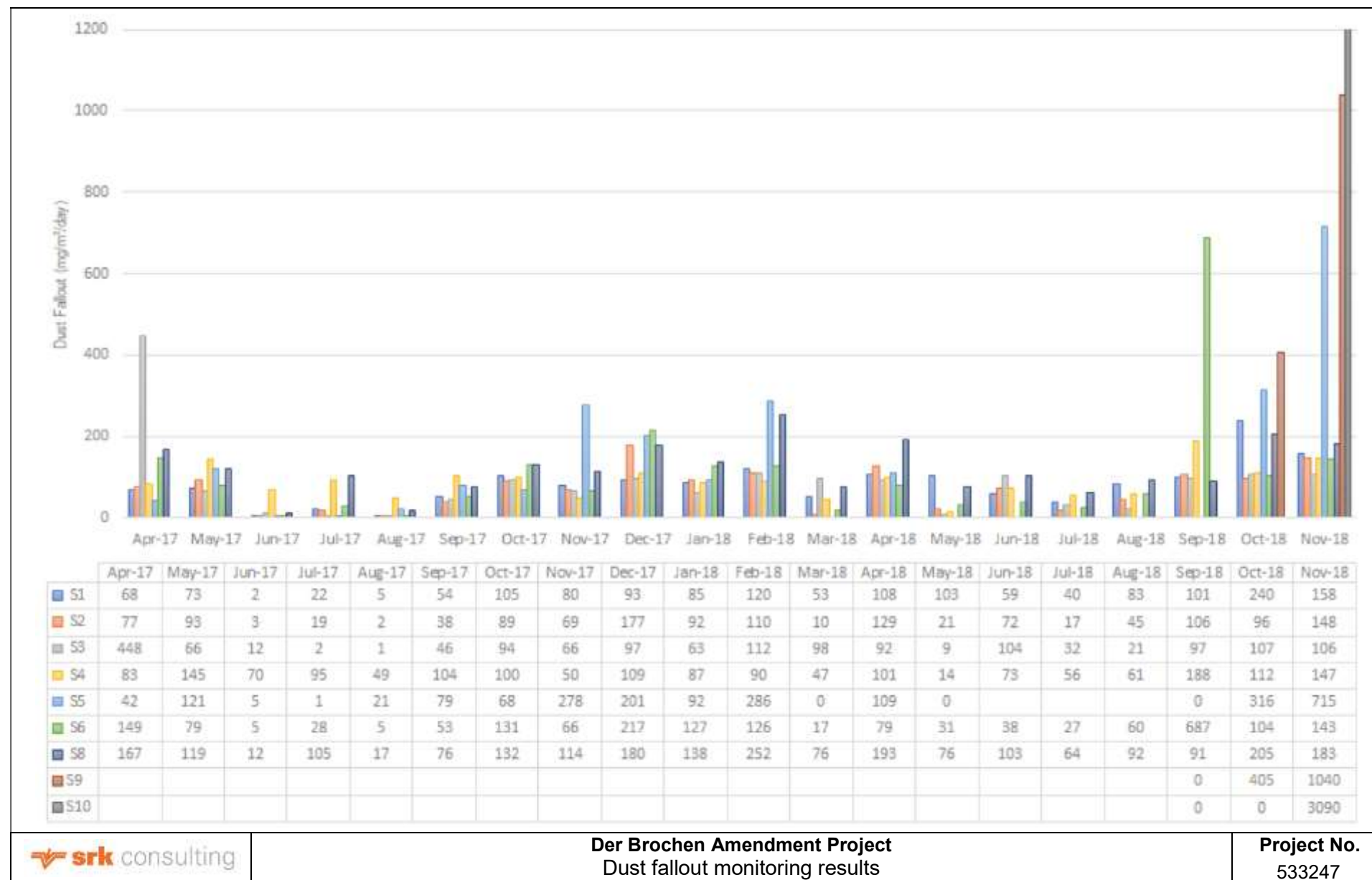


Figure 9-22: Measured dust fallout (April 2017 - November 2018)

9.9 Noise and vibrations

NOTE: A noise and vibration specialist study was conducted as part of the impact assessment phase. The information contained in this section of the EIA/EMPr report is sourced from the noise specialist study attached as Appendix D6.

Sound is a wave motion, which occurs when a sound source sets the nearest particles of air in motion. The movement gradually spreads to air particles further away from the source. Sound propagates in air with a speed of approximately 340 m/s. The sound pressure level in free field conditions is inversely proportional to the square of the distance from the sound source – inverse square law. Expressed logarithmically as decibels, this means the sound level decreases 6.0dB with the doubling of distance. This applies to a point source only. If the sound is uniform and linear then the decrease is only 3.0dB per doubling of distance. The decibel scale is logarithmic, therefore decibel levels cannot be added in the normal arithmetic way, for example, two sound sources of 50.0dB each do not produce 100.0dB but 53.0dB, nor does 50.0dB and 30.0dB equal 80.0dB but remains 50.0dB. Air absorption is important over large distances at high frequencies, and it depends on the humidity but is typically about 40.0dB/km @ 4000 Hz. Traffic noise frequencies are mainly mid/low and will be unaffected below 200m.

When measuring the intensity of a sound, an instrument, which duplicates the ear variable sensitivity to sound of different frequency, is usually used. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter because it conforms to the internationally standardized A-weighting curves. Measurements of sound level made with this filter are called A-weighted sound level measurements, and the unit is dB.

Sound propagation is affected by wind gradient rather than the wind itself. The profile of the ground causes such a gradient. The sound may be propagated during upwind conditions upwards to create a sound shadow. A downwind refracts the sound towards the ground producing a slight increase in sound level over calm isothermal conditions. The velocity of sound is inversely proportional to the temperature therefore a temperature gradient produces a velocity gradient and a refraction of the sound. Temperature decreases with height and the sound is refracted upwards.

For a source and receiver close to the ground quite large attenuation can be obtained at certain frequencies over absorbing surfaces, noticeably grassland. This attenuation is caused by a change in phase when the reflected wave strikes the absorbing ground and the destructive interference of that wave with the direct wave. The reduction in sound tends to be concentrated between 250 Hz and 600 Hz.

Types of noise exposure:

- Continuous exposure to noise – The level is constant and does not vary with time e.g. traffic on freeway and an extractor fan;
- Intermittent exposure to noise – The noise level is not constant and occurs at times e.g. car alarms and sirens;
- Exposure to impact noise – A sharp burst of sound at intermittent intervals e.g. Explosions and low frequency sound.

Noise affects humans differently and the new noise which will be coming from the mine expansion and the associated activities will depend upon the intensity of the sound, the length of time of exposure and how often over time the ear is exposed to it. Urban dwellers are besieged by noise, not only in the city streets but also in the busy workplaces and household noises.

The World Bank in the Environmental Health and Safety Guidelines has laid down the following noise level guidelines:

- Residential area – 55.0dBA for the daytime and 45.0dBA for the night-time period; and
- Industrial area – 70.0dBA for the day- and night-time periods.

The difference between the actual noise and the ambient noise level and the time of the day and the duration of the activity, will determine how people will respond to sound and what the noise impact will be. In terms of the Noise Regulations a noise disturbance is created when the prevailing ambient noise level is exceeded by 7.0dBA or more. Noise however becomes audible when the prevailing ambient noise level is exceeded by 5.0dBA.

In order to evaluate the difference, there must be uniform guidelines to evaluate each scenario. SANS 10103 of 2008 has laid down sound pressure levels for specific districts and has provided the following continuous noise levels per district as given in Table 9-16.

Table 9-21: Recommended noise levels for different districts

Type of district	Equivalent continuous rating level (LReq.T) for ambient noise - dBA					
	Outdoors			Indoors, with open windows		
	Day-night LRdn	Daytime LReqd	Night-time LReqn	Day-night LR.dn	Daytime LReq.d	Night-time LReq.n
a) Rural districts	45	45	35	35	35	25
b) Suburban districts with little road traffic	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
d) Urban districts with some workshops, with business premises and with main roads	60	60	50	50	50	40
e) Central business district	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50

The response to noise can be classified as follows:

- An increase of 1.0dBA to 3.0dBA above the ambient noise level will cause no response from the affected community. For a person with normal hearing an increase of 0.0dBA to 3.0dBA will not be noticeable.
- An increase between 1.0dBA to 10.0dBA will elicit little to sporadic response. When the difference is more than 5.0dBA above the ambient noise level a person with normal hearing will start to hear a difference.
- An increase between 5.0dBA to 15.0dBA will elicit medium response from the affected community.
- An increase between 10.0dBA to 20.0dBA will elicit strong community reaction.

Because there is no clear-cut transition from one community response to another as well as several variables, categories of responses can overlap. This should be taken into consideration during the evaluation of a potential noise problem. There is therefore a mixture of activities and higher noise levels as per the above recommended continuous rating levels within i.e. residential, industrial and feeder roads in close proximity of each other. The ambient noise level will therefore differ throughout the study area, depending on the region and the measuring position in relation to areas with existing mining activities. People exposed to an increase in the prevailing ambient noise level will react differently to the noise levels and the response is given in Table 9-17.

Table 9-22: Estimated community/group response when the ambient noise level is exceeded

Excess dB	Estimated community/group response	
	Category	Description
0	None	No observed reaction
0-10	Little	Sporadic complaints
5-15	Medium	Widespread complaints
10-20	Strong	Threats of community/group action
>15	Very strong	Vigorous community/group action

9.9.1 Description of the receiving environment

Existing mining activities, traffic, seasonal agricultural activities, domestic activities contributes to the prevailing ambient noise level depending on the distance the residential area is to the proposed mining activities. The prevailing ambient noise levels were created by seasonal farming activity noise, intermittent traffic noise along the gravel roads, traffic noise along the R577 and feeder road to Booyensdal mine complex. The noise receptors (residential properties) within and around the vicinity of the proposed mine project area and other mining activities are described in Table 9-23 below and illustrated in Figure 9-23.

Table 9-23: Noise receptors within and around the Der Brochen Amendment Project

Noise receptor ID	Farm	Description of residential property
Noise receptors located within the proposed project area		
V	St George 2 JT	Gamawela Community
W	Richmond 370 KT	
Noise receptors located adjacent to the proposed project area		
K	Vygenhoek 10 JT	Mawela Community
L		Pakaneng Community
M		Choma Community
Noise receptors located beyond the project area		
N	Schaapkraal 420 JT	PakanengChoma community
P		PakanengChoma community
Q		PakanengChoma community
R		PakanengChoma community
S	Sterkfontein 530 JT	PakanengChoma community
T		PakanengChoma community
X	Welgevonden 9 JT	Didingwe River guest lodge & Thorncliff guest lodge

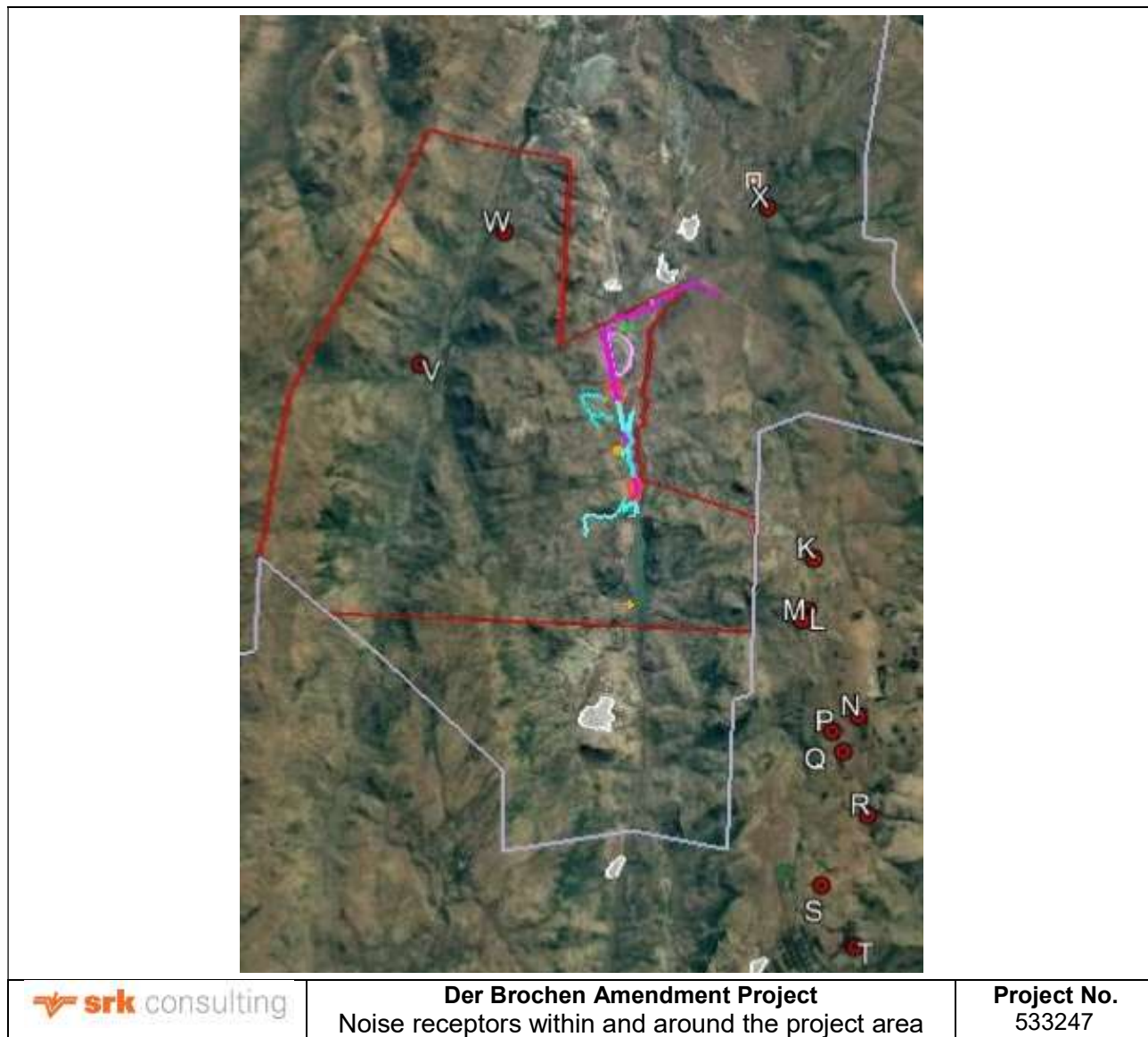


Figure 9-23: Noise receptors in the vicinity of the proposed project area (dBAcoustic, 2019)

9.9.2 Noise sources in the vicinity of the study area

The following were noise sources in the vicinity of and the boundaries of the study area during the time of the noise survey:

- Booyensdal mining activities noise;
- Traffic noise along the feeder road to the Booyensdal mine complex;
- Distant traffic noise from the abutting feeder roads;
- Traffic noise from the Mashishing (Lydenburg) road;
- Other mining activity noise in the valley;
- Farming activities noise;
- Insects;
- Birds; and
- Wind noise.

9.9.3 Underground blasting

Underground blasting will take place and the closest residential area will be noise receptor V. The distances were calculated from the nearest point of the underground blasting areas and the identification of the underground blasting areas is illustrated in Figure 9-24.

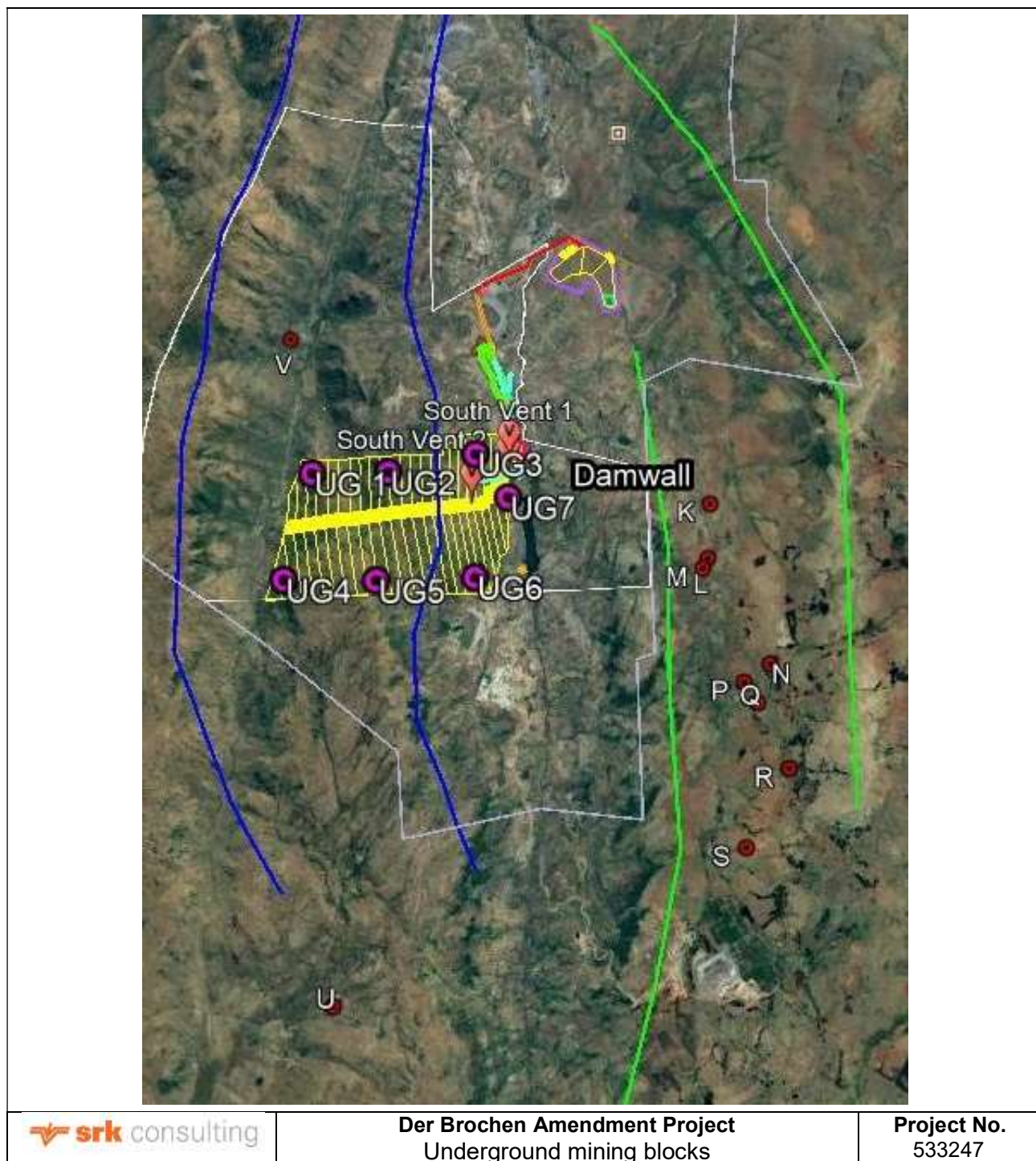


Figure 9-24: Underground mining blocks

The meter distances (direct line) between the different blocks and the abutting noise receptors and the Der Brochen dam wall are illustrated in Table 9-24. This will be the shortest route between the noise receptor and the blasting area.

Table 9-24: Distance (m) between different blocks and the noise receptors

Noise receptor	UG1	UG2	UG3	UG4	UG5	UG6	UG7
K	9 399	7 451	5 881	10 271	7 806	5 511	4 738
L	9 519	7 722	6 429	10 021	7 660	5 178	4 924
M	9 403	7 701	6 323	9 878	7 410	5 125	4 886
N	11 614	9 922	8 830	11 549	9 027	6 789	7 406
P	11 228	9 693	8 611	11 082	8 546	6 437	7 119
Q	11 690	10 165	9 169	11 441	9 012	6 807	7 632
R	13 030	11 572	10 692	12 448	10 315	8 117	9 076
S	13 478	12 148	11 560	12 242	10 198	8 347	9 833
U	12 443	12 408	13 195	9 264	9 280	9 943	12 147
V	2 944	3 880	4 874	6 030	6 444	7 546	6 348
Der Brochen dam wall	5 292	3 325	1 252	6 077	4 022	2 005	341

The calculated ground vibration during blasting with 75kg and 100kg explosives per delay per blast is given in Table 9-25.

Table 9-25: Calculated ground vibration levels (mm/s) at the different noise receptors during underground blasting (75kg/delay) at different blocks

Noise receptors	UG1	UG2	UG3	UG4	UG5	UG6	UG7
K	0.03	0.05	0.07	0.03	0.04	0.07	0.09
L	0.03	0.04	0.06	0.03	0.04	0.08	0.09
M	0.03	0.04	0.06	0.03	0.05	0.08	0.09
N	0.02	0.03	0.04	0.02	0.03	0.05	0.05
P	0.02	0.03	0.04	0.03	0.04	0.06	0.05
Q	0.02	0.03	0.03	0.02	0.03	0.05	0.04
R	0.02	0.02	0.03	0.02	0.03	0.04	0.03
S	0.02	0.02	0.02	0.02	0.03	0.04	0.03
U	0.02	0.02	0.02	0.03	0.03	0.03	0.02
V	0.19	0.12	0.09	0.06	0.06	0.05	0.06
Der Brochen dam wall	0.08	0.16	0.68	0.06	0.12	0.33	4.85

Should the explosives during an underground blast be increased to 100kg per delay the vibration level at the dam wall during an underground blast at UG7 will be 6.03mm/s.

9.10 Traffic

NOTE: A traffic specialist study was conducted as part of the impact assessment phase. The information contained in this section of the EIA/EMPr report is sourced from the traffic specialist study attached as Appendix D7.

The area is serviced by an established road network, with Provincial Road R557 aligned to the north and east of the Mine and Provincial Road R555 aligned in a north – south direction to the west of the Mine. District Road 1261 links the R557 to the R555. The Mine is accessed by an approximately 10 km long access road, which intersects at a T-junction with the R557. The access road also serves a number of other mines along its length.

9.10.1 Road Description

Provincial Road R555

Provincial Road R555 is the main road that links the towns of Emalahleni (Witbank) and Middelburg in the south and Burgersfort in the north, to the town of Steelpoort. The R555 is a 2-lane single carriageway road with one lane in each direction. Each lane is approximately 3,7m wide. The R555 forms part of the regional road network linking Gauteng in the east and the Limpopo Province in the west that also serves the vast mining areas of Witbank and Ogies.

The R555 is an asphalt surfaced road with unpaved shoulders and with a 60km/hr speed restriction in the vicinity of the Tubatse Chrome Plant, thereafter it is 80km/hr. The horizontal alignment of the R555 within the study area is fairly straight while the vertical alignment is predominantly flat. The pavement condition of this road ranges from fair to poor with potholes, rutting, ravelling, cracking and patching is evident in certain sections. There are no formal sidewalks along the R555. Pedestrians were observed walking on the unpaved shoulders and verges. There are no formal public transport facilities along the R555 in the vicinity of the Der Brochen project, however mini bus taxis were observed stopping randomly at numerous locations along this section of road.

Provincial road R577

Provincial Road R577 also forms part of the surrounding regional road network that links the town of Mashishing (Lydenburg) to the east, with the R555 to the west, passing the mine access road in an east-west direction. It is a two-way two-lane road with 3.7m wide lanes, and local widening at the major intersecting roads, allowing right turning vehicles to turn in the protection of a right-turn lane.

This road is one of the main access routes for mine workers from Mashishing (Lydenburg) as well as Steelpoort and Burgersfort. The alignment of the R577 in the vicinity of the access road to the Der Brochen project is fairly straight and the vertical alignment is predominantly flat.

The pavement condition of this road also ranges from fair to poor with potholes, rutting, ravelling, cracking and patching visible in certain sections. There are no formal sidewalks, public transport facilities, or street lighting. Pedestrians were observed at the mine access road intersection, waiting for public transport or hitch hiking, with minibus taxis and random cars pulling off onto the roadside to pick up passengers.

District Road D1261

D1261 is a District Road that links the R577 in the south to the R555 in the north. It is a two lane, two way asphalt surfaced road with 3.7m lanes, gravel shoulders, and a speed limit of 80km/hr, reducing to 60km/hr near the several mine access intersections. The D1261 road also has local widening at each mine access road, allowing through vehicles to safely pass vehicles waiting to turn into the mines.

Main access Road to the Der Brochen

The access road from the R577 to the main entrance gate of the Der Brochen Project & Booyseindal Mine also serves a further 5 mining activity nodes along its length. The road is a two-lane two-way road with 3.5m lanes and gravel shoulders. This road is approximately 8km long and is fairly windy with a relatively flat vertical alignment and a speed limit of 60km/hr. There are high volumes of heavy vehicles waiting to load at each mine, sometimes to the point where they block the access road for a few minutes with their activity. The road condition is moderate with the occasional pothole and edge breaks. There are no pedestrian facilities or public transport facilities along the road nor is there street lighting.

Der Brochen Project access Gate

The Der Brochen project access gate is shared with the neighbouring Booyseendal Mine, with each organisation having a separate, dedicated security control point where visitors and staff enter and exit. From the dedicated security control point however, both streams of traffic merge onto one road and proceed further south. This road is referred to as the Internal Access Road leading to the Der Brochen Mine and Booyseendal Mine.

Internal Access Road leading to Der Brochen and Booyseendal Mine

The internal Access Road that leads to the Der Brochen Mine and Booyseendal Mine commences at the Mine Entrance Gate and is a continuation of the Mine Access Road. The internal Mine Access Road is only utilised by the Der Brochen Mine and Booyseendal Mine.

This is an asphalt surfaced road approximately 11km long. Road widths range between 5m - 6m. It is a two-lane two-way road. The site visit showed low volumes of traffic along this road. The speed limit of this road is 40km/h.

9.10.2 Status Quo Traffic Analysis

Level of Service (LOS) is defined as a qualitative measure of the operational conditions within a traffic stream as perceived by road users. This definition generally describes these traffic conditions in terms of speed, travel times, freedom to manoeuvre, traffic interruptions, comfort, convenience and safety. There are six levels of service used to describe the quality of travel on the road network. Each of these levels is given a letter designation from A to F, with LOS A representing the best operating conditions while LOS F represents the least desirable conditions.

The road network surrounding the development will be analysed in detail and the current levels of service on the existing road network will be discussed in detail in this Chapter. The levels of service at each intersection will be presented schematically. The following legend will be used to depict the LOS of each movement at the intersections.

9.10.3 Existing Public Transport Infrastructure

The current operations are such that most mines have local private transport service providers for their workers. These are contracted bus or minibus taxi services that pick-up and drop-off workers at the mines. The public transport services pick up and drop off mine workers at the mine gate and therefore there is very little pedestrian activity along the mine access road. There is pedestrian activity at the mine access gates, however there are no pedestrian or public transport facilities at the mine gates.

There are public transport services for the general public on the mine access road. Both buses and minibus taxis operate to and from the locality of Thorncliffe that is situated adjacent to the Mine Access Road. There is a formal bus rank called Thorncliffe Bus Stop and an informal minibus taxi rank called Thorncliffe taxi rank in Thorncliffe. These are located on either side of the mine access road.

Shelters and loading bays are provided in the Thorncliffe Bus Stop. The Thorncliffe minibus taxi rank is informal and has no infrastructure.

9.10.4 Existing Pedestrian and Bicycle Activity

A few pedestrians and no cyclists were observed on the road network in the immediate vicinity of the Der Brochen project area. A concentration of pedestrian activity was observed to the north, along the R555, in the vicinity of the commercial and residential areas around Steelpoort and Burgersfort. The pedestrians use the wide unpaved shoulders and wide verges of the R555. Pedestrians do not impede the flow of traffic on any of the roads within the study area.

No pedestrians were observed along the R577 except in the immediate vicinity of the mine access road intersection. There is thus very little conflict between pedestrians and traffic along the roads in the vicinity of the mine.

9.10.5 Existing Road Safety Conditions

Based on observation during the site visit, the road safety conditions along the R555 and R577 are generally acceptable during the day when visibility is good and smaller vehicles are able to overtake the heavy vehicles fairly safely.

The vehicle speeds and driver behaviour within the study area are generally good based on observation during the site visit, with the occasional vehicle exceeding the speed limit. There is signage displaying the maximum permissible speed on the R555 and R577 and advanced warning signs for the presence of slower moving heavy vehicles on these sections of road.

From observation, pedestrian activity did not pose a road safety threat on any of the roads surrounding the project area.

9.11 Archaeological and cultural heritage

NOTE: *A heritage specialist study was conducted as part of the impact assessment phase. The information contained in this section of the EIA/EMPr report is sourced from the heritage specialist study attached as Appendix D8.*

Since 2002, various heritage surveys were conducted and numerous sites of archaeological importance have been recorded, ranging from the Middle Stone Age to the recent households of farm labourers in the Der Brochen project area. Their distributions on the landscape show different land use patterns. Many agriculturally orientated societies (making Eiland, Leolo and Marateng pottery) built their villages in the valleys near cultivatable alluvium. Others (probably Ndebele) built terraced-settlements on basal slopes of the valley edge, while farm labourers usually lived in the valleys as well. During the 19th Century, farmers lived around the edge of high meadows as a measure of protection. A few Middle Iron Age Eiland sites were also identified in this plateau environment (ARM, 2012).

9.11.1 Archaeological Overview of the Study Area and Surrounding

The Study Area and Surroundings during the Stone Age

The Early Stone Age is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these technological phases is known as Oldowan, which is associated with crude flakes and hammerstones and dates to some 2 million years ago. The second technological phase in the earlier stone age of Southern Africa is known as the Acheulian and comprises more refined and better-made stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates back to approximately 1.5 million years ago. No Early Stone Age sites are known to be located within the study area or its immediate surroundings. 250 000 to 40 000 years ago

The Middle Stone Age is the second oldest phase identified in South Africa's archaeological history. This phase is associated with flakes, points and blades manufactured by means of the so-called 'prepared core' technique. A low-density surface scatter of Middle Stone Age lithics was identified during the present fieldwork (refer site DBE 6). Additionally, during an archaeological survey conducted in 2002, 'widely scattered' Middle Stone Age lithics were identified in the footprint area of the Mareesburg TSF (Huffman, 2002).

The Later Stone Age is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths. A well-known feature of the Later Stone Age is rock art in

the form of rock paintings and engravings. No Later Stone Age sites are known to be located within the study area. This said a Later Stone Age site was identified on the farm Richmond 370 KT during an archaeological survey (Roodt, 2008). This site is located approximately 4.5km north-west of the present study area.

The Study Area and Surroundings during the Iron Age

The arrival of early farming communities during the first millenium, heralded in the start of the Iron Age for South Africa. The Iron Age is that period in South Africa's archaeological history associated with precolonial farming communities who practiced cultivation and pastoralist farming activities, metal working, cultural customs such as lobola and whose settlement layouts show the tangible representation of the significance of cattle (known as the Central Cattle Pattern) (Huffman, 2007).

The Icon facies of the Moloko Branch of the Urewe Ceramic Tradition is the fifth Iron Age presence for which archaeological evidence had been found in the surroundings of the study area. The key features on the decoration of the ceramics from this facies comprise multiple incised bands separated by colour and lip decoration on bowls (Huffman, 2007).

An Iron Age site with ceramics containing early Moloko decoration was identified during an archaeological survey for the proposed Mareesburg Joint Venture Mine (Matakoma, 2007). This site is located 2.5km south of the present study area components located on the farm Mareesburg 8 IT. Furthermore, during a heritage study of the farm Richmond 370 KT, Iron Age sites with Icon type pottery were identified (Roodt, 2008).

The Marateng facies of the Moloko Branch of the Urewe Ceramic Tradition is the sixth Iron Age facies to be identified within the surroundings of the study area. The key features of the decoration used on the ceramics from this facies include incised arcades on upper shoulder separating black and red (Huffman, 2007). The Marateng facies can be associated with modern Pedi.

During the present survey, Marateng pottery was identified at site DBE 7, which is located within the Helena Waste Rock Dump Alternative. Marateng sites were also identified during other surveys in the surroundings of the study area and is expected to be found quite widespread in this area.

Der Brochen Amendment Project Heritage Sites

PGS Heritage (Pty) Ltd
Heritage Management Unit

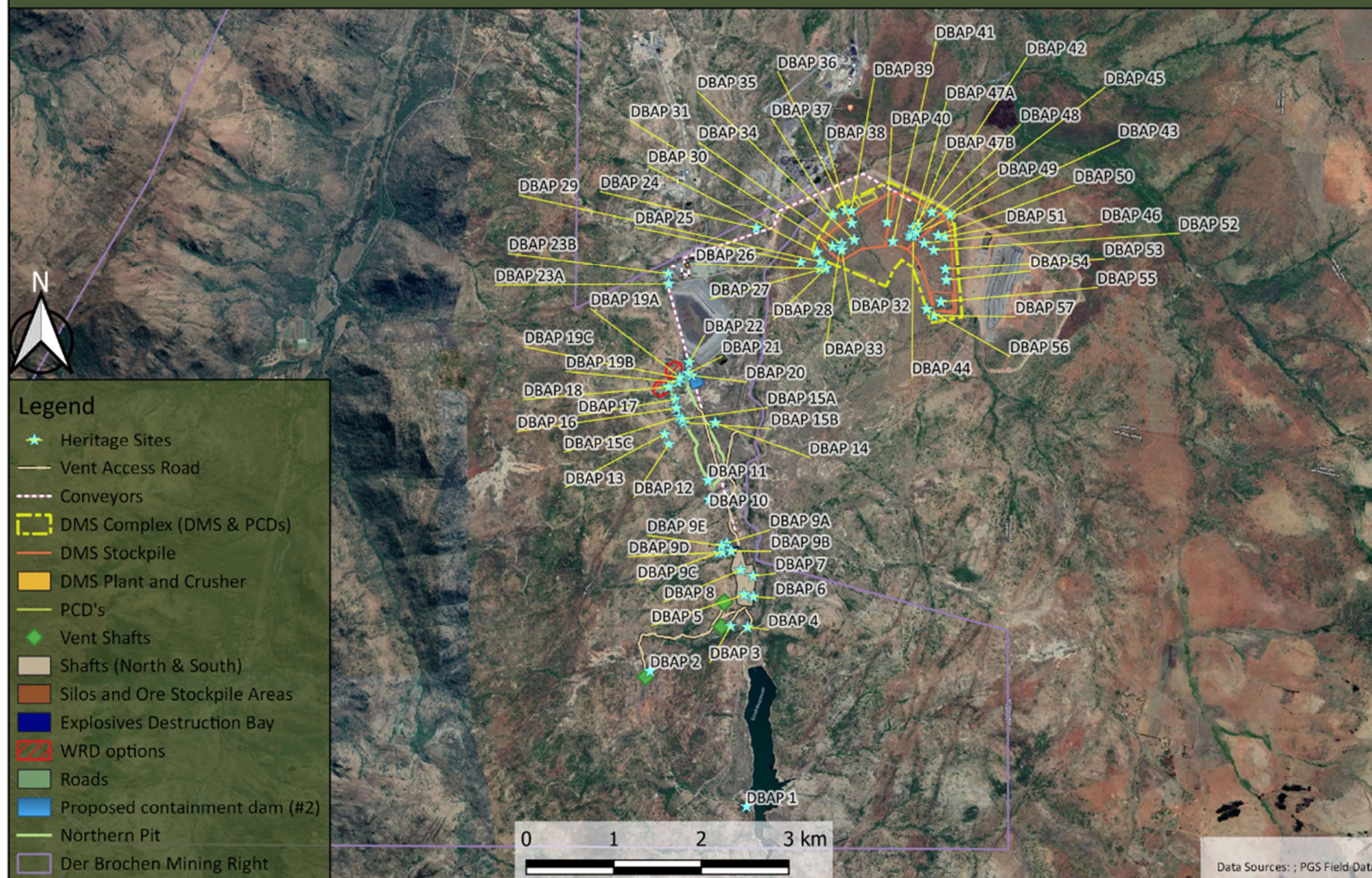


Figure 9-25: Identified Heritage Sites within the Der Brochen Amendment Project's footprint area

9.11.2 Historic Overview of Mining within the Study Area

While platinum was first found in the Mashishing (Lydenburg) District by J.A. Lombaard on his farm Maandagshoek 254 KT (old number 148) (roughly 60 km north of the present study area), it was Hans Merensky who identified the first platinum reef in South Africa and brought it to the attention of the world (Machens, 2009). With the assistance provided by Lombaard's cousins Schalk and Willem Schoeman, Merensky also discovered platinum south of the Steelpoort River. All these discoveries and investigations were made during August and September 1924 (National Archives, MNW, MM525/25).

The discovery of a platinum reef by Hans Merensky led to a mad rush by fortune seekers, prospectors and businessman from across the country to obtain options on farms where platinum was believed to be found. In a report written by a Dr. Wagner (during or just before 1925) on the platinum fields of the Mashishing (Lydenburg) District, he indicated that although the platinum reef had not yet been traced all the way from Maandagshoek to Dwarsrivier, it was clearly evident on the last mentioned farm. The report also stated that the outcrop stretched over Thorncliffe and continued for nearly 16 miles all the way to Sterkfontein. With the farm Thorncliffe located directly north of Helena, it is evident that platinum had already been discovered at Helena by this time.

In fact, according to a sworn statement held at the National Archives in Pretoria, platinum was discovered on the farm Helena by Lydenburg lawyer Cornelius Jansen Weilbach on 6 December 1924 (National Archives, MNW, 775, MM1037/25). This discovery was made by Weilbach during prospecting activities undertaken on the Remainder of the farm Helena that was owned by Barend Leendert Geldenhuys. These prospecting activities were undertaken in terms of the consent provided by the mineral rights owned by Geldenhuys and Magtild Cecilia Weilbach, Cornelius Jansen Weilbach's wife. At the time, each of the two mineral rights owners of the remainder of the farm Helena held one-half share of the mineral rights to the said portion.

On 17 January 1925 the Platinum Proprietary Company (of Lydenburg) Limited was established (South African Mining Yearbook, 1941/42) with Cornelius Jansen Weilbach as one of the directors. On 26 January 1925 an application for discoverer's rights on the farm Helena was submitted. At this point, on 17 March 1925, the portion of the farm belonging to Bresler was transferred to Ludwig Wipplinger. On 28 April 1925, Cornelius Jansen Weilbach received 20 discoverer's claims on the farm Helena and on 10 September 1925 a beacon certificate was issued which defined the boundary of Weilbach's discoverer's rights on the farm. By 14 September 1925, the ownership of mineral rights for the farm Helena was registered in such a way that of the portion of the farm owned by Barend Leendert Geldenhuys one-half share of the mineral rights was owned by Geldenhuys while the remaining half was owned by Magtild Cecilia Weilbach (born Schoeman). In turn, of the portion owned by Ludwig Wipplinger, one half share in the mineral rights of this portion were owned by Pieter Benjamin Bresler with the remaining half share owned by Magtild Cecilia Weilbach (born Schoeman). This means that by September 1925 Mrs. Weilbach owned one-half share in the mineral rights of the entire farm.

Cornelius Jansen Weilbach subsequently ceded his discoverer's rights to the farm to the Platinum Proprietary Company (of Lydenburg) Limited, in which he was a director. This company owned the mineral rights to the farm Helena and by c. 1929 had undertaken a "...considerable amount of work...on the Merensky Horizon...on Helena" (Wagner, 1973: 303).

It is not known for how long the Platinum Proprietary Company conducted mining activities on Helena, but by the early 1940s, the company was still active on the farm. At the time the company directors were D.C. Greig, Herman Ohlthaver and Ludwig Wipplinger (South African Mining Yearbook, 1941/42). While Wipplinger had been the assistant to Hans Merensky, Ohlthaver was a friend of Merensky and with his business partner Gustav Becker often supported Merensky's prospecting expeditions financially (Machens, 2009). The company name still appears in archival records dating

to 1957 (National Archives, WLD, 936/1957), but not after this date. It would appear therefore that the Platinum Proprietary Company ceased to exist during the late 1950s.

9.11.3 Current Status Quo

The study area is primarily situated in the valley of the Groot Dwarsrivier. As a result, it is located in an undulating landscape ranging from reasonably high ridges to more level areas. While infrastructural development associated with existing mining activities is present in the study area and surroundings, significant components of the study area can still be described as reasonably undisturbed.

For the most part, the study area is located within the Sekhukhune Mountain Bushveld vegetation type. This vegetation type is characterised by "...dry, open to closed microphyllous and broad-leaved savanna on hills and mountain slopes that form concentric belts parallel to the north-eastern escarpment. Open bushveld often associated with ultramafic soils on southern aspects. Bushveld on ultramafic soils contain a high diversity of edaphic specialists. Bushveld of mountain slopes generally taller than in the valleys, with a well-developed herb layer. Bushveld of valleys and dry northern aspects usually dense, like thicket, with a herb layer comprising many short-lived perennials. Dry habitats contain a number of species with xerophytic adaptations, such as succulence and underground storage organs. Both man-made and natural erosion dongas occur on foot slopes of clays rich in heavy metals." (www.sanbi.org). A number of these dongas were observed during the fieldwork.

In terms of geology, the Sekhukhune Mountain Bushveld vegetation type is associated with "...rocks mainly ultramafic intrusive of the lower, critical and main zones of the eastern Rustenberg Layered Suite of the Bushveld Igneous Complex (Vaalian). Three subsuites (zones), namely Croydon, Dwars River and Dsjate consist mainly of norite, pyroxenite, anorthosite and gabbro, and are characterised by localised intrusions of magnetite, diorite, dunite, bronzitite and harzburgite. Soils are predominantly shallow, rocky and clayey."

9.12 Socio-economic Structure

NOTE: A social specialist study was conducted as part of the impact assessment phase. The information contained in this section of the EIA/EMPr report is sourced from the social specialist study attached as Appendix D9.

The Der Brochen Mine located within the Fetakgomo Tubatse Local Municipality¹⁰ (FTLM), under jurisdiction of the Greater Sekhukhune District Municipality (GSDM). Thaba Chweu Local Municipality (TCLM) is an important labour sending area for the mine and as such, has been included in this report. The TCLM falls under the Ehlanzeni District Municipality, within the Mpumalanga Province.

The growing mining sector in both FTLM and TCLM has attracted many job seekers and their families to the area. FTLM is part of the 7th largest regional economy in South Africa, while TCLM is showing promising upward economic growth in tourism, mining and trade. FTLM is ranked 19th amongst Local Municipalities according to population size (335 676 people), while TCLM is ranked 115th and has a population of 98 387.

A large percentage (50.3%) of the population in the FTLM is unemployed and most households (62%) are living on less than R76,400 per annum. The TCLM has a much lower unemployment rate (20.5%). A higher percentage (59.6%) of economically active youth is unemployed in the FTLM, a most worrying statistic when compared to TCLM, which has a youth unemployment rate of 27.2%. More than half of

¹⁰ The FGTLM was established by the amalgamation of the Fetakgomo and Greater Tubatse Local Municipalities in August 2016, prior to which they were separate entities.

those employed in the FTLM work in the mining and quarrying sector, while mining, agriculture and trade are significant employment sectors in the TCLM.

A promising 43.2% of the FTLM population have completed some primary school education, while 39.3% completed their secondary school education. Only 0.8% have received higher education, while 1.6% have no schooling. The TCLM has poorer education levels, with 38.6% having some primary school education, 15.4% having completed their secondary school education and slightly more having achieved higher education (1.5%) than the FTLM.

The baseline has revealed a number of concerns for the socio-economic status of FTLM and TCLM. The incidence of HIV/AIDs, while less than previous years in FTLM, is still significant, particularly in the rural and peri-rural parts of the municipality. The TCLM still has one of the highest HIV prevalence rates in the Mpumalanga Province and few clinics and hospitals to service those affected. The FTLM also has a high crime rate, with dangerous crimes including rape, murder, and assault reported on a frequent basis.

Sanitation and water delivery is a constant constraint, while over 16.0% of the population do not have access to energy for warmth in the colder months in the FTLM. Service delivery in the TCLM is better than the FTLM; however, many rural and informal settlements find themselves with poor service delivery. Minimal health facilities and a growing population will be a cause for concern for both municipalities as populations continue to increase.

Local governance structures in the study area are complex and are likely to become more complex. A number of land claims have been lodged for the same land by a number of claimants, and the final land distribution could lead to violence and conflict between communities.

9.12.1 Traditional governance

Traditional governance plays an important role in South Africa. This is particularly true in the Limpopo Province rural context, where traditional systems, although intertwined with western modernisation, continue to be influential in many communities. Traditional governance and influence is sustained by a number of traditional structures including Traditional Councils (Kgoshis and Councillors), Communal Property Associations and religious organisations and leaders.

The FTLM currently has 39 wards and a larger portion of the municipality is predominantly rural. With its rural nature, the area is administered by Traditional Leaders and are responsible for the day to day running of the traditional authorities including land allocation in the rural areas. The majority of the land claims in the GSDM are lodged by Traditional Leaders.

There are 12 Traditional Leaders seconded by the Limpopo house of Traditional Leaders serving in the FTLM council.

9.12.2 Communities

Three communities reside on farms falling within the Zol, those being the Gamawela, Moletsi and PakanengChoma (further elaborated on below). While these communities acknowledge the presence of ward councillors in their areas, there seem to be little or no interaction between these communities and the ward councillors; rather, these communities refer to their Communal Property Associations (CPAs) or community trusts for governance.

A complex and contradictory land claims situation is evident in the study area, with the following factors contributing towards this complexity (SRK SIA, 2014):

- Several communities and families claimed the same farm portions separately and individually;
- Some communities claimed the farms and later withdrew the claims after these had been registered with the Regional Land Claims Commissioner (RLCC);

- In some instances, Traditional Authorities claimed land on behalf of the affected communities and families in order to meet the closing date for submission, with the intention to return successful claims to the rightful owners;
- Different communities collectively lodged claims (mostly using verbal agreements without any formal documentation of the agreement) and later decided to part ways. In most instances, the party that separated itself left without having any proof of having lodged a claim, apart from a verbal agreement that was nullified when they decided to part ways;
- The project site and affected farms are close to the boundary between the Limpopo and Mpumalanga Provinces, and therefore land claims for the same properties were lodged in Mpumalanga and Limpopo Provinces;
- The amount of time that it takes to research, verify and resolve the land claims also compromises on the outcome of the claims, especially in cases where the paper trail is lost, or when the officials dealing with the claims change positions; and
- Some of the communities who missed the 1998 cut-off date for lodging the claims have indicated their intention to lodge claims on farms that have already been claimed by other parties, following the reopening of the restitution process by Government in 2014.

Some of the farms currently falling under Limpopo Province were previously located in Mpumalanga Province before the revision of the Municipal Demarcation Board boundaries. As a result, land claims for some of the farms were originally lodged with the Mpumalanga RLCC office. However, because these were historical claims, which have been transferred to the Limpopo Province, the current information could not be made available. The existing information received from the Mpumalanga RLCC office is dated 2010 and has been used for comparative purposes only.

Gamawela Community

This community falls within the boundaries of the FTLM. The Gamawela community includes households currently residing on St. George 2 JT, Hermansdal 3 JT, Richmond 370 KT and Mareesburg 8 JT, with the families Magane, Leshaba, Matjomane, Mogashoa and Gamawela. This community is currently governed by the Gamawela CPA and has lodged land claims for all the farm portions they reside on (Table 5 4). According to the SRK team's knowledge, the only claim that has officially been finalised is for St. George 2 JT.

Gamawela derives its name "Gamawela Mankge" from the appearance of the surrounding landscape. Oral history advises that the Mankge community became fascinated by the landscapes in the Dwars River valley as they moved (also known as "go wela" in Sepedi) down the valley to settle at the foot of the mountains many years ago. Besides the rock outcrops (some of which resemble a baboon, which is the community totem), the land has other beautiful characteristics and attractions in the form of fauna and flora, including a multitude of bird species, hiking trails, and "dinalana" (grinding stones).

The first recorded history of the Gamawela Community dates to the 1700s, when the community started residing on the farms along Molototsi (Klein Dwars River) and some parts of the Moletsi (Dwars River). The Gamawela community was established under the leadership of Kgoshi Marobele Mankge. The land was divided into farm portions soon thereafter, when white people arrived in the area and claimed land ownership. In 1987 the last head of household remaining on the St George 2 JT passed away and his widow and children were evicted from the farm (SRK key informant interview, 2014).

Following the successful claim on the farm St. George 2 JT, some of the Gamawela people started moving back into the area from 2008 for agricultural purposes, following a decision by the community to use the land for agricultural rather than residential purposes. A lack of services in the area have also discouraged some claimants from returning to settle in the area.

Moletsi Community

This community falls within the boundaries of the FGTL. The Moletsi community is made up of the Leshaba family who reside on Welgevonden 9 JT. The community was governed by the Gamawela CPA until recently. Due to land claims for farm portions similar to those of the Gamawela community (Table 5 4), the Leshaba family has separated itself from the Gamawela CPA and is currently governed by the Dithabeng Tsa Moletsi Community Trust.

The Moletsi community had not specified the farm portions that they were claiming and the Land Claims Commission has requested clarification in this regard in order to further investigate the claim (SRK SIA, 2014).

PakanengChoma Community

This community falls within the boundaries of the TCLM. The PakanengChoma community includes the Pakaneng, Choma, Makanyane and Mawela families and lives on Vygenhoek 10 JT and Schaapkraal 42 JT. The Choma, Mawela and the Malepa A Makanyane communities together lodged a land claim against these two farm portions. Vygenhoek 10 JT was restituted to the PakanengChoma community in 2010. Schaapkraal 42 JT has not yet been restituted to the PakanengChoma community. However, following the separation between the three families/communities after 2010, the only claim that remains is the Choma claim (Table 5 5). The Mawela and Makanyane families/communities have indicated that they would be lodging a claim against this farm portion as well.

Two governance structures are active in the area: the Mawela Community Trust, which includes the Malepa A Makanyane, and the Pakaneng Choma Community Trust (PCCT). These trusts were created following a status report from the Land Claims Commission in 2012, stating that the Schaapkraal 42 JT claim has yet to be finalised. Those who recently moved into the area following the receipt of the status report from the Land Claims Commission in 2012 appear to be governed by the PCCT. Farmworker households appear to be governed by the Mawela Community Trust.

The influx into the area seems to have been motivated by the opinion of the claimants that the finalisation of the Schaapkraal 42 JT claim was taking too long. There were also fears that the land would be illegally occupied. Most of these in-migrants live in informal structures without access to services.

9.13 Description of current land uses

The Der Brochen project area is situated in a remote rural area, which up until recently saw very little human activity. This is the result of:

- The steep Dwars-River valley combined with the rocky soils and low rainfall, which is not suitable for crop agriculture in the area;
- The steep gradients in the area and rocky soils leading to stock farming being marginal in the area; and
- The Dwars-River valley that is bordered by tall mountains to the east, west and south making accessibility and thoroughfare difficult, therefore limiting human activity in the area.

Based on the above observations historical land use in the area consisted of large areas of open wilderness with some game farming and cattle grazing activities occurring.

In more recent times mining development has become established in the area and now forms part of the land uses that occurs within the greater area.

Current land use activities associated with the focus area are largely dominated by wildlife and wilderness, with some mining operations in the surrounding areas along with limited game farming and cattle grazing activities occurring. Refer to Figure 9-7 and Figure 9-8 for the current land use map.

10 Environmental impact assessment

This section provides an overview of the impact assessment methodology, the specialist findings and recommendations. It also contains the outcomes of the impact assessment which includes both positive and negative impacts identified by the specialists and EAP for the respective phases of the proposed project (i.e. pre-construction, construction, operation, closure and post-closure) and the mitigation measures recommended to avoid or reduce the negative impacts identified or measures to enhance the positive impacts identified.

10.1 Methodology used in determining the significance of environmental impacts

The impact assessment methodology used, has been formalised to comply with Regulation 31(2)(l) of the National Environmental Management Act (Act 107 of 1998) as amended (NEMA), which states the following:

“(2) An environmental impact assessment report must contain all information that is necessary for the competent authority to consider the application and to reach a decision ..., and must include –

- (i) an assessment of each identified potentially significant impact, including –*
 - (i) **cumulative** impacts;*
 - (ii) the **nature** of the impact;*
 - (iii) the **extent** and **duration** of the impact;*
 - (iv) the **probability** of the impact occurring;*
 - (v) the **degree** to which the **impact can be reversed**;*
 - (vi) the **degree** to which the **impact may cause irreplaceable loss of resources**; and*
 - (vii) the **degree** to which the **impact can be mitigated**.”*

Based on the above, the EIA Methodology will require that each potential impact identified is clearly described (providing the nature of the impact) and be assessed in terms of the following factors:

- **Extend** (spatial scale) - will the impact affect the national, regional or local environment, or only that of the site?
- **Duration** (temporal scale) - how long will the impact last?
- **Magnitude** (severity) - will the impact be of high, moderate or low severity?; and
- **Probability** (likelihood of occurring) - how likely is it that the impact may occur?

To enable a scientific approach for the determination of the environmental significance (importance) of each identified potential impact, a numerical value has been linked to each factor. The ranking scales applicable are shown in Table 10-1 below.

Table 10-1: Impact Ranking Scales

Occurrence	Duration	Probability
	5 – Permanent	5 – Definite/don't know
	4 - Long-term (ceases with the operational life)	4 – Highly probable
	3 - Medium-term (5-15 years)	3 – Medium probability
	2 - Short-term (0-5 years)	2 – Low probability
	1 – Immediate	1 – Improbable
Severity	Extent/Scale	Magnitude
	5 – International	10 - Very high/uncertain
	4 – National	8 – High
	3 – Regional	6 – Moderate
	2 – Local	4 – Low
	1 – Site only	2 – Minor

Once the above factors had been ranked for each identified potential impact, the environmental significance of each impact can be calculated using the following calculation:

$$\textbf{Significance} = (\textit{duration} + \textit{extend} + \textit{magnitude}) \times \textit{probability}$$

The maximum value that can be calculated for the environmental significance of any impact is 100.

The environmental significance of any identified potential impact is then rated as either: high, moderate or low on the following basis:

- More than 60 significance value indicates a **high** environmental significance impact;
- Between 30 and 60 significance value indicates a **Moderate** environmental significance impact; and
- Less than 30 significance value indicates a **Low** environmental significance impact.

In order to assess the degree to which the potential impact can be reversed and be mitigated, each identified potential impact will need to be assessed twice.

- Firstly, the potential impact will be assessed and rated prior to implementing any mitigation and management measures; and
- Secondly, the potential impact will be assessed and rated after the proposed mitigation and management measures have been implemented.

The purpose of this dual rating of the impact before and after mitigation is to indicate that the significance rating of the initial impact is and should be higher in relation to the significance of the impact after mitigation measures have been implemented.

In order to assess the **degree** to which the potential **impact can cause irreplaceable loss of resources**, the following classes (%) was be used:

- 5 100% → Permanent loss
- 4 75% - 99% → Significant loss
- 3 50% - 74% → Moderate loss
- 2 25% - 49% → Minor loss
- 1 0% - 24% → Limited loss

Please note that the Loss of Resources aspect will not affect the overall significance rating of the impact.

In terms of assessing **cumulative impacts**, it is important to understand that the impact of an activity may in itself not be significant but may become significant when added to the existing or potential impacts evaluated from similar or diverse activities within and around the project area.

The cumulative impacts assessed are based on the consideration of the impacts related to the project specific activity in relation the overall proposed project.

It is important to note that cumulative impacts can occur over different temporal and spatial scales by interacting and/or combining so that the overall effect often exceeds the simple sum of previous effects. Cumulative impacts therefore require a holistic view, interpretation and analysis of the biophysical, social and economic systems during the assessment process.

10.2 Impacts identified per project phase and recommended mitigation measures

Table 10-2 provides the anticipated activities that will be undertaken during the different phases of the proposed Der Brochen Amendment Project.

Table 10-2: Project related activities to be undertaken

Project related phase	Activities to be undertaken
Pre-construction	<ul style="list-style-type: none"> - Site clearing of all footprint areas associated with the proposed project infrastructure - Stockpiling of topsoil - Use of existing gravel roads for pre-construction activities.
Construction	<ul style="list-style-type: none"> - Construction of infrastructure - Construction of gravel maintenance roads to the proposed ventilation shafts - Upgrading of existing gravel roads to tar roads to serve as main access roads - Generation of Construction waste
Operational	<ul style="list-style-type: none"> - Underground mechanised mining at South Shaft - Temporary hauling of ore - Operation of Conveyor Systems - Stockpiling of ore material at Mototolo Concentrator - Operation of the Chrome Recovery Inter-Stage Plant - Operation of the DMS Plant - Deposition of DMS material onto the DMS Stockpile Area - Utilisation of storm water management infrastructure at shafts, and PCD's at DMS stockpile - Utilisation of the Staff Accommodation near the Der Brochen Dam - Utilisation of tar access roads - Utilisation of gravel maintenance roads associated with the ventilation shafts - Dangerous Goods storage (including hydrocarbons/chemicals/explosives) - Generation of waste
Closure & Post-closure	<ul style="list-style-type: none"> - Pre-Decommissioning planning - Removal of all plant equipment including conveyor belt systems and staff accommodation - Rehabilitation of the DMS Stockpile and PCDs - Closure of the Shafts and underground workings

The following sections provides further details of the impacts identified per project phase and the mitigation measures developed to be implemented to avoid or reduce the negative impacts identified or measures to enhance the positive impacts identified.

10.2.1 Pre-construction activities

The impacts and associated management measures associated with the pre-construction activities are provided for in **Table 10-3**. These activities are:

- Site clearing of all footprint areas associated with the proposed project infrastructure
- Stockpiling of topsoil
- Use of existing gravel roads for pre-construction activities

Table 10-3: Pre-Construction activities, anticipated impacts and recommended mitigation measures

Nature of the impact Description of the impact including whether the impact is negative or positive	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance		
Site Clearing															
Flora: Clearing and removal of Floral SCC, including collection of medicinal/protected floral species within the focus area	-	5	4	2	8	3	70 High	<ul style="list-style-type: none">No collection of firewood, floral SCC or medicinal floral species must be allowed by construction or mining personnel;During the surveying and site-pegging phase of surface infrastructure, all floral SCC that will be affected by surface infrastructure must be marked and where possible, relocated to suitable habitat surrounding the disturbance footprint; Should any floral species protected under Limpopo Environmental Management Act (LEMA) (Act 7 of 2003) and National Forest Act (Act 84 of 1998) be encountered within the proposed development footprint areas, permits should be obtained from LDEDET and DAFF to remove, cut or destroy any protected tree species before construction of infrastructure takes place;The following protected species listed under the National Forest Act (Act 84 of 1998) were observed within the focus area at the time of the assessment: <i>Balanites maughamii</i>, <i>Catha edulis</i>, <i>Lydenburgia cassinoides</i> and <i>Sclerocarya birrea subsp. caffra</i>.Permits will be required were any of these species to be affected by the mining activities;Additionally, several species listed as protected under the LEMA (Act 7 of 2003) were observed during the field assessment namely: <i>Aloe cryptopoda</i>, <i>Huernia sp.</i>, <i>Jamesbrittenia macrantha</i> and <i>Scadoxys puniceus</i>.	4	4	2	6	2	48 Moderate	31.4

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance	
							<ul style="list-style-type: none"> These species will need to be rescued and relocated or, were they to be affected by the mining activities, permits should be obtained from LEDET. The mine will establish a nursery developed by the mine to cultivate indigenous/endemic and SCC plant species with focus on rehabilitation during the post closure phase in conjunction with a suitably qualified specialist. 							
Flora: Potential loss of floral habitat and species, including floral Species of Conservation Concern (SCC). Clearance of vegetation for placement of infrastructure within drainage lines will result in greater linear impacts downstream.	-	5	4	3	8	3	75 High	2	4	1	6	2	22 Low	70.7
Flora: Clearing of vegetation and site preparation associated with the proposed surface infrastructure footprints, contractor laydown areas and construction of surface infrastructure will lead to the loss of sensitive floral habitat, i.e. rocky outcrops, and species, including floral SCC. Clearing of vegetation along linear activities will lead to a loss of species, including SCC. Potential proliferation of alien and invasive floral species due to disturbance along roads.	-	5	5	2	8	3	75 High	5	4	1	8	3	65 High	13.3

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance	
							<ul style="list-style-type: none"> Activities should be limited to months of low rainfall (dry season) where possible to reduce probability of potential impact. Moisture control will be necessary on large bare areas during dry season construction, in order to reduce the frequency and amount of dust suspended in the ambient air. The mine will implement adequate wet suppression techniques to limit dust release. The mine will implement a revegetation programme on the disturbed areas adjacent to the site clearance area. Following completion of construction, all disturbed areas adjacent to the infrastructure will be ripped and re-vegetated with an indigenous grass mix, to re-establish a protective cover, in order to minimise soil erosion; All areas impacted by construction must be monitored post rehabilitation until basal vegetation cover has been re-established; Should plants not successfully establish within two growing seasons after the revegetation, new plant material should be provided Regulated speed limits of 40km/hr must be maintained to minimize dust generation; and Storm water management measures must be implemented at the start of the construction phase. A biodiversity offset strategy must be developed. 							
Fauna: Clearing of faunal habitat and site preparation associated with the proposed surface infrastructure footprints, contractor laydown areas and construction of surface infrastructure. These activities will lead to loss of sensitive faunal habitat and species, including faunal SCC.	-	5	4	2	8	2	<ul style="list-style-type: none"> Ensure that the ephemeral drainage lines, rocky outcrops and areas containing faunal SCC outside of the construction areas are demarcated as no-go zones for personnel and construction vehicles; Clearing of vegetation should take place in a phased manner so that faunal species are given the opportunity to naturally move off and relocate to the surrounding natural areas; 	5	2	1	6	2	45 Moderate	35.7

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>		Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
		P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance	
Fauna: Loss of faunal species abundance and diversity due to habitat clearing, habitat degradation and increased illegal hunting/trapping/poaching by mine personnel	-	5	4	2	8	3	70 High	<ul style="list-style-type: none">No indiscriminate driving through the veld is allowed. As far as possible vehicles are to utilise the existing roads. Where this is not feasible, new roads are to be in areas of existing high disturbance, and not encroach upon sensitive habitats;A species rescue and removal plan will be in place and acted upon should species and SCC be observed within construction footprints, notably if these species do not self-relocate naturally. Species such as the smaller less mobile and habitat specific species such as <i>Chrysospalax villosus</i>, <i>Hadogenes polytrichobothrius</i> and <i>Python natalensis</i>;No faunal species may be hunted, trapped, snared or captured for any purpose whatsoever.Fences and boundaries must be monitored on a weekly basis in order to locate and remove snares and traps.Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development.	4	4	2	6	2	48 Moderate	31.4
Fauna: Loss of faunal SCC due to habitat loss, decreased food resources, pollution of water resources and illegal hunting/trapping/poaching by mine personnel	-	5	4	2	8	3	70 High		4	4	2	6	2	48 Moderate	31.4
Freshwater Aquatics: Loss of freshwater resource habitat due to potential placement of PCDs and stockpiles within ephemeral drainage lines (north-eastern corner of the focus area, near the Mareesburg TSF) leading to loss of recharge of downstream systems.	-	5	5	2	10	3	85 High	<ul style="list-style-type: none">The footprint of the proposed infrastructure area must be clearly demarcated.Project related activities are to be confined to the demarcated area.The mine will design and construct such structures in compliance with Regulation 704No discharge of effluents or other forms of dirty water are permitted directly into the watercourses or their surrounding environments within the focus areaDedicated parking areas for construction vehicles must be located away from the delineated watercourses and the 100m zone of regulationNo vehicles may indiscriminately be moved through the watercoursesIf construction activities take place during the summer rainfall period, diversion of watercourses may be necessary to enable construction. Should this be required, the diversion of flow will lead to an altered flow regime and inundation period of the reach of the Groot Dwars River downstream of the construction site. It is	3	5	2	8	3	45 Moderate	47.1

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance	
							<p>recommended that the diversion channel ensures that the pattern, flow and timing of the upstream area is retained through a diversion structure to the downstream reach;</p> <ul style="list-style-type: none"> Excavation within the watercourses should be limited in extent (only to what is necessary for the new culvert crossings) and the smallest construction equipment possible utilised in order to limit the impact within the active channel and to ensure that the hydrological patterns within the watercourse return to normal as soon as possible after construction; Cobbles and sediment traps must be implemented within any required diversion channel as well as downstream of the construction dewatered area in order to prevent excess silt entering the downstream reaches of the system; The diversion sandbags utilised for the dewatered area/coffer dam should be filled with in situ material so as to prevent foreign materials being introduced into the Groot Dwars River; Sediment traps should be constructed downstream of the construction area and spaced at 20m intervals for 60m below the construction area. Sediment traps can be created by pegging an appropriate geotextile across the entire width of the channel held down by cobbles/boulders or by geotextile wrapped hay bales spanning the width of the channel and staked into position 							
Soils Land Use and Land Capability: Site preparation prior to construction of activities related to the proposed surface infrastructure and open cast mining block areas. Poor planning may potentially result in permanent loss of soil resources	-	4	4	1	6	3	<ul style="list-style-type: none"> The construction footprint must be kept as small as possible in order to minimise impact on the surrounding environment The footprint of the proposed infrastructure areas will be clearly demarcated to restrict vegetation clearing activities as far as practically possible 	1	4	1	4	1	9 Low	79.5

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance		
Soils Land Use and Land Capability: Site preparation activities will lead to disturbance of soils suitable for grazing (Class VII) and disruption of current land uses activities (i.e. wildlife)	-	4	2	2	6	1	40 Moderate	<ul style="list-style-type: none">Clearing of vegetation will take place in a phased manner as to keep bare soil areas as small as possible to limit the erosion potential;*Moisture control will be necessary on large bare areas during dry season construction, in order to reduce the frequency and amount of dust suspended in the ambient air	3	2	1	2	3	15 Low	62.5
Soils Land Use and Land Capability: Vegetation clearing within the proposed mining and infrastructure areas as part of site preparation prior to commencement mining and related of activities which will lead to soil erosion	-	5	2	1	8	4	55 Moderate	<ul style="list-style-type: none">All disturbed areas adjacent to the infrastructural areas can be re-vegetated with an indigenous grass mix, to re-establish a protective cover, in order to minimise soil erosion and dust emission. This can be achieved by conducting a vegetation assessment.Soils from the infrastructure footprint must be stripped and stockpiled at a designated area;Stockpile may not exceed three (3) meters in height and will be treated with temporary soil stabilization and erosion control measures;Stockpiles must be revegetated to establish a vegetation cover as an erosion control measure;These stockpiles will always also be kept alien vegetation free to prevent loss of soil quality;Burying or burning of any waste including rubble, domestic waste, empty containers on the site will be strictly prohibited and all construction rubble waste must be removed to an approved disposal site.	3	2	1	2	2	15 Low	72.7

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance	
Surface Water: <u>Reduction in water quality due to an increase in turbidity as a result of an increase in erosion from cleared areas, topsoil stockpiles or any other area where there are exposed soils can occur during storm events.</u> Increased erosion can result in an increase in turbidity, suspended solids and sedimentation in the Groot-Dwars River and tributaries (indirect and cumulative impact). Some level of sedimentation is expected to occur in the Groot-Dwars River and/or Mareesburg Stream pre-development as runoff is naturally anticipated to pick up environmental debris as it crosses natural areas. The increase in turbidity/suspended solids can result in a deterioration in the water quality such that water is no longer available for use by downstream users (indirect impact).	-	4	2	1	8	1	44 Moderate <ul style="list-style-type: none"> The footprint of the proposed infrastructure area must be clearly demarcated. Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area. Vegetation clearance will be undertaken in a phased manner. Flood protection berms will be constructed at the area where the Southern Portal and DMS Stockpile Erosion control measures in the form of temporary erosion prevention berms will be implemented during construction. Clean water diversion bunds will be constructed upstream of the construction site prior to clearing areas for new infrastructure. PCD's will be constructed downstream of the working activities to minimise uncontrolled runoff from the site. Areas disturbed by construction activities will be rehabilitated immediately on completion of construction of each area. Activities will be limited to months of low rainfall (dry season) to reduce probability of potential impact. Bunded containment and settlement facilities will be provided for hazardous materials, such as fuel and oil Spill-sorb or a similar product will be kept on site and used to clean up hydrocarbon spills in the event that they will occur. Continue with the current water quality monitoring programme. Provide enough on-site ablution, sanitation and waste management facilities. 	3	2	1	6	1	27 Low	38.6

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance		
Noise: Clearing and stripping of topsoil and vegetation with earthmoving machinery which will increase the prevailing ambient noise level in the vicinity of the footprint accordingly. Construction activities of the access roads, crushers and services at the south decline shaft which will increase the prevailing ambient noise level during the construction activities accordingly above 85.0dBA.	-	3	2	1	4	2	21 Low	<ul style="list-style-type: none">Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels.Construction activities to take place during daytime period only.The construction area where construction is taking place will have to be declared as a noise zone should the threshold value of 85.0dBA be exceeded.Appropriate hearing protection devices will have to be issued to all workers working in these areas.Withdraw equipment for maintenance if change in noise emission characteristics is noticeable.Maintain complaints and grievance register and act promptly to complaints regarding noise.	2	2	1	4	2	14 Low	33.3
Visual: Pre-construction activities will generate visual impacts related to earthworks, vehicles/plant/machinery and workers on site. Construction visual impacts are typically limited to the immediate area surrounding the site and the construction period. Dust generated at the site (e.g. dust from earthworks and trucks travelling on haul roads and dust deposited on off-site vegetation) is visually unappealing and may further detract from the visual quality of	-	1	1	1	4	1	6 Low	<ul style="list-style-type: none">Moisture control will be necessary on large bare areas during dry season construction, in order to reduce the frequency and amount of dust suspended in the ambient air.The mine will implement adequate wet suppression techniques to limit dust release.Ensure speed limits on all haul/internal roads are always respected.Locate new haul roads on disturbed areas as far as possible.	1	1	1	4	1	6 Low	0.0

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance	
Heritage: <u>Destruction of confirmed graves:</u> DBAP 19, DBAP 33, DBAP 43, DBAP 44, DBAP 51 and DBAP 52 are either confirmed graves and cemeteries based on their appearance and characteristics or sites where possible graves are located which had been corroborated by prior stakeholder engagement as graves. Additionally, these sites are also all located within the proposed development footprints.	-	5	5	3	8	3	80 High	4	4	2	4	2	40 Moderate	50.0
Heritage: <u>Potential disturbance of graves:</u> DBAP 11, DBAP 15B, DBAP 15C and DBAP 21 are applicable. DBAP 11 comprises a cemetery that is located no more than 7m west of the proposed North Pit area. The unmarked stillborn graves located at DBAP 15B and DBAP 15C are located no more than 6m and 27m from the proposed North Pit area respectively. DBAP 21 comprises a cemetery which is located 32m west of the actual conveyor footprint and 12m	-	4	5	3	8	3	64 High	3	4	2	4	2	30 Moderate	52.4

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance	
<p>from the buffer area around the conveyor footprint.</p> <p>Although these grave sites are not located within any of the proposed development footprint areas, their close proximity is of concern. During the pre-construction phase there is a risk that these graves may be disturbed or destroyed if pre-construction activities are not managed properly within the demarcated development areas.</p>							<ul style="list-style-type: none"> An exhumation process that keeps the dignity of the remains and family intact. An exhumation process that safeguards the legal rights of the families as well as that of the mining company. The process must be done by a reputable company well versed in the mitigation of graves. Before construction commences, the sites must be fenced. At DBAP 25 this fencing must be undertaken in such a way that the closest distances between the visible grave dressings and the fence are always at least 5m. As the two graves at DBAP 15 are unmarked, it recommended that the three buildings from site DBAP 15 numbered for the purposes of this report as DBAP 15A, DBAP 15B, and DBAP 15C, be fenced. As the graves at DBAP 15B and DBAP 15C are unmarked, the fence must be erected in such a way that the closest distance between these two unmarked graves and the fence enclosing all the three buildings are at least 10m. Signposts must be erected that clearly indicates the fenced area as a cemetery. The position of the cemetery at DBAP 25 and the unmarked graves at DBAP 15 must be shown on all the construction and operation maps to ensure that all individuals associated with construction and mining activities are aware of the presence of these sites. 							
<p>Heritage: <u><i>Destruction of heritage site and potential disturbance of grave:</i></u> DBAP 9 comprises a historic black homestead where graves are also buried. Although the homestead is located partially within the footprint of the Explosive Destruction Bay the graves are located outside the footprint area.</p>	-	3	5	3	8	3	<ul style="list-style-type: none"> The mine will undertake a social consultation process to assess whether any local residents or the wider public is aware of the presence of graves on the sties. The confirmed positions of all unmarked stillborn graves and graves must be fenced, signposted and plotted on all project and construction maps. The required mitigation measures as outlined for historic black homesteads regarding unmarked stillborn graves must also be undertaken. 	2	4	3	4	2	22 Low	54.2

Nature of the impact Description of the impact including whether the impact is negative or positive	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resou rces	Significan ce		P	D	E	M	Loss of Reso urces	Significa nce		
Heritage: <u>Destruction of heritage site and potential disturbance of grave:</u> DBAP 9 comprises a historic black homestead where graves are also buried. Although the homestead is located partially within the footprint of the Explosive Destruction Bay the graves are located outside the footprint area.	-	3	5	3	8	3	48 Moderate	<ul style="list-style-type: none">The mine will undertake a social consultation process to assess whether any local residents or the wider public is aware of the presence of graves on the sties.The confirmed positions of all unmarked stillborn graves and graves must be fenced, signposted and plotted on all project and construction maps.<ul style="list-style-type: none">The required mitigation measures as outlined for historic black homesteads regarding unmarked stillborn graves must also be undertaken.	2	3	3	4	2	20 Low	58.3
Heritage: <u>Destruction of unconfirmed graves:</u> DBAP 53 comprises a stone enclosure which may have had a military association in the past. This site is located within the footprint area of the proposed DMS stockpile.	-	3	5	3	6	3	42 Moderate	<ul style="list-style-type: none">An archaeological site layout plan must be compiled using accepted archaeological techniques. Furthermore, the site must be cleared of vegetation and both recorded and photographed.Archival and historical research must be undertaken to attempt to obtain information with which the site can better be interpreted.A permit application to SAHRA for archaeological mitigation to take place.Once the permit is received, limited archaeological mitigation may be undertaken. This will likely take the form of using a metal detector to screen the site for metal artefacts as well as the excavation and archaeological screening of soil from within the stone enclosure. As no archaeological deposit per se is expected to be located here, these measures will be aimed at obtaining information with which the site can be better interpreted.An archaeological mitigation report must be compiled.A destruction permit application must be lodged with (SAHRA) to allow for the destruction of the site.	2	4	2	4	2	20 Low	52.4
Heritage: <u>Destruction of heritage site:</u> DBAP 38 comprises stonewalling and structures that can in all likelihood be associated with both the Late Iron Age and Historic Period. The possible presence of graves can also not be excluded.	-	4	4	3	6	3	52 Moderate	<ul style="list-style-type: none">The mine will undertake a social consultation process to assess whether any local residents or the wider public is aware of the presence of graves here.<ul style="list-style-type: none">Outcome 1: The social consultation absolutely confirms that no graves are located here.Outcome 2: The social consultation absolutely confirms that graves are located here.	2	3	3	4	2	20 Low	61.5

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance	
Heritage: <u>Destruction of heritage site:</u> Site DBAP 7 comprises a low-density surface scatter of Middle Stone Age lithics and is located within the proposed development footprint areas	-	4	4	3	6	3	52 Moderate <ul style="list-style-type: none"> Outcome 3: The social consultation does not yield any confident results. A permit application to SAHRA for archaeological mitigation to take place. Once the permit is received, a surface collection of the potsherds from each site can be made. Limited archaeological test excavations may also be required, should a deposit be identified. An archaeological mitigation report must be compiled. The completed mitigation report must be submitted to the relevant heritage authorities. Should graves be confirmed on any of these sites, a grave relocation process will comprise of the following steps: <ul style="list-style-type: none"> A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation. Bilingual site and newspaper notices indicating the intent of the relocation. Permits from all the relevant and legally required authorities. An exhumation process that keeps the dignity of the remains and family intact. An exhumation process that safeguards the legal rights of the families as well as that of the mining company. The process must be done by a reputable company well versed in the mitigation of graves. 	3	4	2	2	3	24 Low	53.8
Heritage: <u>Complete destruction of three sites containing potsherd scatters and which may be surface indications for unmarked graves.</u> DBAP 18, DBAP 20, DBAP 34 and DBAP 35 comprise of surface scatters of potsherds which can either be associated with the Late Iron Age or Historic Period. The possibility of such	-	3	5	3	6	3	42 Moderate <ul style="list-style-type: none"> The mine will undertake a social consultation process to assess whether any local residents or the wider public is aware of the presence of graves here <ul style="list-style-type: none"> Outcome 1: The social consultation absolutely confirms that no graves are located here. Outcome 2: The social consultation absolutely confirms that graves are located here. Outcome 3: The social consultation does not yield any confident results. 	2	4	2	4	2	20 Low	52.4

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance	
potsherd scatters providing surface indications for the presence of unmarked Pedi graves.							<ul style="list-style-type: none"> A permit application to SAHRA for archaeological mitigation to take place. Once the permit is received, a surface collection of the potsherds from each site can be made. Limited archaeological test excavations may also be required, should a deposit be identified. An archaeological mitigation report must be compiled. The completed mitigation report must be submitted to the relevant heritage authorities. Should graves be confirmed on any of these sites, a grave relocation process will comprise of the following steps: <ul style="list-style-type: none"> A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation. Bilingual site and newspaper notices indicating the intent of the relocation. Permits from all the relevant and legally required authorities. An exhumation process that keeps the dignity of the remains and family intact. An exhumation process that safeguards the legal rights of the families as well as that of the mining company. The process must be done by a reputable company well versed in the mitigation of graves. 							

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance	
Heritage: <u>Complete destruction of two Late Iron Age stonewalled sites</u> DBAP 48 and DBAP 50 comprise Late Iron Age stonewalled settlements located within the proposed development footprint areas	-	4	5	2	6	3	52 Moderate <ul style="list-style-type: none"> An archaeological site layout plan must be compiled using accepted archaeological techniques. During the recording of the archaeological site layout plan, an attempt must be made to identify any archaeological middens associated with these sites. Should such middens be identified, archaeological test excavations would be required. If no such middens are found, the next two mitigation measures comprising an archaeological excavation permit application and archaeological test excavations would not be required. A permit application to SAHRA for archaeological test excavations to take place. Once the permit is received, limited archaeological test excavations may also be required, should a deposit be identified. An archaeological mitigation report must be compiled. A destruction permit application must be lodged with (SAHRA) to allow for the destruction of the site. 	3	4	1	4	2	27 Low	48.1
Social: <u>Influx of job seekers into the study area</u> There is a likelihood that job seekers will move into the study area and seek accommodation in the villages located near the mine (specifically the Pakaneng Village and Kalkfontein). This may cause conflict with existing community members who currently feel that they have not been fairly considered for job opportunities at the mine.	-	3	2	2	6	1	30 Moderate <ul style="list-style-type: none"> Anglo will consider the establishment of a Community Monitoring Forum (CMF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The CMF will include the following: <ul style="list-style-type: none"> Enforcing local employment far as practically possible; Avoid the establishment of camps, hostels or temporary accommodation for workers. Assist employees (non-local) with suitable employment in the surrounding the area. Provide employees with adequate health support from the project team for work-related health problems, including the dissemination of the Health and Safety Policy -including HIV/AIDS policy, and any awareness training required as part of the general employment contract with contract or permanent staff. 	2	2	2	4	1	16 Low	46.7
Social: <u>Creation of employment and income</u> Prior to the construction phase, contractors will be employed to undertake the required site	+	3	2	1	8	1	33 Moderate <ul style="list-style-type: none"> Emerging employment opportunities should be targeted at local residents as well as people from the surrounding communities in cases where the skills cannot be obtained from immediately adjacent communities. 	4	2	1	8	1	44 Moderate	25.0

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance	
preparation activities in line with the development plan. This creation of employment will be short term, for the duration of the pre-construction and construction phases.							<ul style="list-style-type: none"> Recruitment of labour should be guided by Anglo's recruitment policies which should promote the employment of local labour by any appointed contractors. Anglo should ensure that a transparent process of employment is followed to limit opportunities for conflict situations. The support of local business and the use of their products and services should be promoted as far as possible. 							
Social: <u>Stakeholder concerns regarding insufficient women in the workplace (gendered division of labour)</u> Women still face barriers to entering and participating in the mining sector even though South African legislation compels companies to employ women at all levels. Der Brochen's Human Rights Due Diligence (HRDD) report also identified unfair employment practices as human rights infringements, and this includes women. According to the Der Brochen SLP, at the end of June 2018, Der Brochen employed 158 people, 45 of which were women (28%). Most of these women were in semi-skilled and junior positions. Gender equality needs to be considered in the planning phase of the project to ensure that equal employment outcomes for both women and men and to ensure that women are also employed in management positions at the mines.	-	4	2	1	6	1	<ul style="list-style-type: none"> Der Brochen's HR policy will support preferential employment opportunities for women, as well as measures to increase accessibility and safety considerations for women working in mines. Training and skills development focused on women will take place to increase their participation in the labour force. Continue the implementation of the management measures provided in the HRDD report, with HR input, to ensure equitable remuneration packages for women and their male counterparts. Institute a well-designed gender equality strategy for the project. 	3	2	2	4	1	24 Low	33.3

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance	
Social: <u>Perceived lack of coordinated disclosure of the Der Brochen project activities.</u> Proposed projects and developments often generate uncertainty, anxiety or fear due to lack of communication between the project, especially the Social Performance (SP) team and the communities. Perceived lack of information provided to the local communities by the SP team, especially with regards to employment and procurement opportunities has led to the erosion of trust, which affects the communities attitude towards the project, and Anglo operations in general. The capacity of the SP team is also inadequate to ensure proper, consistent and continuous engagement with stakeholders. Currently Der Brochen SP team consists of two team members, with one off-site support personnel, to engage with a total of 26 key villages spanning over a 30km radius.	-	4	2	2	6	1	40 Moderate <ul style="list-style-type: none"> Der Brochen Mine has an existing Stakeholder Engagement Plan (SEP), 2018, which provides for engagement protocols for their stakeholders. The SEP provides a platform for engagement with the surrounding communities and stakeholders, as well as issues of priorities for such stakeholders. also provides for measures in which provides stakeholders. Strengthen the capacity of the SP team to ensure proper engagement with stakeholders on a continuous basis to ensure that all stakeholder concerns and inputs are taken into consideration, especially for vulnerable groups 	3	2	2	4	1	24 Low	40.0

Nature of the impact Description of the impact including whether the impact is negative or positive	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance		
Social: <u>Perceived lack of support to local communities, especially women and youth to enable them to access opportunities at the mine</u> During focus group discussions, most of the community members had concerns regarding the mine's inability to build their capacity, especially with regards to training provision by the mine. Furthermore, stringent entry level requirements for employment were identified by community members as a way of deterring them from accessing opportunities. Currently the minimum requirement for Grade 12 and a significant number of the surrounding communities do not fulfil this requirement nor do they have any practical skills training which would be required by the mine. This reduces their chances of gaining employment at Der Brochen.	-	4	2	2	8	1	48 Moderate	<ul style="list-style-type: none">The Der Brochen SLP makes provision for training of existing employees, and not local communities. However, based on the lack of availability of skilled labour force in the area, Der Brochen has made opportunities available for communities to attend Adult Education and Training (AET), with a view to increasing their literacy levels.The SLP also makes provision for engineering learnerships programmes for local youth, whereby they can get on the job training at the mine and where opportunities exist, they can be absorbed.Information regarding these opportunities (how many people, from which communities, progress on learnerships) will be communicated to stakeholders through existing forums to clear any misconceptions.It is furthermore advised that recognition of prior learning and training take place for all applicants with the relevant skills, but who may not have the necessarily qualifications.	3	2	2	6	1	30 Moderate	37.5

Nature of the impact Description of the impact including whether the impact is negative or positive	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance		
Social: <u>Impact on the physical quality of the living environment due to construction activities</u> Clearing activities have the potential to create pollution or environmental degradation. Impacts such as noise, odour and dust have an impact on social well-being of society.	-	4	2	1	4	2	28 Low	<ul style="list-style-type: none">Implement social incident management procedure including the existing grievances to capture community and stakeholder concerns and grievances regarding environmental impacts.Bonfires and burning of waste materials will be prohibited.Where practicable, stockpiles of soils and materials will be located as far as possible from sensitive receptors, taking account of prevailing wind directions and seasonal variations in the prevailing wind.Wherever feasible, construction traffic will avoid sensitive roads (residential roads, congested roads, via unsuitable junctions, etc.) and that vehicles are kept clean and sheeted when on public roads.Timing of any large-scale vehicle movements to avoid peak hours on the local road network would also be beneficial.Vehicle speeds (especially on unpaved roads) will be reduced to limit the re-entrainment of dust. Implement Der Brochen's Emergency Preparedness Plan to communicate with communities regarding ways in which to respond during emergencies.	3	2	1	4	2	21 Low	25.0
Social: <u>Loss of cultural heritage</u> During clearing of land in preparation for construction, cultural heritage chance-finds (unmarked graves, archaeological tools etc) could be exposed.	-	2	2	1	8	1	22 Low	<ul style="list-style-type: none">Residents and landowners should inform mitigation measures when addressing any potential impact on cultural heritage sites.Implement the existing chance finds procedure to deal with how to project graves and heritage sites accidentally unearthed during construction.	1	2	1	4	1	7 Low	68.2
Social: <u>Health and social well-being</u> Construction-related public health impacts due to dust/air pollution and noise pollution associated with land clearing are possible.	-	4	2	1	4	1	28 Low	<ul style="list-style-type: none">Environmental pollution (noise, dust, etc.) must be limited as far as possible and the requirements of the EMP be implemented to reduce the impact on surrounding residents.The necessary safety precautions will be taken, and first aid supplies will be made available on site;All project employees (including contractors) will undergo health and safety training on induction and thereafter on a regular basis; Instruct contractors on how to work in line with the health and safety document	4	2	1	2	1	20 Low	28.6

Nature of the impact Description of the impact including whether the impact is negative or positive	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance		
								and site rules; and Appoint a Health and Safety representative.							
Traffic: The clearing of the site will result in an increase of heavy vehicle traffic on the internal road network while travelling to areas that need to be cleared. The impact of these heavy vehicles will be very low in terms of traffic as the number of vehicles is not excessive	-	2	1	1	2	1	8 Low	<ul style="list-style-type: none">The mine has prepared a Transport Management Plan which indicates that all traffic must abide by the speed limit (40km/h) and traffic signs are clearly visible.	2	1	1	2	1	8 Low	0.0
Air Quality: Dust generation associated with earth moving activities, land clearing, topsoil removal, material loading and hauling, has its own duration and potential for dust generation. However, dust particles will be suspended and thereafter deposited close to the construction activities. Climatic conditions, such as rainfall and wind, may influence the impact of dust generation in and around the project area.	-	3	2	2	6		30 Moderate	<ul style="list-style-type: none">The footprint of the proposed infrastructure area must be clearly demarcated.Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area.Moisture control will be necessary on large bare areas during dry season construction, in order to reduce the frequency and amount of dust suspended in the ambient air.The mine will implement adequate wet suppression techniques to limit dust release.The mine will implement a revegetation programme on the disturbed areas adjacent to the site clearance area.Continue with the current air quality monitoring programme.	2	2	1	4		14 Low	53.3
Stockpiling of Topsoil															
Soils, Land Use and Land Capability: Excavation and removal of topsoil from the proposed infrastructure areas, will lead to an increased risk of transportation of sediment from exposed soils in storm water runoff, leading to loss of natural topography, soil depth, soil volume and alteration of natural drainage pattern.	-	5	2	2	6	3	50 Moderate	<ul style="list-style-type: none">Construction personnel and construction vehicles should be kept to the bare minimal per site in order to reduce the construction footprint and potential of soil compaction.Soils should be stockpiled on the designated topsoil stockpile area.Prevent mixing of high-quality topsoil (A and B-horizons) with low quality underlying material to ensure sufficient volumes of high-quality soil for rehabilitation.	3	2	1	2	1	15 Low	70.0

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance		
Surface Water: Stripping of topsoil for DMS Stockpiles and portals can result in an increase in erosion from cleared areas. The stockpile could become eroded during storm events and result in localised deterioration of water quality due to increased turbidity and suspended solids in the Groot-Dwars River during storm events. Increased turbidity is reversible and surface water should return to pre-impact turbidity levels once sediment levels entering the watercourse are reduced. Settled sediments should naturally move downstream during periods of high flow flowing storm events.	-	4	3	1	6	1	40 Moderate	<ul style="list-style-type: none">Separate stockpiling of different soil type groups (to obtain the highest post-mining land capabilitySeparate stripping, stockpiling and replacing of soil horizons (A and B horizon) in the original natural sequence to combat hard setting and compaction, and maintain soil fertility.Stockpiles should be revegetated to establish a vegetation cover as an erosion control measure.Temporary berms can be installed, if necessary, around stockpile areas whilst vegetation cover has not established to avoid soil loss through erosion.All exposed soils on steep slopes must be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) in order to prevent dust generation resulting in vegetation smothering and sedimentation of the watercourses.Edge effects of all construction activities, which may affect floral habitat within surrounding areas, are to be strictly managed.	3	3	1	4	1	24 Low	40.0
Air Quality: Dust generation associated with stockpiling of topsoil will be of concern, however, dust particles will be suspended and thereafter deposited close to the construction activities. Climatic conditions, such as rainfall and wind, may influence the impact of dust generation in and around the project area.	-	3	2	2	6		30 Moderate	<ul style="list-style-type: none">The mine will implement an alien and invasive plant control planErosion control measures in the form of temporary erosion prevention berms will be implemented during construction.Where possible, activities will be limited to months of low rainfall (dry season) to reduce probability of potential impact.The topsoil stockpile will be vegetated and while vegetating, measures will be needed to contain erosion of the stockpile during rain events.The mine will implement adequate wet suppression techniques to limit dust release from stockpiling of topsoil.The topsoil stockpile footprint area will be demarcated.Stockpiling activities will be confined to the demarcated footprint areas.The mine will implement a revegetation programme on the topsoil stockpiles.	2	2	2	6		20 Low	33.3

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance	
							<ul style="list-style-type: none"> Weekly inspections of the stability of the stockpiles will be undertaken. If erosion and degradation of the topsoil stockpiles is noted during the weekly inspections, measures to stabilise the stockpiles will be investigated (chemical, rock cladding or vegetative), and be implemented. 							
Social: <u>Physical quality of the living environment</u> Impacts such as noise and dust are expected to occur during topsoil stockpiling and may have an impact on social well-being of communities located near the activities.	-	4	2	1	4	2	<ul style="list-style-type: none"> Implement social incident management procedure including the existing grievances to capture community and stakeholder concerns and grievances regarding environmental impacts Where practicable, stockpiles of soils and materials will be located as far as possible from sensitive receptors, taking account of prevailing wind directions and seasonal variations in the prevailing wind. Timing of any large-scale vehicle movements to avoid peak hours on the local road network would also be beneficial; Vehicle speeds (especially on unpaved roads) of 40km/h will be enforced to limit the re-entrainment of dust. Implement Der Brochen's Emergency Preparedness Plan to communicate with communities regarding ways in which to respond during emergencies 	3	2	1	4	2	21 Low	25.0
Traffic: The stockpiling of topsoil will result in an increase of heavy vehicle traffic on the internal road network when the trucks travel to and from the stockpiles. The impact of these heavy vehicles will be very low in terms of traffic as the number of vehicles is not excessive	-	2	1	1	2	1	<ul style="list-style-type: none"> The mine has prepared a Transport Management Plan which indicates that all traffic must abide by the speed limit and traffic signs are clearly visible. 	2	1	1	2	1	8 Low	0.0

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance		
Visual: Pre-construction activities will generate visual impacts related to earthworks, vehicles/plant/machinery and workers on site. Construction visual impacts are typically limited to the immediate area surrounding the site and the construction period. Dust generated at the site (e.g. dust from earthworks and trucks travelling on haul roads and dust deposited on off-site vegetation) is visually unappealing and may further detract from the visual quality of the receiving environment.	-	1	1	1	4	1	6 Low	<ul style="list-style-type: none">Update the dust suppression/control management programme plan to make provision for reducing dust on new dust-generating infrastructure/facilities, as required (i.e. when a plume is visible on site or when dust is being deposited on vegetation).Ensure speed limits on all haul/internal roads are respected at all times.Locate new haul roads on disturbed areas as far as possible.	1	1	1	4	1	6 Low	0.0
Use of existing gravel roads for pre-construction activities															
Surface Water: In an unmanaged scenario; alteration or damming of water where roads cross ephemeral drainage lines could negatively affect downstream ecosystems, promote significant erosion of water course banks, prevent the flow of surface water to the Groot-Dwars River, and cause flooding at and above the point of alteration or obstruction. The impact limited as there is seldom water in the water courses but there is reliance on this resource for aquatic, floral and faunal diversity (refer SAS, 2019). These are existing gravel roads and as such, it is anticipated that this impact is likely to be minimal.	-	2	2	1	4	1	14 Low	<ul style="list-style-type: none">The mine will design and construct crossing structures and stormwater outlets in compliance with Regulation 704	2	2	1	2	1	10 Low	28.6
Air Quality: Vehicle entrainment from construction vehicles will lead to suspended particulate matter being released into the ambient air.	-	3	2	2	6		30 Moderate	<ul style="list-style-type: none">Moisture control will be necessary on large bare areas during dry season construction, in order to reduce the frequency and amount of dust suspended in the ambient air.The mine will implement adequate wet suppression techniques to limit dust release.	2	2	1	6		18 Low	40.0

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance	
							<ul style="list-style-type: none"> All vehicles using the haul roads will be restricted to vehicle speeds of 40km/hr to limit the dust released from this source. 							
Social: <u>Physical quality of the living environment</u> Impacts such as noise and dust are expected to occur from trucks and machinery making use of the unsealed/gravel roads. This activity may have an impact on social well-being of communities near the activities.	-	4	2	1	4	2	<ul style="list-style-type: none"> Implement social incident management procedure including the existing grievances to capture community and stakeholder concerns and grievances regarding environmental impacts. Wherever feasible, construction traffic should avoid sensitive roads (residential roads, congested roads, via unsuitable junctions, etc.) and that vehicles are kept clean and sheeted when on public roads. Timing of any large-scale vehicle movements to avoid peak hours on the local road network would also be beneficial. Vehicle speeds (especially on unpaved roads) should be reduced to limit the re-entrainment of dust. Implement Der Brochen's Emergency Preparedness Plan to communicate with communities regarding ways in which to respond during emergencies 	3	2	1	4	2	21 Low	25.0
Social: <u>Health and social well-being</u> Public health impacts due to dust/air pollution and noise pollution associated construction vehicles on unsealed roads are possible.	-	4	2	1	4	1	<ul style="list-style-type: none"> Environmental pollution (noise, dust, etc.) must be limited as far as possible and the requirements of the EMP be implemented to reduce the impact on surrounding residents. The necessary safety precautions will be taken and first aid supplies will be made available on site; All project employees (including contractors) will undergo health and safety training on induction and thereafter on a regular basis; Instruct contractors on how to work in line with the health and safety document and site rules; and Appoint a Health and Safety representative. 	4	2	1	2	1	20 Low	28.6
Traffic: This will result in an increase of heavy vehicle traffic on the internal existing gravel roads. The impact of these heavy vehicles will be very low in terms of traffic as the number of vehicles is not excessive.	-	2	1	1	2	1	<ul style="list-style-type: none"> The mine has prepared a Transport Management Plan which indicates that all traffic must abide by the speed limit (40km/h) and traffic signs are clearly visible. If the gravel roads are in poor condition, the mine will gravel and compact the roads. The maintained of internal roads will be carried out on an ongoing basis. 	2	1	1	2	1	8 Low	0.0

Nature of the impact <i>Description of the impact including whether the impact is negative or positive</i>	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources	Significance		P	D	E	M	Loss of Resources	Significance		
Visual: Pre-construction activities will generate visual impacts related to earthworks, vehicles/plant/machinery and workers on site. Construction visual impacts are typically limited to the immediate area surrounding the site and the construction period. Dust generated at the site (e.g. dust from earthworks and trucks travelling on haul roads and dust deposited on off-site vegetation) is visually unappealing and may further detract from the visual quality of	-	1	1	1	4	1	6 Low	<ul style="list-style-type: none">Moisture control will be necessary on large bare areas during dry season construction, in order to reduce the frequency and amount of dust suspended in the ambient air.The mine will implement adequate wet suppression techniques to limit dust release.Ensure speed limits on all haul/internal roads are always respected.Locate new haul roads on disturbed areas as far as possible.	1	1	1	4	1	6 Low	0.0

10.2.2 Construction activities

The impacts and associated management measures associated with the construction activities are provided for in **Table 10-4**. These activities includes:

- Construction of infrastructure
- Construction of gravel maintenance roads to the proposed ventilation shafts
- Upgrading of existing gravel roads to tar roads to serve as main access roads
- Generation of construction waste

Table 10-4: Construction activities, anticipated impacts and recommended mitigation measures

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance		
Construction of infrastructure (DMS Plant, DMS Stockpile area and associated PCDs, conveyor belt systems, South Shaft, Ventilation shafts, staff accommodation and explosive destruction bay)															
Flora: The construction off infrastructure and access roads, haul roads and conveyor systems through natural, intact areas may lead to a loss of floral habitat, SCC, plant species diversity and habitat connectivity.	-	5	4	2	8	4	70 High	<ul style="list-style-type: none">Any mining surface infrastructure, including shafts, stockpiles and construction/ contractor's camps must be placed within transformed areas as far as possible.Edge effects of all construction activities, which may affect floral habitat within surrounding areas, are to be strictly managed.The mine will implement an alien and invasive plant control plan Erosion control measures in the form of temporary erosion prevention berms will be implemented during construction.Where possible, activities will be limited to months of low rainfall (dry season) to reduce probability of potential impactEnsure that the ephemeral drainage lines, rocky outcrops and areas containing floral SCC are demarcated as no-go zones for personnel and construction vehicles;As far as possible vehicles are to utilize the existing roads. Where this is not feasible, new roads are to be in areas of existing high disturbance, and not encroach upon sensitive habitats;Access roads will be planned and constructed in such a way as to avoid habitat fragmentation;	5	4	2	6	4	60 High	14.3

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
							<ul style="list-style-type: none"> A rehabilitation plan will be implemented upon completion of the construction activities to ensure that the affected areas return to an ecologically functioning state, thereby increasing habitat connectivity within affected areas. 							
Flora: Increased fire frequency and intensity, as well as uncontrolled fires due to increased human activity may impact on floral communities	-	5	2	1	8	3	55 Moderate <ul style="list-style-type: none"> Prevent all open fires; Provide fire safe zone facilities and suitable fire control measures; Use of trees, shrubs or any vegetation for fire making purposes is strictly prohibited; A Fire Management Plan (FMP) will be set in place to ensure that any fires that do originate can be managed and / or stopped before the significant damage to the environment occurs. 	3	2	2	2	1	18 Low	67.3
Flora: Loss of surrounding floral biodiversity and floral SCC through invasion of alien species in disturbed area. Specific mention in this regard is made to Category 1b species identified within the development footprint areas;	-	5	4	2	8	3	70 High <ul style="list-style-type: none"> The mine will Implement an alien and invasive plant control plan. 	4	4	2	6	2	48 Moderate	31.4
Flora: Soil compaction and erosion as a result of development activities and storm water runoff leading to a loss of floral diversity	-	5	4	3	8	3	75 High <ul style="list-style-type: none"> All soils compacted as a result of construction activities falling outside of the proposed infrastructure areas will be ripped and profiled. The mine will Implement an alien and invasive plant control plan. 	4	4	2	6	2	48 Moderate	36.0

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
Freshwater Aquatics: Surface impacts (blasting, drilling and shaft preparation) has the potential to lead to the contamination of freshwater resources due to chemicals/hydrocarbons contamination and/or increased sedimentation. This will have a negative impact on riparian and in-stream habitat and/or biota. The South Shaft (and preferred South Shaft Complex) is located closer to the Groot Dwars River, but above the Der Brochen Dam. Any potential impacts in terms of sedimentation and erosion risk downstream of the South Shaft, will thus be mitigated by the inundated conditions in the existing Der Brochen Dam, as sediment will be at least partially contained therein.	-	4	2	3	6	3	44 Moderate <ul style="list-style-type: none"> Sheet runoff from access roads should be slowed down by the strategic placement of berms; A soil management plan, including erosion / run-off control for construction phase to be developed and implemented. As far as possible, all construction activities should occur in the low flow season, during the drier winter months. Monitor all areas outside of the development footprint for erosion and incision Fresh concrete and cement mortar should not be mixed near the watercourses. Mixing of cement may be done within the construction camp, may not be mixed on bare soil, and must be within a lined, bound or bunded portable mixer. Consideration must be taken to use ready mix concrete; No mixed concrete shall be deposited directly onto the ground within the watercourses or its associated riparian habitat. A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited whilst it awaits placing. Cement bags must be disposed of in the demarcated hazardous waste receptacles and the used bags must be disposed of through the hazardous substance waste stream; and Spilled or excess concrete must be disposed of at a suitable landfill site 	2	2	2	2	1	12 Low	72.7

Nature of the impact	Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance	P		D	E	M	Loss of Resources (%)	Significance			
Freshwater Aquatics: Alteration of the hydrological characteristics of the local catchment due to the creation of stockpiles, especially within drainage lines, may lead to: - Loss of recharge to downstream systems; - Potential erosion of terrestrial areas as preferential flow paths are formed in the landscape; - Potential for erosion and sedimentation of freshwater resources, leading to altered channel competency and altered vegetation community composition; and - Altered runoff peaks leading to changes in the hydrological regime of the freshwater resources.	-	4	5	2	6	4	52 Moderate	<ul style="list-style-type: none">Construct and maintain clean and dirty water management infrastructure A soil management plan, including erosion / run-off control for construction phase to be developed and implementedImplement the biodiversity, surface and groundwater monitoring programmes.If the monitoring programme identifies significant changes in water quality, the mine must investigate the source and implement appropriate actions.All wet and dry material should be stored within the construction camp, and these materials should be covered and contained to prevent contact with rainfall or runoff.	3	4	1	2	2	21 Low	59.6	
Freshwater Aquatics: Construction activities relating to supporting structures (conveyor supports, powerline pylons, bridge crossings), and the mixing and casting of concrete has the potential to impact on the freshwater aquatics.	-	4	2	1	6	3	36 Moderate	<ul style="list-style-type: none">Contractor laydown areas, material storage facilities and mixing of concrete to remain outside of the stipulated NEMA zone of regulation (32m) applicable to each freshwater resource.This zone of regulation must be demarcated clearly by the ECO prior to the commencement of construction activities;	2	2	1	4	1	14 Low	61.1	
Soils, Land Use and Land Capability: Movement of heavy machinery / construction vehicles off existing/demarcated roads, leading to soil compaction and potential spillage from machinery / construction vehicles	-	4	2	1	6	1	36 Moderate	<ul style="list-style-type: none">All vehicular traffic should be restricted to the existing service roads and the selected haul road servitude as far as practically possibleCompacted soils adjacent to the mining related infrastructure footprint can be lightly ripped to at least 25 cm below ground surface to alleviate compaction prior to re-vegetation.	2	2	1	2	2	10 Low	72.2	
Soils Land Use and Land Capability: Construction of surface infrastructure increasing the potential risk of soil erosion, dust emission, sedimentation	-	4	4	1	8	2	52 Moderate	<ul style="list-style-type: none">Sheet runoff from access roads should be slowed down by the strategic placement of berm.A soil management plan, including erosion / run-off control for construction phase to be developed and implemented.	2	2	1	2	1	10 Low	80.8	

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
and disposal of waste on soil resources, leading to altered soil chemistry and quality and/or altered flow patterns due to instream blockages.							<ul style="list-style-type: none"> As far as possible, all construction activities should occur in the low flow season, during the drier winter month. Monitor all areas outside of the development footprint for erosion Exposed slopes especially along the riparian areas are highly prone to erosion, so drainage control features such as earth berms, perimeter berm/swales, or diversions. Any gullies occurring as a result of erosion from the construction activities must be actively repaired by means of brush layering or live gully repair: <ul style="list-style-type: none"> Brush layering is effective for earth reinforcement and mass stability. Brush layers break up the slope length, preventing surface erosion, and reinforce the soil with branch stems and roots, providing resistance to sliding or shear displacement. Brush layers also trap debris, aid infiltration on dry slopes, dry excessively wet sites, and mitigate slope seepage by acting as horizontal drains. Brush layers facilitate vegetation establishment by providing a stable slope and a favourable microclimate for growth of vegetation. Live gully repair is a technique that is similar to branch packing but is used to repair rills and gullies. Live gully repairs offer immediate reinforcement and reduce the velocity of concentrated flows. They also provide a filter barrier that reduces further rill and gully erosion and must be used where gully erosion is taking place on the project footprint. Stream banks must be reprofiled to the pre-construction upstream and downstream slopes 							

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
Surface Water: Reduction in water quality due to an increase in turbidity as a result of an increase in erosion due to cleared, compacted or hard standing areas. Increased turbidity is reversible and surface water should return to pre-impact turbidity levels once sediment levels entering the watercourse are reduced. Settled sediments should naturally move downstream during periods of high flow flowing storm events	-	4	2	1	8	1	44 Moderate <ul style="list-style-type: none"> Flood protection berms should be constructed at the area where the Southern Portal and DMS Stockpile Erosion control measures in the form of temporary erosion prevention berms should be implemented during construction. Clean water diversion bunds should be constructed upstream of the construction site prior to clearing areas for new infrastructure. PCD's should be constructed downstream of the working activities to minimize uncontrolled runoff from the site. Areas disturbed by construction activities should be rehabilitated immediately on completion of construction of each area. Activities should be limited to months of low rainfall (dry season) to reduce probability of potential impact. 	3	2	1	6	1	27 Low	38.6
Surface Water: Provision of hard standing areas and compacted areas will reduce infiltration and increase the volume and velocity of stormwater runoff with subsequent potential for damming of water and flooding. Increased runoff velocity	-	3	2	1	2	1	15 Low <ul style="list-style-type: none"> Stormwater measures should be appropriately designed to allow for free flow of water Areas should be appropriately graded to prevent ponding. 	2	2	1	2	1	10 Low	33.3
Surface Water: Deterioration in surface water quality due to spillages and accidental discharges. Spillages and accidental discharges could result in the contamination of surface water resources. Localised accidental spillages of hydrocarbons (diesel, oils etc.) from earthmoving and construction equipment, hazardous substances (ammonia nitrates for blasting) and other potentially polluting materials including human waste, could result in contaminated runoff leaving the site if spillages are not	-	2	2	1	2	1	10 Low <ul style="list-style-type: none"> Clean water diversions should be constructed prior to clearing areas for new infrastructure. Hazardous substances and potentially polluting materials should be stored in appropriately bunded areas located outside of the riparian zone. Bunds should be designed for a capacity of 110% of the stored material. Servicing and maintenance of vehicles and equipment should be done outside the riparian zone in appropriate facilities designed for this purpose. Contractors should be adequately trained in handling of hazardous substances and potentially polluting materials especially during transport in the vicinity of the riparian zone, e.g. over river crossings. 	1	2	1	2	1	5 Low	50.0

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
contained or inadequate emergency control measures are in place. This could result in indirect contamination of the surface water resources.							<ul style="list-style-type: none">Contractors should be made aware of the WUL conditions that apply during construction and made liable for environmental damages caused by spillages. Emergency action plans should be drawn up to deal with spillages.Contaminated runoff should be contained and reused as necessary e.g. for dust suppression.Chemical toilets should be provided at construction sites.							
Surface Water: <u>Alteration of catchment hydrology causing change in watercourse functionality and increased risk of flooding and scouring.</u> Surface drainage paths exist within the footprint area of the proposed infrastructure which capture water during rainfall events, but most of the time are dry. The hydrology of these water courses will have to change to allow the development of the portals and stockpiles, and clean water diversions will be required to route catchment water around these areas. This alteration of catchment hydrology can cause a change in watercourse functionality which, without adequate clean water diversions or suitable grading of areas, could result in an increased risk of flooding upstream (impedance of flow) which could result in damage to property and infrastructure. The impact will be localised but will remain throughout the activity	-	3	4	2	6	2	<ul style="list-style-type: none">Appropriately designed and constructed crossing structures and stormwater outlets in compliance with Regulation 704 will reduce the potential for erosion.The mine will undertake ongoing monitoring and maintenanceStormwater measures should be appropriately designed to allow for free flow of waterThe mine will implement the conditions of the storm water management plan	2	4	2	6	2	24 Low	33.3

Nature of the impact	Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance	P		D	E	M	Loss of Resources (%)	Significance			
Surface Water: Provision of hard standing areas will reduce infiltration and increase the volume and velocity of stormwater runoff with subsequent potential for damming of water and flooding as discussed above	-	3	2	1	2	1	15 Low	<ul style="list-style-type: none">Stormwater measures should be appropriately designed to allow for free flow of waterThe mine will implement the conditions of the storm water management planAreas should be appropriately graded to prevent ponding.	2	2	1	2	1	10 Low	33.3	
Noise: <i>Blasting of the decline shaft portal</i> Blasting during the construction phase will be the biggest increase in the prevailing ambient noise level on an intermittent basis. The blasting activities during the construction phase must be done in conjunction with the safe blasting techniques and monitoring of each blast must take place. The use of mechanised machinery will create a noise increase in the immediate vicinity of the construction activity.	-	3	2	2	6	2	30 Moderate	<ul style="list-style-type: none">Blasting to be done during daytime and to use the safe blasting techniques.Ground vibration monitoring must be done at the nearest residential areas during each blast.Environmental noise monitoring must be undertaken on a quarterly basis.	3	2	2	4	2	24 Low	20.0	
Air Quality This phase will comprise a series of different operations including material loading and hauling, compacting, grading(etc.). These activities will have the potential to release dust. However, dust particles will be suspended and thereafter deposited close to the construction activities. Climatic conditions, such as rainfall and wind, may influence the impact of dust generation in and around the project area.	-	4	2	2	6		40 Moderate	<ul style="list-style-type: none">Wet suppression will be necessary on large bare areas during dry season construction, in order to reduce the frequency and amount of dust suspended in the ambient air.The mine will implement adequate wet suppression techniques to limit dust release.The mine will implement a revegetation programme on the disturbed areas adjacent to the site clearance area.	2	2	1	6		18 Low	55.0	

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
Heritage: All impacts relating to heritage assessments were assessed under the planning stage of the pre-construction activities, as the heritage management plans needs to be undertaken prior to site clearing activities commencing. However, there is a possibility that additional heritage sites can be identified during pre-construction activities. As such, a chance find procedure must be undertaken.							<ul style="list-style-type: none"> The following 'Chance find Procedure' will be followed if further historical features are identified within the project footprint: <ul style="list-style-type: none"> Upon finding any archaeological or historical material all work at the affected area must cease. The area should be demarcated in order to prevent any further work there until an investigation has been completed. An archaeologist should be contacted immediately to advise the applicant and contractor of the required processes to be followed. If needed, the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist. The removal of such archaeological material will be done by the archaeologist in lieu of the approval given by SAHRA, including any conditions stipulated by the latter. Work on site will only continue after removal of the archaeological/ historical material was done. 							
Social: <u>Influx of job seekers into the study area</u> There is a likelihood that job seekers will move into the study area and seek accommodation in the villages located near the mine (specifically the Pakaneng Village and Kalkfontein). This may cause conflict with existing community members who currently feel that they have not been fairly considered for job opportunities at the mine.	-	3	2	2	6	1	30 Moderate	2	2	2	4	1	16 Low	46.7
Social: <u>Creation of employment and income</u> During the construction phase, contractors will be employed to undertake the required construction activities in line with the development plan. This creation of employment will be short term, for the duration of the pre-construction and construction phases.	+	3	2	1	8	1	33 Moderate	4	2	1	8	1	44 Moderate	25.0

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
							<ul style="list-style-type: none"> Anglo should ensure that a transparent process of employment is followed to limit opportunities for conflict situations. The support of local business and the use of their products and services should be promoted as far as possible. 							
Social: <u>Physical quality of the living environment</u> Impacts such as noise and dust are expected to occur from construction trucks and machinery. This activity may have an impact on social well-being of communities in close proximity to the activities.	-	4	2	1	4	2	<ul style="list-style-type: none"> As with noise impacts, a comments and complaints register, accessible to members of public, should be implemented and maintained; Wherever feasible, construction traffic should avoid sensitive roads (residential roads, congested roads, via unsuitable junctions, etc.) and that vehicles are kept clean and sheeted when on public roads; Timing of any large-scale vehicle movements to avoid peak hours on the local road network would also be beneficial; and Vehicle speeds (especially on unpaved roads) should be reduced so as to limit the re-entrainment of dust. 	3	2	1	2	2	15 Low	46.4
Social: <u>Health and social well-being</u> Public and workforce health impacts due to dust/air pollution and noise pollution associated construction vehicles and machinery on site.	-	3	2	1	4	1	<ul style="list-style-type: none"> Environmental pollution (noise, dust, etc.) must be limited as far as possible and the requirements of the EMP be implemented to reduce the impact on surrounding residents. The necessary safety precautions should be taken, and first aid supplies should be made available on site. All project employees (including contractors) should undergo health and safety training on induction and thereafter on a regular basis. Instruct contractors on how to work in line with the health and safety document and site rules. The mine will appoint a Health and Safety representative. 	2	2	1	2	1	10 Low	52.4
Traffic: This will result in an increase of heavy and light vehicle traffic on the internal roads. The impact of these vehicles will be very low in terms of traffic as the number of vehicles is not excessive.	-	2	2	1	2	1	<ul style="list-style-type: none"> The mine will maintain the internal roads. Gravel roads will be regraded and compacted. Asphalt roads will undergo pothole repair and resurfacing where necessary. The maintenance of internal roads will be carried out on an ongoing basis. 	2	2	0	2	1	8 Low	20.0

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance		
Visual: Altered sense of place and visual intrusion caused by infrastructure.	-	5	4	2	8	3	70 High	<ul style="list-style-type: none">Moisture control will be necessary on large bare areas during dry season construction, in order to reduce the frequency and amount of dust suspended in the ambient air.The mine will implement adequate wet suppression techniques to limit dust release.	3	4	2	2	1	24 Low	65.7
Construction of gravel maintenance roads to the proposed ventilation shafts															
Soils, Land Use and Land Capability: Movement of heavy machinery / construction vehicles off existing/demarcated roads, loading to soil compaction and potential spillage from machinery / construction vehicles	-	4	2	1	6	1	36 Moderate	<ul style="list-style-type: none">All vehicular traffic should be restricted to the existing service roads and the selected haul road servitude as far as practically possible.Compacted soils adjacent to the mining blocks and associated infrastructure footprint can be lightly ripped to at least 25 cm below ground surface to alleviate compaction prior to re-vegetation.	2	2	1	2	2	10 Low	72.2
Surface Water: Deterioration of surface water quality due to erosion, spillages and accidental discharges at conveyor or road crossings.	-	3	4	1	6	1	33 Moderate	<ul style="list-style-type: none">Construction should take place in the low flow period (dry season) as far as possible.Areas disturbed by linear construction activities should be rehabilitated immediately on completion of construction of each area.Erosion protection and energy dissipaters should be constructed at the crossings as applicable.Contractors should be made aware of the WUL conditions that apply during construction and made liable for environmental damages caused by spillages.Emergency action plans should be drawn up to deal with spillages.Chemical toilets should be provided at construction sites.Rehabilitation should include ripping of compacted soils and revegetation of ripped and other disturbed areas.	2	4	1	6	1	22 Low	33.3
Surface Water: Reduced availability of water to downstream users due to obstruction of flow at crossings	-	4	4	1	6	1	44 Moderate	<ul style="list-style-type: none">Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event.Erosion protection and energy dissipaters should be constructed at the crossings as applicable	3	4	1	4	1	27 Low	38.6

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance		
Air quality: This phase will comprise of land clearing, compacting and grading. These activities will have dust impacts.	-	3	2	2	6	1	30 Moderate	<ul style="list-style-type: none">The mine will implement adequate wet suppression techniques to limit dust release.	2	2	1	4		14 Low	53.3
Social: <u>Physical quality of the living environment</u> Impacts such as noise and dust are expected to occur from trucks and machinery making use of the unsealed/gravel roads. This activity may have an impact on social well-being of communities near the activities.	-	4	2	1	4	2	28 Low	<ul style="list-style-type: none">Implement social incident management procedure including the existing grievances to capture community and stakeholder concerns and grievances regarding environmental impacts Bonfires and burning of waste materials should be prohibited; Where practicable, stockpiles of soils and materials should be located as far as possible from sensitive receptors, taking account of prevailing wind directions and seasonal variations in the prevailing wind. Wherever feasible, construction traffic should avoid sensitive roads (residential roads, congested roads, via unsuitable junctions, etc.) and that vehicles are kept clean and sheeted when on public roads; Timing of any large-scale vehicle movements to avoid peak hours on the local road network would also be beneficial; and Vehicle speeds (especially on unpaved roads) should be reduced so as to limit the re-entrainment of dust. Implement Der Brochen's Emergency Preparedness Plan to communicate with communities regarding ways in which to respond during emergencies	3	2	1	4	2	21 Low	25.0
Social: <u>Health and social well-being</u> Public and workforce-related health impacts due to dust/air pollution and noise pollution associated construction vehicles and machinery on site particularly during clearing for the construction of the gravel roads. Noise pollution may be generated if blasting is required for the construction of the ventilation shafts.	-	3	2	2	6	1	30 Moderate	<ul style="list-style-type: none">Environmental pollution (noise, dust, etc.) must be limited as far as possible and the requirements of the EMP be implemented to reduce the impact on surrounding residents. The necessary safety precautions should be taken, and first aid supplies should be made available on site; All project employees (including contractors) should undergo health and safety training on induction and thereafter on a regular basis; Instruct contractors on how to work in line with the health and safety document and site rules; and Appoint a Health and Safety representative.	2	2	2	4	1	16 Low	46.7

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance		
Traffic: This will result in an increase of heavy and light vehicle traffic on the internal roads when traveling to and from the roads that are being constructed. The impact of these vehicles will be very low in terms of traffic as the number of vehicles is not excessive.	-	1	2	1	2	1	5 Low	<ul style="list-style-type: none">The mine has prepared a Transport Management Plan which indicates that all traffic must abide by the speed limit (40km/h) and traffic signs are clearly visible.If the gravel roads are in poor condition, the mine will gravel and compact the roads.The maintained of internal roads will be carried out on an ongoing basis.	1	2	0	2	1	4 Low	20.0
Upgrading of existing gravel roads to tar roads to serve as main access roads															
Soils, Land Use and Land Capability: Movement of heavy machinery / construction vehicles off existing/demarcated roads, leading to soil compaction and potential spillage from machinery / construction vehicles	-	4	2	1	6	1	36 Moderate	<ul style="list-style-type: none">*Compacted soils adjacent to the mining blocks and associated infrastructure footprint can be lightly ripped to at least 25 cm below ground surface to alleviate compaction prior to re-vegetation.	2	2	1	2	2	10 Low	72.2
Surface Water: Deterioration of surface water quality due to erosion, spillages and accidental discharges at conveyor or road crossings.	-	3	4	1	6	1	33 Moderate	<ul style="list-style-type: none">Construction should take place in the low flow period (dry season). Areas disturbed by linear construction activities should be rehabilitated immediately on completion of construction of each area. Erosion protection and energy dissipaters should be constructed at the crossings as applicable. Contractors should be made aware of the WUL conditions that apply during construction and made liable for environmental damages caused by spillages. Emergency action plans should be drawn up to deal with spillages. Chemical toilets should be provided at construction sites. Rehabilitation should include ripping of compacted soils and revegetation of ripped and other disturbed areas.	2	4	1	6	1	22 Low	33.3
Surface Water: Reduced availability of water to downstream users due to obstruction of flow at crossings	-	4	4	1	6	1	44 Moderate	<ul style="list-style-type: none">Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event.Erosion protection and energy dissipaters should be constructed at the crossings as applicable	3	4	1	4	1	27 Low	38.6

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance		
Air quality: Grading of the existing haul road to prepare the surface for tar will give rise to dust impacts.	-	3	2	2	4		24 Low	<ul style="list-style-type: none">The mine will implement adequate wet suppression techniques to limit dust release.	1	2	1	4		7 Low	70.8
Social: <u>Health and social well-being</u> Impacts such as noise and dust are expected to occur from construction trucks and machinery during the road upgrades. In addition to this, the health and safety aspects of the surrounding communities need to be considered specifically with regards to access roads which may be constructed off or not confined to the mine's property. The hazards associated with the construction of the access roads are therefore more easily accessed by community members, members of the general public and road users.	-	3	2	2	6	1	30 Moderate	<ul style="list-style-type: none">Environmental pollution (noise, dust, etc.) must be limited as far as possible and the requirements of the EMP be implemented to reduce the impact on surrounding residents.The necessary safety precautions should be taken, and first aid supplies should be made available on site.All project employees (including contractors) should undergo health and safety training on induction and thereafter on a regular basis.Instruct contractors on how to work in line with the health and safety document and site rules.Appoint a Health and Safety representative.	3	2	2	4	1	24 Low	20.0
Traffic: This will result in an increase of heavy and light vehicle traffic on the internal roads when traveling to and from the roads that are being upgraded to asphalt. The impact of these vehicles will be very low in terms of traffic as the number of vehicles is not excessive.	-	1	2	1	2	1	5 Low	<ul style="list-style-type: none">The mine will maintain the internal roads.Gravel roads will be regraded and compacted.Asphalt roads will undergo pothole repair and resurfacing where necessary.The maintenance of internal roads will be carried out on an ongoing basis.	1	2	0	2	1	4 Low	20.0
Generation of construction waste															
Flora: Disposal of construction related waste material in the surrounding habitat	-	4	2	1	6	2	36 Moderate	<ul style="list-style-type: none">A waste management plan will be developed for the construction phaseSorting of solid waste into recyclable and non-recyclable waste streams will be undertaken.	2	2	1	6	1	18 Low	50.0

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
Soils, Land Use and Land Capability: Potential indiscriminate disposal of hazardous and non-hazardous materials wastes within freshwater resources, leading to Altered water quality, possible changes to flow patterns as a result of blockages caused by solid wastes/rubble.	4	2	1	6	1	36 Moderate	<ul style="list-style-type: none"> Storage of domestic and hazardous waste will be undertaken within designated waste storage facilities. The waste storage area must be clearly marked with signage boards and fenced off. Waste will be removed off site by a licensed contractor to a suitable licensed facility. All construction related waste and material is to be disposed of at a registered waste facility; No waste of construction rubble is to be dumped in the freshwater features or surrounding habitats. Burying or burning of any waste including rubble, domestic waste, empty containers on the site will be strictly prohibited and all construction rubble waste must be removed to an approved disposal site. Provide sufficient on-site ablution, sanitation and waste management facilities. 	2	2	1	2	2	10 Low	72.2

10.2.3 Operational activities

The impacts and associated management measures associated with the operational activities are provided for in **Table 10-5**. These activities are:

- Underground mechanised mining at South Shaft
- Temporary hauling of ore
- Operation of Conveyor Systems
- Stockpiling of ore material at Mototolo Concentrator
- Operation of the Chrome Recovery Inter-Stage Plant
- Operation of the DMS Plant
- Deposition of DMS material onto the DMS Stockpile Area
- Utilisation of storm water management infrastructure at shafts, and PCD's at DMS stockpile
- Utilisation of the Staff Accommodation near the Der Brochen Dam
- Utilisation of tar access roads
- Utilisation of gravel maintenance roads associated with the ventilation shafts
- Dangerous Goods storage (including hydrocarbons/chemicals/explosives)
- Waste Management

Table 10-5: Operational activities, anticipated impacts and recommended mitigation measures

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance		
Underground mechanised mining at South Shaft															
Surface Water: Reduced availability of water to downstream users due to containment of dirty water and alteration of catchment hydrology (volume). The rainfall that falls within this area will be removed from the catchment and may reduce the quantity of water available to downstream users. The probability that the impact will be contained to the site and will occur for the duration of the project is definite. Therefore, this impact is rated as having a moderate	-	5	4	1	4	1	45 Moderate	<ul style="list-style-type: none">• Maintain all water management structures so that only dirty water is contained, and clean water is diverted to the natural environment.• Clean and dirty water separation systems must be constructed and be maintained to contain spills/leaks. All dirty water containment facilities will be adequately lined to prevent seepage.• All facilities with the potential to generate dirty storm water runoff, effluent or washdown water will be located within the designated dirty water area.• Clean runoff will be diverted around the designated dirty areas by means of cut-off canals, sized to accommodate at least the 1:50 year peak flow event.	5	4	1	2	1	35 Moderate	22.2

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance		
significance. However, loss of MAR due to dirty water containment is considered of LOW significance to the B41G catchment but will remain locally at Moderate.							<ul style="list-style-type: none">Weekly inspections of stormwater canals and dirty water containment facilities must be undertaken.When incidents are identified (such as spills, blockage, siltation, etc.), undertake the necessary actions to mitigate.								
Surface Water: Limited water available to sustain mine. The mine has limited water available under the current water authorizations to sustain the mine without water conservation and storage of excess water.	-	5	4	2	8	3	70 High	<ul style="list-style-type: none">Buffer storage and water conservation are critical to sustain the mine.	4	4	2	8	4	56 Moderate	20.0
Groundwater: Potential Contamination of shallow groundwater resources due to accidental hydrocarbon or other chemical spillages, vehicles and operational activities. Spillages are however commonly minor and localized. If properly contained and/or excavated quickly impacts are reversible and unlikely to occur.	-	2	3	2	6	2	22 Low	<ul style="list-style-type: none">The mine will develop and maintain a Standard Operating Procedure to contain and remediate any accidental hydrocarbon or other chemical spillages.Spill kits should be made available and used in the event of a spill.Contain spillage, excavated and dispose of contaminated material/soil required at accredited disposal site.	2	3	1	4	2	16 Low	27.3
Groundwater: There are no 3rd party groundwater users within 1km of the underground workings. Localized lowering of the water level within the shallow weathered aquifer due to dewatering of the box-cut and shaft	-	3	4	2	4	2	30 Moderate	<ul style="list-style-type: none">The mine will undertake continuous monitoring of water levels in monitoring boreholes in the shallow weathered aquifer.The mine will undertake monitoring of piezometric head from installed piezometers for the shallow and deep aquifer (limited hydraulic connection between the shallow and deep aquifer).Excess water must be pumped to the surface water storage facilities for re-use.	3	4	1	4	2	27 Low	10.0
Groundwater: Change of the ambient water quality due to underground mine workings	-	3	4	1	4	2	27 Low	<ul style="list-style-type: none">Geochemical results indicate that the material to be exposed is non-acid generating.Leach test results suggest limited impacts of seepage from the exposed underground mine material.Dewatering qualities must be measured at the transfer and pollution control dams.	3	4	1	2	1	21 Low	22.2

Nature of the impact	Significance of potential impact BEFORE mitigation							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance	P		D	E	M	Loss of Resources (%)	Significance			
Air Quality: Gaseous emissions (i.e. SO2, NOx and PM) from ventilation shafts would impact on the ambient air quality. These impacts, however, are expected to be localized and will not exceed NAAQS at surrounding sensitive receptors.	-	4	4	1	4		36 Moderate	<ul style="list-style-type: none">The mine will undertake regular maintenance and will ensure that the technology meet supplier specifications and acceptable occupational health and safety limits.The mine will develop and implement a routine emissions and ambient air quality monitoring programme to determine whether there are any significant increases in emissions and impacts on sensitive receptors.If ambient concentrations exceed NAAQS, investigate options for increasing the stack heights and/or the exit velocities to increase the dispersion potential of the gasses emitted.Implement the corrective action according to the investigation results. The mine will implement of the air quality monitoring programme.	4	4	1	2		28 Low	22.2	
Social: <u>Unfavourable perceptions of the project</u> Proposed projects and developments often generate uncertainty, anxiety or fear due to lack in communication between the project developer and the mine. The credibility or trust in the mine will affect the communities' attitude towards the operation of the proposed activities and may result in community tension and unrest specifically due to the stigma associated with mechanized mining.	-	4	4	2	8	1	56 Moderate	<ul style="list-style-type: none">It is advised that the communities be engaged with on platforms suitable to their needs and take their access to online (internet) resources as well as transport (travel to centralized meetings far from their homes) into consideration.	3	2	2	6	1	30 Moderate	46.4	
Social: <u>Lack of employment creation and increase in unemployment</u> With the Der Brochen project now incorporating the Mototolo mine, it is anticipated that Der Brochen will take over labourer's from the Mototolo mine, thus reducing the number of employment opportunities required	-	4	2	2	8	1	48 Moderate	<ul style="list-style-type: none">Emerging employment opportunities should be targeted at local residents as well as people from the surrounding communities in cases where the skills cannot be obtained from immediately adjacent communities.The mine must provide the surrounding communities with practical skills training so that they have the opportunity to upskill themselves and apply for jobs with the mine. Recruitment of labour should be guided by	3	2	2	6	1	30 Moderate	37.5	

Nature of the impact		Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
		P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance		
It is not anticipated that the construction of the proposed additional activities at Der Brochen mine will create employment for a significant number of people however, some employment opportunity may be available for unskilled, semi-skilled and skilled labour.								<p>Anglo's recruitment policies which should promote the employment of local labour.</p> <ul style="list-style-type: none">The recruitment process must be transparent and communicated to stakeholders in order to limit opportunities for conflict situations.Der Brochen's contractor management plan also needs to be implemented to ensure that appointed contractors also employ locally as far as practically possible. Support for local businesses through SMME development should be prioritized, with support from other surrounding mines, business forums and the municipality.The appointment of local business and the use of their products and services should be promoted as far as practically possible, as it will potentially open up opportunities for local employment.								
Social: <u>Capacity building</u> On a short-term basis, mechanization generally has a negative effect on the labour complement and on the communities in which these mining companies operate. However, mechanization may not necessarily lead to job losses but to different employment demographics such as the employment of more skilled people and to the upskilling of the current workforce. This will also help mitigate the impact of mine closure.		+	2	4	2	4	1	20 Low	<ul style="list-style-type: none">It is advised that Anglo provide training and skills development programme specifically tailored to local persons interested in obtaining employment as part of municipal infrastructure programme.It is furthermore advised that recognition of prior learning and training take place for all applicants with the relevant skills, but who may not have the necessarily qualifications. In order to ensure that all Anglo's policies and procedures translate into real time benefits to the local community it must become a requirement of all tender procedures that bidders comply with Anglo principles and policies.The use of local business should also be promoted as far as possible by providing them with preferential procurement status.	3	4	2	6	1	36 Moderate	44.4
Noise: Crushing activities at the southern decline shaft could increase the noise levels at the noise receptors A, D, E, K, L and M on an intermittent basis during the night-time period in the winter (refer to Figure 9-23).			3	4	2	6	2	36 Moderate	<ul style="list-style-type: none">All noise sources exceeding 85.0dBA to be identified and if practical to be acoustically screened off.The mouth of the up-cast shaft to face away from the residential areas to the east and the mouth must face in a northerly direction.	2	4	2	4	2	20 Low	44.4

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
Noise: Ventilation shaft noise from the southern ventilation up cast shafts which could increase the noise levels at the noise receptors A, D, E, K, L and M on an intermittent basis during the night-time period in the winter (refer to Figure 9-23).	4	4	2	6	2	48 Moderate	<ul style="list-style-type: none"> Emergency generators to be placed in such a manner that it is away from any residential area. Noise monitoring to be carried out along the footprint boundaries at the Mototolo concentrator plant, decline shafts (north and south), ventilation shafts, ventilation plant, overland conveyor and central ventilation plant. Noise monitoring at the residential areas and the mine boundaries to be done on a quarterly basis for a year after which the frequency can change to an annual basis. Noise survey to be done on a quarterly basis and after one year to change to an annual basis if the prevailing ambient noise levels at the footprint boundaries are in line with the 70.0dBA threshold value. Actively manage the process and the noise management plan must be used to ensure compliance to the noise regulations and/or standards. The levels to be evaluated in terms of the baseline noise levels. 	3	4	2	4	2	30 Moderate	37.5
Vibration: Blasting impact at noise receptor V during underground blasting at Blocks A, B, C, D, E and F (refer to Figure 9-24).	3	4	2	6	2	36 Moderate	<ul style="list-style-type: none"> Ground vibration blasting to be measured at noise receptor V during underground blasting on an ongoing basis to determine if the threshold values for ground vibration levels according to USBM RI 8507 of 12.7mm/s to 50.8mm/s are adhered to. 	3	4	2	4	2	30 Moderate	16.7
Climate Change: A warmer and drier climate is expected (an increase of 3°C plausible by the period 2040-2060), which will be associated with an increase in the frequency of occurrence of heat-wave days and high fire-danger days. This will result in dryland agriculture and livestock production to be increasingly less viable, which may lead to protests/disruption from the surrounding communities due to concerns regarding water allocation to mines and industries.	-	4	5	4	2	44 Moderate	<ul style="list-style-type: none"> Der Brochen will develop climate change awareness and communication programmes to inform the stakeholders of practical aspects to address climate change. Der Brochen will investigate capacity building initiatives over the long term through future SLP commitments, to provide for technical assistance, support service or local projects relating to climate change. Climate change adaptation actions will be investigated. Der Brochen will implement a proactive approach to disaster management. Der Brochen will implement and maintain water conservation measures Der Brochen will and create and maintain firebreaks. 	3	5	4	2	1	33 Moderate	25.0

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
Climate Change: Flood events may cause equipment damage and operational disruption and lack of accessibility due to road damage. There is a potential for more intense tropical lows and cyclones making landfall over Limpopo which may lead to sporadic and devastating flood events.	-	4	5	4	2		44 Moderate <ul style="list-style-type: none"> Der Brochen will implement a proactive approach to disaster management. Der Brochen will ensure that access routes are well maintained and repaired as/when damaged, or where accessibility is limited. Der Brochen will implement and maintain water conservation measures 	3	5	4	2		33 Moderate	25.0
Climate Change: Lower than normal rainfall and increased drought will result in water shortages. Climate change impacts may likely exacerbate existing water quantity and quality issues.	-	4	5	4	2	2	44 Moderate <ul style="list-style-type: none"> Water use agreements between Der Brochen and DWS must be amended according to future demand and availability. A site-specific flood risk assessment must be conducted to confirm the likelihood and consequence. Der Brochen will implement and maintain water conservation measures 	3	5	4	2	1	33 Moderate	25.0
Temporary hauling of ore from shafts to Mototolo Concentrator along the corridor associated with the Ore Conveyor System (whilst conveyor system is being constructed)														
Flora: Dust generation during operational activities leading to a loss of floral habitat	-	5	5	2	8	2	75 High <ul style="list-style-type: none"> The mine will implement adequate wet suppression techniques to limit dust release. Der Brochen will continue with the air quality monitoring programme. If the results of the air quality management programme (dust fallout) indicate more than two exceedances in a year, or exceedance in two consecutive months, a dust management plan will be developed and be implemented. 	3	4	2	6	2	36 Moderate	52.0
Fauna: Movement of vehicles between infrastructure areas can potentially lead to increased risk of faunal species collisions with vehicles.	-	4	4	2	6	2	48 Moderate <ul style="list-style-type: none"> Vehicles are to utilize the existing roads only; Speed restrictions to be placed on all vehicles within the focus area to limit faunal and vehicle collisions; Drivers to be educated about the presence and importance of faunal species and instructed to actively avoid of collisions with faunal species; 	3	4	1	4	1	27 Low	43.8
Fauna: Increased personnel on site leading to possible poaching and increased risk of uncontrolled fires	-	4	4	2	8	2	56 Moderate <ul style="list-style-type: none"> The footprint and daily operation of these structures must be strictly monitored to ensure that footprint creep and edge effects does not affect the surrounding sensitive faunal habitat; 	3	4	1	4	1	27 Low	51.8
Fauna: Further loss of faunal habitat and	-	4	4	2	8	2	56 Moderate	2	3	1	4	1	16 Low	71.4

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
species as a result of edge effects and operational footprint creep							<ul style="list-style-type: none"> Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development. 	2	3	1	4	1	16 Low	71.4
Fauna: Alien plant proliferation within disturbed areas	-	5	5	2	8	2	<ul style="list-style-type: none"> No indiscriminate driving through the veld is allowed. Ensure that the ephemeral drainage lines are demarcated as no go zones for personnel and mine vehicles. No faunal species may be hunted, trapped, snared or captured for any purpose whatsoever. Fences and boundaries must be monitored on a weekly basis in order to locate and remove snares and traps. Prevent all open fires; Provide fire safe zone facilities and suitable fire control measures; Use of trees, shrubs or any vegetation for fire making purposes is strictly prohibited; A Fire Management Plan (FMP) will be set in place to ensure that any fires that do originate can be managed and / or stopped before the significant damage to the environment occurs. The mine will Implement an alien and invasive plant control plan; 	3	4	1	6	2	33 Moderate	56.0
Fauna: Increased ambient lighting will result in the attraction of insects and insectivorous predators. This may result in the increased risk of injury or mortality rates to such species either from collision with operational machinery and vehicles, or as a result of direct human conflict.	-	5	4	2	8	2	<ul style="list-style-type: none"> Lighting pollution and its effect on fauna (with special mention of invertebrates, bats and avifauna) must be effectively mitigated with the following guidelines in mind and with due cognizance taken of health and safety requirements: Downward facing lights must be installed and limited to absolutely essential areas; Covers/light diffusers must be installed to lessen the intensity of illumination where possible; Outside lights are to utilize bulbs of varying wave lengths that do not attract insects; As far as possible unnecessary lighting should be avoided/switched off at night, leaving only that which is essential for continued mining operation on. 	3	4	1	6	1	33 Moderate	52.9
Surface Water: Deterioration of surface water quality	-	3	4	1	6	1	<ul style="list-style-type: none"> Erosion protection and energy dissipaters should be maintained at the crossings as applicable 	2	4	1	6	1	22 Low	33.3

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
due to erosion, spillages and accidental discharges at conveyor or road crossings.							<ul style="list-style-type: none"> Contractors should be made aware of the WUL conditions that apply during transfer of ore and/or materials and made liable for environmental damages caused by spillages. Emergency action plans should be drawn up to deal with spillages. 							
Surface Water: Reduced availability of water to downstream users due to obstruction of flow at crossings	-	4	4	1	6	1	44 Moderate <ul style="list-style-type: none"> Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event. Erosion protection and energy dissipaters should be constructed at the crossings as applicable 	3	4	1	4	1	27 Low	38.6
Air Quality: Vehicle entrainment from haul trucks will have particulate impacts	-	4	4	1	6		44 Moderate <ul style="list-style-type: none"> The mine will implement adequate wet suppression techniques to limit dust release. Der Brochen will continue with the air quality monitoring programme. If the results of the air quality management programme (dust fallout) indicate more than two exceedances in a year, or exceedance in two consecutive months, a dust management plan will be developed and be implemented. Due to the close proximity of sensitive receptors to the project, it is recommended that the temporary haul road be watered providing a 75% control efficiency, the conveyor be covered providing a 65% control efficiency. 	4	4	1	2	1	28 Low	36.4
Traffic: The hauling of ore will result in an increase of heavy vehicle traffic on the internal road network from the shafts to the concentrator. The impact of these heavy vehicles will be very low in terms of traffic as the number of vehicles is not excessive.	-	3	1	2	6	2	27 Low <ul style="list-style-type: none"> The mine has prepared a Transport Management Plan which indicates that all traffic must abide by the speed limit (40km/h) and traffic signs are clearly visible. If the gravel roads are in poor condition, the mine will gravel and compact the roads. The maintained of internal roads will be carried out on an ongoing basis. 	2	1	1	2	1	8 Low	70.4
Noise: Additional traffic noise at 200m from the access roads will be 45.6dBA and the prevailing ambient noise levels during the day was 48.7dBA and 49.8dBA during the night. The traffic		2	4	2	2	2	<ul style="list-style-type: none"> The speed limit along the roads of 40km/h to be adhered to at all times. 	2	4	2	2	2	16 Low	0.0

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
noise will not be audible at the abutting noise receptors.														
Operation of conveyor systems														
Flora: The operation of the conveyor system will lead to continued loss of floral diversity and floral endemics as a result of long-term habitat loss. The conveyor system extends across the majority of the focus area and can lead to fragmentation of habitat, thereby altering floral population dynamics and reducing species diversity.	-	5	4	2	8	4	<ul style="list-style-type: none"> Weekly inspections of conveyor route must be undertaken. When incidents are identified (such as spills, blockage, siltation, etc.), undertake the necessary actions to mitigate. Ensure that an Emergency Response Plan is developed and implemented in the case of a spill. Inspection and maintenance of the conveyor belt should be undertaken regularly as per engineering and supplier recommendations to ensure the conveyor is kept in serviceable condition; and All spills as a result of belt failure must be cleaned immediately and be cleaned The mine will Implement an alien and invasive plant control plan. The mine will implement adequate wet suppression techniques to limit dust release. Der Brochen will continue with the air quality monitoring programme. If the results of the air quality management programme (dust fallout) indicate more than two exceedances in a year, or exceedance in two consecutive months, a dust management plan will be developed and be implemented. 	5	4	1	8	3	65 High	7.1
Flora: Risk of discharge and contamination from operational facilities may pollute receiving environment leading to altered floral habitat	-	5	5	3	8	2		3	4	2	6	2	36 Moderate	55.0
Flora: Dust generation during operational activities leading to a loss of floral habitat	-	5	5	2	8	2		3	4	2	6	2	36 Moderate	55.0
								3	4	2	6	2	36 Moderate	52.0
Freshwater Aquatics: Transportation/transfer of platinum ore via the conveyor, potentially resulting in spillages from the conveyor in turn leading to contamination of soils, surface water and groundwater. Sediment laden and contaminated (hydrocarbon) runoff from road surfaces.	-	4	4	2	6	2		2	4	1	4	1	18 Low	62.5
Soils Land Use and Land Capability: Transportation/transfer of platinum ore via the conveyor, potentially resulting in spillages from the conveyor in turn leading to contamination of soils	-	4	4	2	6	2		2	4	1	4	1	18 Low	62.5
Surface Water: Deterioration of surface water quality	-	3	4	1	6	1	<ul style="list-style-type: none"> Erosion protection and energy dissipaters should be maintained at the crossings as applicable. 	2	4	1	6	1	22 Low	33.3

Nature of the impact		Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
		P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
due to erosion, spillages and accidental discharges at conveyor or road crossings.								<ul style="list-style-type: none">Contractors should be made aware of the WUL conditions that apply during transfer of ore and/or materials and made liable for environmental damages caused by spillages.Emergency action plans should be drawn up to deal with spillages.Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event.							
Noise: Overland conveyor north and south. Screeching rollers to be audible at Noise receptors K, L and M during the night-time in the winter (refer to Figure 9-23).		3	4	2	2	2	24 Low	<ul style="list-style-type: none">Equipment and/or machinery which radiate noise levels between 85.0dBA and 90.0dBA to be acoustically screened off.Noise monitoring to be carried out along the footprint boundaries at the Mototolo concentrator plant, decline shafts (north and south), ventilation shafts, ventilation plant, overland conveyor and central ventilation plant.Noise monitoring at the residential areas and the mine boundaries to be done on a quarterly basis for a year after which the frequency can change to an annual basis.Actively manage the process and the noise management plan must be used to ensure compliance to the noise regulations and/or standards. The levels to be evaluated in terms of the baseline noise levels.	2	4	2	2	2	16 Low	33.3
Air Quality: Windblown dust from conveyor may cause dust impacts.		-	4	4	1	6	44 Moderate	<ul style="list-style-type: none">The conveyor will be covered on the top and one side to limit windblown dust release.If the conveyor dust release is found to be excessive, alternative measures will be investigated and implemented to limit dust release.	4	4	1	2	1	28 Low	36.4
Stockpiling of ore material at Mototolo Concentrator															
Air Quality: Windblown dust form stockpiled material		-	3	4	1	2	21 Low	<ul style="list-style-type: none">The mine will implement adequate wet suppression techniques to limit dust release.Der Brochen will continue with the air quality monitoring programme.If the results of the air quality management programme (dust fallout) indicate more than two exceedances in a year, or exceedance in two consecutive months, a dust	2	4	1	2	1	14 Low	33.3

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
							management plan will be developed and be implemented.							
Operation of the Chrome Recovery Inter-Stage Plant														
Soil Land Use and Land Capability: Potential contamination soils from the concentrator plant resulting from stormwater runoff or leaking pipes, resulting in contamination of soils,	-	5	2	2	8	3	60 Moderate <ul style="list-style-type: none">Maintain all water management structures so that only dirty water is contained, and clean water is diverted to the natural environment.Clean and dirty water separation systems must be constructed and be maintained to contain spills/leaks. All dirty water containment facilities will be adequately lined to prevent seepage.All facilities with the potential to generate dirty storm water runoff, effluent or washdown water will be located within the designated dirty water area.Clean runoff will be diverted around the designated dirty areas by means of cut-off canals, sized to accommodate at least the 1:50 year peak flow event.Weekly inspections of stormwater canals and dirty water containment facilities must be undertaken.When incidents are identified (such as spills, blockage, siltation, etc.), undertake the necessary actions to mitigate.	3	4	1	4	2	27 Low	55.0
Operation of the DMS Plant														
Freshwater Aquatics: Potential contamination emanating from the DMS plant and ore stockpiles via stormwater runoff or leaking pipes, resulting in contamination of soils, groundwater and surface water. Also, spillage or decant from process water systems associated with the DMS plant pose a considerable risk with reference to water quality impacts (notably elevated EC), as well as fine tailings settling on sensitive habitat. This may result in destruction of shallow, rocky riffle habitats, and/or aquatic biota (e.g. directly through smothering, or indirectly due to	-	4	4	3	8	3	60 Moderate <ul style="list-style-type: none">Maintain all water management structures so that only dirty water is contained, and clean water is diverted to the natural environment.Clean and dirty water separation systems must be constructed and be maintained to contain spills/leaks. All dirty water containment facilities will be adequately lined to prevent seepage.All facilities with the potential to generate dirty storm water runoff, effluent or washdown water will be located within the designated dirty water area.Clean runoff will be diverted around the designated dirty areas by means of cut-off canals, sized to accommodate at least the 1:50 year peak flow event.Weekly inspections of stormwater canals and dirty water containment facilities must be undertaken.	3	4	2	4	2	30 Moderate	50.0

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resou rces (%)	Significa ce		P	D	E	M	Loss of Reso urces (%)	Significa nce		
destruction or alteration of suitable habitat).							<ul style="list-style-type: none">When incidents are identified (such as spills, blockage, siltation, etc.), undertake the necessary actions to mitigate.								
Soil Land Use and Land Capability: Potential contamination soils from the concentrator plant resulting from stormwater runoff or leaking pipes, resulting in contamination of soils,	-	5	2	2	8	3		60 Moderate	3	4	1	4	2	27 Low	55.0
Surface Water: New activities are located within the Mototolo Concentrator Plant and additional impacts are therefore not anticipated.	-	2	4	1	6	1		22 Low	2	4	1	6	1	22 Low	0.0
Traffic: The stockpiling of ore will result in an increase of heavy vehicle traffic on the internal road network when the trucks travel to and from the stockpiles. The impact of these heavy vehicles will be very low in terms of traffic as the number of vehicles is not excessive	-	2	1	2	2	1	10 Low	<ul style="list-style-type: none">The mine has prepared a Transport Management Plan which indicates that all traffic must abide by the speed limit (40km/h) and traffic signs are clearly visible.	2	1	1	2	1	8 Low	20.0
Deposition of DMS material onto the DMS Stockpile Area															
Freshwater Aquatics: Runoff and leachate from rocks may contain fine sediment, salts, chemical residues from blasting (e.g. nitrogen) or from mining related activities (such as hydrocarbons from fuel etc.), which may potentially impact water quality of freshwater resources (run-off and indirectly via groundwater) negatively.	-	4	5	3	6	3	56 Moderate	<ul style="list-style-type: none">Ensure that the DMS stockpile footprint liner is finalized prior to commencing with stockpiling of DMS material to prevent seepage.Clean and dirty water diversion structures must be constructed in line with GN704 regulationsWRD should be placed outside of freshwater features to prevent any water ponding paths which may reach the freshwater resources.Monitoring of erosion must take place throughout the life of mine, in order to prevent the formation of erosion gullies as a result of altered flow paths, and the possible sedimentation of the freshwater resources.The mine will implement adequate wet suppression techniques to limit dust release.Der Brochen will continue with the air quality monitoring programme.	3	4	2	2	2	24 Low	57.1
Soils Land Use and Land Capability: - Seepage and runoff from WRDs, leading to possible contamination of soil resources, leading to impaired soil chemistry and quality and salinations of soils - Sedimentation resulting from	-	4	4	1	6	3	44 Moderate		3	4	2	2	2	24 Low	45.5

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
loosening of soil by heavy vehicles and mine machinery							<ul style="list-style-type: none"> If the results of the air quality management programme (dust fallout) indicate more than two exceedances in a year, or exceedance in two consecutive months, a dust management plan will be developed and be implemented. The mine will develop a spill prevention and emergency spill response plan, An emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur. Maintain all water management structures so that only dirty water is contained, and clean water is diverted to the natural environment. Clean and dirty water separation systems must be constructed and be maintained to contain spills/leaks. All dirty water containment facilities will be adequately lined to prevent seepage. All facilities with the potential to generate dirty storm water runoff, effluent or washdown water will be located within the designated dirty water area. Clean runoff will be diverted around the designated dirty areas by means of cut-off canals, sized to accommodate at least the 1:50 year peak flow event. Weekly inspections of stormwater canals and dirty water containment facilities must be undertaken. When incidents are identified (such as spills, blockage, siltation, etc.), undertake the necessary actions to mitigate. Monitor dust generation from the DMS stockpile and implement dust suppression/control measures (e.g. windbreaks) if required (i.e. when a plume is visible on site or when dust is generated during deposition of the DMS material onto the DMS stockpile area). 							
Soils Land Use and Land Capability: Deposition on the DMS stockpile will cause alteration of the hydrological patterns of the landscape which leads to ponding of water and associated water logging conditions in the soil.	-	4	5	2	6	4		3	4	1	2	2	21 Low	59.6
Soils Land Use and Land Capability: Presence of clean and dirty separation infrastructure around upstream areas of DMS stockpile	-	4	5	2	6	4		2	4	1	2	2	14 Low	73.1
Hydropedology: Overland flow is the dominant process. The contribution of bedrock flow paths to the hydropedological behaviour is minimal and evidence of lateral flow through the soils absent. The planned tailings facilities are unlikely to significantly impact the hydrological regime of streams and wetlands in lower lying areas. Care must, however, be taken to ensure that additional overland flow is not generated from the tailings facilities. Since overland flow is dominant, seepage and runoff from the tailings could result in pollution of surface water following large rain event.	-	3	4	3	6	2		1	4	3	6	1	13 Low	66.7
Surface Water: Deterioration of surface water quality due to surface water runoff of leachate from the DMS material. Rain falling on the stockpiled DMS material could, based on the preliminary geochemical characterization undertaken by Delta H (Delta H, 2019, KP, 2019); leach	-	4	4	2	8	1		3	4	2	6	1	36 Moderate	35.7

Nature of the impact		Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
		P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance		
trace concentrations of metals and salts to the environment. The water accumulating within the DMS stockpile footprint could potentially runoff into the surface water resources, resulting in a deterioration in water quality and a reduction in availability of water to the downstream users. The risk of leachate to the environment is assumed to be discussed in more detail in the groundwater report (Delta H, 2019).																
Surface Water: The potential for the DMS stockpile to fail could impede the flow in the rivers due to failure of the stockpile. The potential was assessed as moderate as the material could, due to its proximity, slide into the Groot-Dwars and Mareesburg Stream and potentially affect the Mareesburg TSF pipeline		-	3	4	2	8	1	42 Moderate	<ul style="list-style-type: none">Local slopes on benches must be flattened with earthmoving machineryIncrease the step width of the benches to provide a flatter overall slope,Provide monitoring / survey beacons on the DMS stockpile to monitor movement of benches	2	4	2	6	1	24 Low	42.9
Traffic: The stockpiling of DMS will result in an increase of heavy vehicle traffic on the internal road network when the trucks travel to and from the stockpiles. The impact of these heavy vehicles will be very low in terms of traffic as the number of vehicles is not excessive		-	1	1	1	2	1	4 Low	<ul style="list-style-type: none">The mine has prepared a Transport Management Plan which indicates that all traffic must abide by the speed limit (40km/h) and traffic signs are clearly visible.	1	1	1	2	1	4 Low	0.0
Social: <u>Lack of employment creation and increase in unemployment</u> With the Der Brochen project now incorporating the Mototolo mine, it is anticipated that Der Brochen will take over labourer's from the Mototolo mine, thus reducing the number of employment opportunities required		-	4	2	2	8	1	48 Moderate	<ul style="list-style-type: none">Emerging employment opportunities should be targeted at local residents as well as people from the surrounding communities in cases where the skills cannot be obtained from immediately adjacent communities.The mine must provide the surrounding communities with practical skills training so that they have the opportunity to upskill themselves and apply for jobs with the mine. Recruitment of labour should be guided by	3	2	2	6	1	30 Moderate	37.5

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
It is not anticipated that the construction of the proposed additional activities at Der Brochen mine will create employment for a significant number of people however, some employment opportunity may be available for unskilled, semi-skilled and skilled labour.							<p>Anglo's recruitment policies which should promote the employment of local labour.</p> <ul style="list-style-type: none">The recruitment process must be transparent and communicated to stakeholders in order to limit opportunities for conflict situations.Der Brochen's contractor management plan also needs to be implemented to ensure that appointed contractors also employ locally as far as practically possible. Support for local businesses through SMME development should be prioritized, with support from other surrounding mines, business forums and the municipality.The appointment of local business and the use of their products and services should be promoted as far as practically possible, as it will potentially open up opportunities for local employment.							
Utilization of storm water management and pollution control infrastructure at shafts, and PCD's at DMS stockpile														
Surface Water: The need to capture and contain dirty water will increase the volume of contaminated water that needs to be managed on the mine. Release of dirty water can occur if the containment facilities are not appropriately managed or during periods of extended high rainfall. Overflow from the dirty water containment facilities can result in the formation of channels and the formation of drainage lines resulting in the water reaching the Groot-Dwars River and/or the Mareesburg Stream (DMS Stockpile Phase 3 only). Such overflows and runoff can have a detrimental impact on surface water quality and result in a loss of availability of drinking water to the downstream community.	-	5	4	2	8	1	70 High <ul style="list-style-type: none">Appropriately placed clean water diversions, designed to handle the AAP requirements should be constructed to divert water away from the DMS StockpileEnergy dissipaters should be constructed at points where there are concentrated discharges of water to the environment that could cause significant erosion and within water channels to slow the speed of water.During normal operations dirty water should be contained in pollution control dams designed to handle the 1:50 year event and enable settlement of solids in the contained water prior to reuse.Manage the overall water on site to fully utilize the storage available on site for example, don't discharge from the PCD dams if there are other dams available	3	4	2	6	1	36 Moderate	48.6

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resou rces (%)	Significa ce		P	D	E	M	Loss of Reso urces (%)	Significa nce		
Surface Water: Reduced availability of water to downstream users due to containment of dirty water and alteration of catchment hydrology (volume). The rainfall that falls within this area will be removed from the catchment and may reduce the quantity of water available to downstream users. The probability that the impact will be contained to the site and will occur for the duration of the project is definite. Therefore, this impact is rated as having a moderate significance. However, loss of MAR due to dirty water containment is considered of LOW significance to the B41G catchment (refer to Section 6.4) but will remain locally at Moderate.	-	5	4	1	6	1	55 Moderate	<ul style="list-style-type: none">Maintain all water management structures so that only dirty water is contained, and clean water is diverted to the natural environment.Clean and dirty water separation systems must be constructed and be maintained to contain spills/leaks. All dirty water containment facilities will be adequately lined to prevent seepage.All facilities with the potential to generate dirty storm water runoff, effluent or washdown water will be located within the designated dirty water area.Clean runoff will be diverted around the designated dirty areas by means of cut-off canals, sized to accommodate at least the 1:50 year peak flow event.Weekly inspections of stormwater canals and dirty water containment facilities must be undertaken.When incidents are identified (such as spills, blockage, siltation, etc.), undertake the necessary actions to mitigate.Energy dissipaters should be constructed in areas of concentrated flows.Der Brochen will continue to implement the surface water and groundwater monitoring programme.	5	4	1	4	1	45 Moderate	18.2
Surface Water: Erosion and scouring of water courses at diversion outlets due to stormwater runoff from the mine.	-	5	4	1	6	1	55 Moderate		4	4	1	4	1	36 Moderate	34.5
Groundwater: Change of the ambient groundwater quality due to seepage and run-off from DMS stockpile. Geochemical results indicate that the DMS material to be stockpiled is non-acid generating. Leach test results suggest limited impacts of seepage from the DMS stockpile.	-	3	4	2	4	2	30 Moderate		3	4	1	2	1	21 Low	30.0
Soils Land Use and Land Capability: Presence of clean and dirty separation infrastructure around upstream areas of DMS stockpile	-	4	5	2	6	4	52 Moderate		2	4	1	2	2	14 Low	73.1
Utilization of the Staff Accommodation near the Der Brochen Dam															
Freshwater Aquatics: Increased impermeable surfaces in	-	4	5	2	8	3	60 Moderate	<ul style="list-style-type: none">Adequate stormwater management plan must be incorporated into the design of the development.	2	4	2	4	2	20 Low	66.7

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
vicinity of freshwater resources, leading to increased stormwater runoff, potentially increased flood peaks and possible erosion and formation of preferential surface flow paths.							<ul style="list-style-type: none"> Release of stormwater into the wetland must not result in further bank incision or erosion, energy dissipators must be installed. Highly recommended that Sustainable Drainage Systems (SUDs) be implemented. 							
Freshwater Aquatics: Operations and maintenance of planned waste management systems (e.g. sewage infrastructure), leading to potential failure of any planned waste management systems (e.g. sewage infrastructure) resulting in leakages and possible contamination of surface and ground water	-	4	5	2	8	3	60 Moderate	2	4	2	4	2	20 Low	66.7
Surface Water: Provision of hard standing areas and compacted areas will reduce infiltration and increase the volume and velocity of stormwater runoff with subsequent potential for damming of water and flooding. Increased runoff velocity	-	2	2	1	2	1	10 Low	2	1	1	2	1	8 Low	20.0
Traffic: Light vehicles travelling to and from the staff accommodation will increase traffic on the internal roads. The impact of these heavy vehicles will be very low in terms of traffic as the number of vehicles is not excessive	-	1	1	1	2	1	4 Low	1	1	1	2	1	4 Low	0.0
Utilization of tar access roads														
Flora: Dust generation during operational activities leading to a loss of floral habitat	-	5	5	2	8	2	75 High	3	4	2	6	2	36 Moderate	52.0
Surface Water: Deterioration of surface water quality due to erosion, spillages and accidental discharges at conveyor or road crossings.	-	3	4	1	6	1	33 Moderate	2	4	1	6	1	22 Low	33.3

Nature of the impact		Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
		P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
								materials and made liable for environmental damages caused by spillages. <ul style="list-style-type: none">Emergency action plans should be drawn up to deal with spillages.Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event.							
Air Quality: Vehicle entrainment will have particulate impacts	-	2	4	2	4		20 Low	<ul style="list-style-type: none">Asphalt roads will undergo pothole repair and resurfacing where necessary.The maintenance of internal roads will be carried out on an ongoing basis.	2	4	1	2		14 Low	30.0
Social: <u>Health and social well-being</u> The health and safety aspects of the surrounding communities need to be considered specifically with regards to access roads which may be easily accessed by community members. Large trucks may pose a hazard to community members, members of the general public and road users.	-	3	4	1	6	1	33 Moderate	<ul style="list-style-type: none">Environmental pollution (noise, dust, etc.) must be limited as far as possible and the requirements of the EMP be implemented to reduce the impact on surrounding residents.The necessary safety precautions should be taken, and first aid supplies should be made available on site;All project employees (including contractors) should undergo health and safety training on induction and thereafter on a regular basis; Instruct contractors on how to work in line with the health and safety document and site rules.Appoint a Health and Safety representative.	2	4	2	4	1	20 Low	39.4
Traffic: Vehicles travelling to and from site on the tar access roads will increase traffic on these roads. The impact of these heavy vehicles will be very low in terms of traffic as the number of vehicles is not excessive	-	2	2	2	2	1	12 Low	<ul style="list-style-type: none">The mine has prepared a Transport Management Plan which indicates that all traffic must abide by the speed limit (40km/h) and traffic signs are clearly visible.Asphalt roads will undergo pothole repair and resurfacing where necessary.The maintenance of internal roads will be carried out on an ongoing basis.	2	2	1	2	1	10 Low	16.7
Utilization of gravel maintenance roads associated with the ventilation shafts															
Flora: Dust generation during operational activities leading to a loss of floral habitat	-	5	5	2	8	2	75 High	<ul style="list-style-type: none">The mine will Implement an alien and invasive plant control plan.The mine will implement adequate wet suppression techniques to limit dust release.	3	4	2	6	2	36 Moderate	52.0
Air Quality: Vehicle entrainment will have particulate impacts	-	2	4	1	4		18 Low	<ul style="list-style-type: none">Der Brochen will continue with the air quality monitoring programme.	2	4	1	2		14 Low	22.2

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
							<ul style="list-style-type: none"> If the results of the air quality management programme (dust fallout) indicate more than two exceedances in a year, or exceedance in two consecutive months, a dust management plan will be developed and be implemented. 							
Surface Water: Deterioration of surface water quality due to erosion, spillages and accidental discharges at conveyor or road crossings.	-	3	4	1	6	1	33 Moderate <ul style="list-style-type: none"> Erosion protection and energy dissipaters should be maintained at the crossings as applicable Contractors should be made aware of the WUL conditions that apply during transfer of ore and/or materials and made liable for environmental damages caused by spillages. Emergency action plans should be drawn up to deal with spillages. Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event. 	2	4	1	6	1	22 Low	33.3
Social: <u>Health and social well-being</u> The health and safety aspects of the surrounding communities need to be considered specifically with regards to maintenance roads which are located in close proximity to surrounding communities.	-	2	4	1	6	1	22 Low <ul style="list-style-type: none"> Environmental pollution (noise, dust, etc.) must be limited as far as possible and the requirements of the EMP be implemented to reduce the impact on surrounding residents. The necessary safety precautions should be taken, and first aid supplies should be made available on site. All project employees (including contractors) should undergo health and safety training on induction and thereafter on a regular basis. Instruct contractors on how to work in line with the health and safety document and site rules. Appoint a Health and Safety representative. 	2	4	2	4	1	20 Low	9.1
Traffic: Vehicles travelling to and from the ventilation shafts on the gravel maintenance roads will increase traffic on these roads. The impact of these heavy vehicles will be very low in terms of traffic as the number of vehicles is not excessive	-	2	2	2	2	1	12 Low <ul style="list-style-type: none"> The mine has prepared a Transport Management Plan which indicates that all traffic must abide by the speed limit (40km/h) and traffic signs are clearly visible. If the gravel roads are in poor condition, the mine will gravel and compact the roads. The maintained of internal roads will be carried out on an ongoing basis. 	2	2	1	2	1	10 Low	16.7
Dangerous Goods storage and handling (including hydrocarbons/chemicals/explosives)														

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
All aspects: Storage of chemicals may lead to contamination of soil and water as well as minor gaseous emissions. Hydrocarbon spillages from vehicles has the potential to contaminate soil, surface water, groundwater and ecology if not managed.	-	4	5	2	8	3	60 Moderate <ul style="list-style-type: none"> The mine will develop and maintain a Standard Operating Procedure to contain and remediate any accidental hydrocarbon or other chemical spillages. A spill prevention and emergency spill response plan must be developed and be implemented in order to address clean-up measures should a spill and/or a leak occur. Clean and dirty water separation systems must be constructed and be maintained to contain spills/leaks. All facilities with the potential to generate dirty storm water runoff, effluent or washdown water will be located within the designated dirty water area. Clean runoff will be diverted around the designated dirty areas by means of cut-off canals, sized to accommodate at least the 1:50 year peak flow event. Adequate erosion protection will be provided at the clean canal discharge locations. Bunded containment and settlement facilities will be provided for hazardous materials, such as fuel and oil; Bund sizing will be done at 110% of the largest tank volume minus the volume occupied by any adjacent tanks in the same bund in accordance with SANS 10089-1, with an allowance of an additional 300 mm used for ballast stones placed in the tank bunds; Waste oil will be stored in drums in a bunded storage area. Hazardous waste will be stored according to the applicable regulations under the National Environmental Management: Waste Act (Act 59 of 2008) and the DWS Minimum Requirements. The hazardous waste storage area will, as a minimum, be paved with concrete, covered and provided with bunds and drainage facilities to collect and contain any spills or adversely affected runoff. Dedicated parking areas for construction vehicles must be located away from the delineated watercourses and the 100 m zone of regulation (ZoR) GNR 704. 	2	4	1	2		14 Low	76.7

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
							<ul style="list-style-type: none"> Drip trays must be located beneath any parked and leaking equipment along with lubricant/fuel absorbing media (moss type products, sawdust) within the drip trays to contain spilled material. Vehicles to be regularly inspected for leaks and to be refueled on sealed surface to prevent ingress Spill-sorb or a similar product will be kept on site and used to clean up hydrocarbon spills in the event that they should occur. All pipeline routes will be inspected on a weekly basis to enable early detection of leaks. Washdown and wastewater from the plant and workshops will be passed through oil skimmers before discharging to the storm water system for containment in the PCD and eventual treatment for reuse or pumping to existing storm water management infrastructure. An inspection and maintenance plan will be implemented on the storm water system to ensure that all oil skimming and sediment handling facilities are maintained, and that storm water canals and pipelines remain unblocked and free flowing – monthly inspections will be carried out. Continued implementation of the surface and ground water quality monitoring programme should be undertaken to detect any impacts. Existing emergency response contingency plan must be implemented to address clean-up measures should a spill and/or a leak occur. 							
Generation of waste														
All aspects: Incorrect storage of waste may lead to contamination of soil and water as well as minor gaseous emissions.	4	5	2	8	3	60 Moderate	<ul style="list-style-type: none"> Sorting of solid waste into recyclable and non-recyclable waste streams will be undertaken. Storage of domestic and hazardous waste will be undertaken within designated waste storage facilities. The waste storage area must be clearly marked with signage boards and fenced off. Waste will be removed off site by a licensed contractor to a suitable licensed facility. 	2	2	1	2	2	10 Low	83.3

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
							<ul style="list-style-type: none"> Weekly monitoring of site activities and machinery must be undertaken to identify spills or leaks. A spill prevention and emergency spill response plan must be developed and be implemented in order to address clean-up measures should a spill and/or a leak occur. Clean and dirty water separation systems must be constructed and be maintained to contain spills/leaks. All facilities with the potential to generate dirty storm water runoff, effluent or washdown water will be located within the designated dirty water area. Clean runoff will be diverted around the designated dirty areas by means of cut-off canals, sized to accommodate at least the 1:50 year peak flow event. Waste oil will be stored in drums in a bunded storage area. Bunded containment and settlement facilities will be provided for hazardous materials, such as fuel and oil; Bund sizing will be done at 110% of the largest tank volume minus the volume occupied by any adjacent tanks in the same bund in accordance with SANS 10089-1, with an allowance of an additional 300 mm used for ballast stones placed in the tank bunds; Hazardous waste will be stored according to the applicable regulations under the National Environmental Management: Waste Act (Act 59 of 2008) and the DWS Minimum Requirements. The hazardous waste storage area will, as a minimum, be paved with concrete, covered and provided with bunds and drainage facilities to collect and contain any spills or adversely affected runoff. Spill-sorb or a similar type product must be kept on site and used to clean up hydrocarbon spills in the event that they should occur. Continued implementation of the surface and ground water quality monitoring programme should be undertaken to detect any impacts. 							

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
							<ul style="list-style-type: none"> Existing emergency response contingency plan must be implemented to address clean-up measures should a spill and/or a leak occur. 							

10.2.4 Closure activities

The impacts and associated management measures associated with the closure activities are provided for in **Table 10-6**. These activities are:

- Pre-Decommissioning planning
- Removal of all plant equipment including conveyor belt systems and staff accommodation
- Rehabilitation of the DMS Stockpile and PCDs
- Closure of the Shafts and underground workings

Table 10-6: Closure activities, anticipated impacts and recommended mitigation measures

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance		
Pre-Decommissioning planning															
Social: <u>Loss of income to surrounding businesses</u> During the cessation of mining and closure of the operations, surrounding businesses will lose income due to the loss off employment or redeployment of employees/contractors, and local purchases made by the mine. This will result in a loss in buying power for the surrounding businesses. This could impact on economic growth and business development in the region. A number of mines may still be in operational in the area at the time of Der Brochen's closure.	-	5	5	2	8	1	75 High	<ul style="list-style-type: none">It is proposed that Anglo investigate alternative sustainable livelihood options for the workforce which can be developed as part of the closure plan while the mine is in operation.These alternative sustainable livelihood options can include agricultural programmes where produce can be sold to the surrounding operational mines and communities as well as alternative key skills development (plumbers, electricians etc.).The mine would need to engage with the communities from the planning phase already in order to identify what the communities and workforce would prefer in terms of alternative livelihood options.	4	5	2	6	1	52 Moderate	30.7
Social: <u>Lack of support from government agencies to ensure the sustainability of any schools and health</u>	-	5	5	2	8	1	75 High	<ul style="list-style-type: none">Any of these areas of need which are developed by the mine during operations need to be adequately handed over to the municipality who will be responsible for ensuring that these needs are sustainable.	4	5	2	6	1	52 Moderate	30.7

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
<i>facilities built during the mine's operation:</i> The communities have mentioned specific areas of need which are currently lacking such as schools and access to health facilities.							<ul style="list-style-type: none"> The mine together with local government need to agree on an approach to ensure the viability of these services during operation in preparation for closure. 							
Social: <u>Creation of employment and income</u> Prior to the decommissioning of the operations, contractors will be employed to undertake the required decommissioning and rehabilitation activities in line with the closure plan. This creation of employment will be short term, for the duration of the decommissioning and closure phase.	+	3	2	1	8	1	33 Moderate <ul style="list-style-type: none"> Emerging employment opportunities should be targeted at local residents as well as people from the surrounding communities in cases where the skills cannot be obtained from immediately adjacent communities. Recruitment of labor should be guided by Anglo's recruitment policies which should promote the employment of local labor by any appointed contractors. Anglo should ensure that a transparent process of employment is followed to limit opportunities for conflict situations. The support of local business and the use of their products and services should be promoted as far as possible. 	4	2	1	8	1	44 Moderate	25.0
Removal of all plant equipment including conveyor belt systems and staff accommodation														
Freshwater Aquatics: Removal of infrastructure such as: - ripping of soil and hard surfaces, sloping and revegetation efforts; - decant management preparation; - increased traffic from vehicles and disturbance of surface areas; and - Rehabilitation of cleared areas. will likely result in much the same risks (surface	-	4	2	1	6	3	36 Moderate <ul style="list-style-type: none"> Demolition footprint must be clearly demarcated and no related activities, including the movement of vehicles, must be permitted to occur outside of the footprint area. As far as possible, all rehabilitation activities involving earth moving equipment should occur in the low flow season, during the drier winter months. A soil management plan, including erosion / run-off control for the rehabilitation phase to be developed and implemented, including monitoring of revegetation efforts. Sheet runoff rehabilitated areas with steep slopes should be slowed down by the strategic placement of berms; 	2	2	1	4	1	14 Low	61.1

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
impacts) as identified for the construction phase.							<ul style="list-style-type: none">All related waste and rubble must be removed from site and disposed of according to relevant SABS standards. No waste must be permitted to enter watercourses;Edge effects such as erosion must be monitored and managed;Compacted soils should be ripped and revegetated with indigenous vegetation to prevent erosion, sheet runoff, and discourage the establishment of alien floral species post-closure.Rehabilitation of affected watercourses must ensure that riparian structure and function are reinstated in such a way as to ensure the ongoing functionality of the larger drainage systems at pre-mining levels;All affected areas should be re-sloped and top soiled where necessary and reseeded with indigenous grasses; It is critical that ongoing monitoring of alien vegetation is maintained post-closure, as proliferation of alien vegetation in the demolition areas is expected; andOngoing aquatic biomonitoring should take place throughout the closure phase of the mine and should continue into the post closure phase to define latent impacts that need to be mitigated.							
Flora & Flora: Decommissioning/ removal of surface infrastructure: -Failure to implement and manage biodiversity action plan, rehabilitation plan, alien and invasive control plan; -Compacted soils limiting the re-establishment of natural vegetation;	-	5	5	2	8	2	75 High <ul style="list-style-type: none">Ensure sound implementation of alien and invasive plant control plan;Where soils have been compacted that are to be ripped and where necessary reprofiled;Indigenous grass species are to be used for revegetation of disturbed areas;Where necessary, hessian sheets (or similar products) are to be used in order to stabilize the soil surface until revegetation has occurred;Erosion control measures are to be implemented to mitigate downslope sedimentation of freshwater resources and the	3	3	1	4	1	24 Low	30.7

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
-Increased risk of erosion in disturbed areas; -Improper rehabilitation of disturbed areas leading to permanent floral habitat loss.							hindrance of revegetation/ rehabilitation activities; <ul style="list-style-type: none"> All surface infrastructure is to be removed and waste material disposed of at a registered dump site. Waste and remnant mine related material is not to be dumped or left within the focus area. 							
Soils Land Use and Land Capability: Ripping of soil and hard surfaces, re sloping, restoration of natural topography and revegetation leading to further soil erosion, compaction and contamination. Resurfacing may lead to water ponding if not done properly	-	4	2	1	6	3	<ul style="list-style-type: none"> The footprint should be ripped to alleviate compaction; Stored topsoil should be replaced (if any) and the footprint graded to a smooth surface; The landscape should be backfilled and reprofiled so as to mimic the natural topography for potential agricultural activities and grazing opportunities post mining. If possible, ensure a continuation of the pre-mining surface drainage pattern; -Slopes of the backfilled surface should therefore change gradually since abrupt changes in slope gradient increase the susceptibility for erosion initiation The topsoil should be ameliorated according to soil chemical analysis and monitoring data. The soil fertility status should be determined by soil chemical analysis after levelling (before seeding/re-vegetation. Soil amelioration should be done according soil analyses as recommended by a soil specialist, in order to correct the pH and nutrition status before revegetation; and The footprint should be re-vegetated with a grass seed mixture as soon as possible, preferably in spring and early summer to stabilize the soil and prevent soil loss during the rainy season. 	2	1	1	4	1	12 Low	66.7
Surface Water: The impacts on closure/rehabilitation are likely to be similar to the water quality and erosion impacts discussed in the	-	3	4	1	6	1	<ul style="list-style-type: none"> Erosion control measures in the form of temporary erosion prevention berms should be implemented during closure. Clean water diversion bunds should be constructed upstream of the construction site prior to clearing infrastructure. 	2	4	1	6	1	22 Low	33.3

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
construction phase. No additional impacts are envisaged as this activity should be restricted to the already disturbed areas. These impacts have therefore been addressed in the construction phase.							<ul style="list-style-type: none">PCD's should be maintained to minimize uncontrolled runoff from the site.Areas disturbed by closure activities should be rehabilitated immediately on completion of the area.Where possible, activities should be limited to months of low rainfall (dry season) to reduce probability of potential impact.Stormwater measures should be appropriately designed to allow for free flow of waterAreas should be appropriately graded to prevent ponding.							
Air Quality: Demolition of building and equipment structure will give rise to dust impacts.	-	3	2	2	6		<ul style="list-style-type: none">The mine will implement adequate wet suppression techniques to limit dust release.The mine will implement a revegetation programme on the disturbed areas.Demolition footprint area will be demarcated.	3	2	1	4		21 Low	30.0
Traffic: The clearing of the site will result in an increase of heavy vehicle traffic on the internal and external road network while travelling to areas that need to be cleared. The impact of these heavy vehicles will be very low in terms of traffic as the number of vehicles is not excessive	-	2	1	1	2	2	<ul style="list-style-type: none">The mine has prepared a Transport Management Plan which indicates that all traffic must abide by the speed limit (40km/h) and traffic signs are clearly visible.	2	1	1	2	1	8 Low	0.0
Rehabilitation of the DMS Stockpile and PCD														
Groundwater: Impact on groundwater quality due to seepage and run off from DMS stockpile. Geochemical results indicate that the DMS material to be stockpiled is non-acid generating		3	4	2	4	2	<ul style="list-style-type: none">Post closure monitoring of seepage and groundwater qualities must be undertaken until acceptable levels have been reached.Monitoring and field testing provide early detection of potential environmental issues, allowing evaluation and if necessary adaptive management interventions.	3	4	1	2	1	21 Low	

Nature of the impact		Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation n (%)	
		P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance		
Leach tests results suggest limited impacts of seepage from the DMS stockpile.																
Flora and Fauna: Failure to adequately rehabilitate the DMS stockpiles – lack of vegetation cover		-	5	5	2	8	2	75 High	<ul style="list-style-type: none">Indigenous grass species are to be used for revegetation of disturbed areas.Where necessary hessian sheets (or similar products) are to be used in order to stabilize the soil surface until revegetation has occurred.Erosion mitigation measures are to be implemented to mitigate downslope sedimentation of freshwater resources and the hindrance of revegetation/ rehabilitation activitiesShould removal of the DMS stockpiles not viable, they are to be sloped and revegetated in accordance with the surrounding topography and vegetation typeRe-vegetation must aim to provide habitat and viable food resources to faunal species within the focus area.	5	5	2	4	2	55 Moderate	26.7
Soils, Land Use and Land Capability: Ripping of soil and hard surfaces, re sloping, restoration of natural topography and revegetation leading to further soil erosion, compaction and contamination. Resurfacing may lead to water ponding if not done properly		-	4	5	2	10	5	68 High	<ul style="list-style-type: none">The footprint should be ripped to alleviate compaction;Stored topsoil should be replaced (if any) and the footprint graded to a smooth surface;The landscape should be backfilled and reprofiled so as to mimic the natural topography for potential agricultural activities and grazing opportunities post mining. If possible, ensure a continuation of the pre-mining surface drainage pattern;-Slopes of the backfilled surface should therefore change gradually since abrupt changes in slope gradient increase the susceptibility for erosion initiationThe topsoil should be ameliorated according to soil chemical analysis and monitoring data. The soil fertility status should be determined by soil chemical analysis after levelling (before seeding/re-vegetation. Soil amelioration should	4	4	2	8	3	56 Low	17.6

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
							be done according soil analyses as recommended by a soil specialist, in order to correct the pH and nutrition status before revegetation; and <ul style="list-style-type: none"> The footprint should be re-vegetated with a grass seed mixture as soon as possible, preferably in spring and early summer to stabilize the soil and prevent soil loss during the rainy season. 							
Surface Water: The impacts on closure/rehabilitation are likely to be similar to the water quality and erosion impacts discussed in the construction phase. No additional impacts are envisaged as this activity should be restricted to the already disturbed areas. These impacts have therefore been addressed in the construction phase.	-	3	4	1	6	1	33 Moderate <ul style="list-style-type: none"> The DMS Stockpile will remain in-situ and should be revegetated to manage on-going dust generation and erosion. Erosion control measures in the form of temporary erosion prevention berms should be implemented during closure. Clean water diversion bunds should be constructed upstream of the construction site prior to clearing infrastructure. PCD's should be maintained to minimize uncontrolled runoff from the site. Areas disturbed by closure activities should be rehabilitated immediately on completion of the area. Where possible, activities should be limited to months of low rainfall (dry season) to reduce probability of potential impact. Stormwater measures should be appropriately designed to allow for free flow of water Areas should be appropriately graded to prevent ponding. All rehabilitation activities should be monitored until vegetation is well established and no further surface water quality impacts are deemed likely. 	2	4	1	6	1	22 Low	33.3
Air Quality: Material handling activities due to the placement of topsoil on the DMS stockpile, and grading	-	3	2	3	6		33 Moderate <ul style="list-style-type: none"> The mine will implement adequate wet suppression techniques to limit dust release. The mine will implement a revegetation programme on the disturbed areas. 	3	2	1	4		21 Low	36.4

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance		
activities would result in dust impacts.															
Noise: Noise increase in the prevailing ambient noise level at the mining right boundaries during the removal of the infrastructure.	1	2	2	1	4	3	14 Low	<ul style="list-style-type: none">Demolition activities to be done during daytime working hours with demolition machinery/equipment which complies with the manufacturer's specifications on all times.	2	2	1	2	2	10 Low	28.6
Closure of the Shafts and underground workings															
Groundwater: Rebound of the water level within the shallow weathered aquifer due to rebound/flooding of underground workings (potential decant)		3	4	2	4	2	30 Moderate	<ul style="list-style-type: none">The mine will undertake continuous monitoring of water levels in monitoring boreholes in the shallow weathered aquifer.The mine will undertake monitoring of piezometric head from installed piezometers for the shallow and deep aquifer (limited hydraulic connection between the shallow and deep aquifer).The box cuts must be sealed offUpon closure, adits to be sealed off, making them impermeable and preventing the ingress of surface water during rain events.The seal to be equipped with a permanent pipe to allow controlled decant of groundwater over time. Once the cavity is flooded due to groundwater seepage from the deeper, fractured aquifer, the water will be decanted via the pipe.Strict monitoring throughout LOM and post-closure is required in order to ensure the health and functioning of freshwater resources is retained and monitoring data must be proactively utilized to identify any emerging issuesShould it prove feasible, drilling of dewatering boreholes to prevent decant/seepage into springs. Pumped water to be treated to baseline quality levels and discharged.Decant to be treated to the quality as stipulated by the Water Use license and released to the	1	4	1	2	2	7 Low	
Groundwater: Impact on groundwater quality due to the flooding of mine workings.		3	4	1	4	2	27 Low		3	4	1	2	1	21 Low	
Surface Water: The impacts on closure/rehabilitation are likely to be similar to the water quality and erosion impacts discussed in the construction phase. No additional impacts are envisaged as this activity should be restricted to the already disturbed areas.	-	3	4	1	6	1	33 Moderate		2	4	1	6	1	22 Low	33.3
Surface Water: Decant from shafts post-closure, leading to: - Increased risk of pollution of surface water as a result of decant from the adit post closure. - Increased risk of	-	4	5	3	8	3	64 Low		3	4	2	4	1	30 Low	53.1

Nature of the impact		Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
		P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance		
pollution of groundwater, potentially leading to the formation of a contaminated groundwater plume, which may migrate downgradient of the surface infrastructure, thus possibly affecting the downgradient freshwater systems.								environment in a controlled manner, mimicking natural conditions. <ul style="list-style-type: none">All rehabilitation activities should be monitored until vegetation is well established and no further surface water quality impacts are deemed likely.								
Air Quality: Material handling and vehicle activity would result in dust impacts.		-	3	2	3	6		33 Moderate	<ul style="list-style-type: none">The mine will implement adequate wet suppression techniques to limit dust release.The mine will implement a revegetation programme on the disturbed areas.Demolition footprint area will be demarcated.	3	2	1	4		21 Low	36.4
Traffic: The closure will result in an increase of heavy vehicle traffic on the internal road network while travelling to and from the shafts. The impact of these heavy vehicles will be very low in terms of traffic as the number of vehicles is not excessive		-	1	1	1	2	1	4 Low	<ul style="list-style-type: none">The mine has prepared a Transport Management Plan which indicates that all traffic must abide by the speed limit (40km/h) and traffic signs are clearly visible.	1	1	1	2	1	4 Low	0.0
Noise: Noise increase in the prevailing ambient noise level at the mining right boundaries during the removal of the infrastructure.		-	2	2	1	4	3	14 Low	<ul style="list-style-type: none">Demolition activities to be done during daytime working hours with demolition machinery/equipment which complies with the manufacturer's specifications on all times.	2	2	1	2	2	10 Low	28.6

10.2.5 Post-closure activities

The impacts and associated management measures associated with the post-closure activities are provided for in **Table 10-7**

Table 10-7: Post-closure activities, anticipated impacts and recommended mitigation measures

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
Flora: Post-rehabilitation: Ineffective or potentially poorly designed rehabilitation efforts will result in ongoing erosion, habitat loss, alien plant proliferation and the loss of floral species diversity. Shift in vegetation type due to inability to restore specialized habitat such as rocky outcrops. This will lead to a loss of species diversity and a permanent loss of habitat for a variety of endemics that are typically associated with rocky habitat within the Sekhukhune Centre of Plant Endemism.	-	5	5	3	10	3	90 High	3	5	2	6	3	39 Moderate	56.7
Flora: Rehabilitation to pre-mined conditions, along with successful relocation of floral SCC, will result in a positive impact on floral diversity and floral SCC numbers associated with the focus area.	+	1	2	2	4	5	8 Low	3	4	3	6	4	39 Moderate	79.5
Fauna: Post-rehabilitation: Ineffective or poorly designed rehabilitation	-	5	5	3	8	2	80 High	3	3	1	4	1	24 Low	70.0

Nature of the impact		Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
		P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance		
efforts will result in ongoing erosion, habitat loss, alien plant proliferation and the loss of faunal species diversity.																
Soils Land Use and Land Capability: Poorly rehabilitation strategy may result in permanent loss of soil resources.		-	4	4	2	8	3	56 Moderate	<ul style="list-style-type: none">Monitoring of backfilled sites should be undertaken to ensure that the landscape is free draining to prevent water logging conditionRe vegetated areas should also be monitored to ensure vegetation is establishing properly as a measure to prevent soil lossA short-term fertilizer program should be implemented based on the findings of the soil chemical status after the first year in order to maintain the fertility status Fertility treatment should take place for 5 years after rehabilitation until the area can be declared self-sustaining.	2	3	1	4	1	16 Low	71.4
Soils, Land Use and Land Capability: Successful implementation of the rehabilitation plan will lead to reinstatement of the natural topography and commencement of pre-mining land uses.		+	2	1	1	4	1	12 Low	<ul style="list-style-type: none">Rehabilitation plan should aim to rehabilitate the soils for grazing land use post closure	4	2	1	6	3	36 Moderate	66.7
Soils, Land Use and Land Capability: Good rehabilitation strategy will lead to commencement of pre-mining land uses such as wildlife/wilderness as well as subsistence grazing in some areas post closure		+	3	3	1	4	1	24 Low	<ul style="list-style-type: none">Surface should be thoroughly cleaned of all waste material;Rubble and waste material should be disposed of at an authorized landfill site; andExcavated areas should be backfilled, and natural topography be reinstated to allow for free movement of livestock and wildlife.	4	3	2	6	3	44 Moderate	45.5
Soils, Land Use and Land Capability: Good rehabilitation strategy will to a subsistence grazing and		+	2	3	1	4	1	16 Low		4	3	1	8	4	48 Moderate	66.7

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)	
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance		
wildlife land capability post closure															
Surface Water: The main activity identified during the post-closure phase that has the potential to impact on surface water resources is dispersion of the contaminated groundwater plume which is discussed in the groundwater specialist report.	-	2	2	1	2	1	10 Low	<ul style="list-style-type: none">During the post-closure phase, all infrastructures will have been removed, therefore the surface water quality should not be further impacted by any of the post-closure activities	1	2	1	2	1	5 Low	50.0
Groundwater: Rebound of the water level within the shallow weathered aquifer due to flooding of underground workings (potential decant)	-	3	4	2	4	2	30 Moderate	<ul style="list-style-type: none">Continuous monitoring of water levels in monitoring boreholes in the shallow weathered aquiferMonitoring of Piezometric head from installed piezometers for the shallow and deep aquiferSeal off box cutsPolluted decant water must be pumped to the surface water storage facilities until within a n accepted discharge qualities	1	4	1	2	2	7 Low	76.7
Groundwater: Geochemical results indicate that the material to be exposed is nonacid generating. Leach test results suggest limited impacts of seepage from the exposed underground mine material. Impact on groundwater quality due to the flooding of mine workings	-	3	4	1	4	2	27 Low	<ul style="list-style-type: none">Sealing of shafts should be considered to isolate certain areas if neededPost-closure monitoring of water qualities until acceptable levels have been reached.	3	4	1	2	1	21 Low	22.2
Groundwater: Geochemical results indicate that the material to be exposed is nonacid generating. Leach test results suggest limited impacts of seepage from the exposed underground	-	3	4	2	4	2	30 Moderate	<ul style="list-style-type: none">Post closure monitoring of seepage and groundwater qualities until acceptable levels have been reached.Monitoring and field testing provide early detection of potential environmental issues, allowing evaluation and if necessary adaptive management interventions	3	4	1	2	1	21 Low	30.0

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)
	P	D	E	M	Loss of Resources (%)	Significance		P	D	E	M	Loss of Resources (%)	Significance	
mine material. Impact on groundwater quality due to seepage and run off from DMS stockpile														
Air Quality: The positive effects during closure would be as follows: There will be no more gaseous emissions relating to the underground workings. The ambient air quality would improve as a result of decreased dust release (vehicle and machinery movement). The vegetated stockpiles would improve the ambient air quality as the windblown dust would reduce.	+	1	2	1	2	1	<ul style="list-style-type: none"> Maintain vegetation cover on the stockpile areas 	2	2	1	2	1	10 Low	50.0
Noise: Maintenance of disturbed areas	-	2	2	1	4	3	<ul style="list-style-type: none"> Maintenance activities to be done during daytime working hours with machinery which complies with the manufacturer's specifications on all times. 	2	2	2	2	2	12 Low	14.3

10.3 Cumulative impacts

Localised cumulative impacts have been identified as part of the specialists' investigations conducted for the proposed Der Brochen Amendment Project. The localised cumulative impacts are those where the magnitude of the combined impacts is greater than the sum of the individual effects.

Cumulative effects or aspects are difficult to define accurately, as these can occur over different temporal and spatial scales by interacting and/or combining so that the overall effect often exceeds the simple sum of previous effects. It is therefore difficult to quantify cumulative impacts, due to limited data availability and accuracy, and uncertainty about the status, description, technical details and management measures in place or planned for neighbouring projects in the area.

The cumulative impacts that may potentially be associated with the proposed Der Brochen Amendment Project are detailed in the sections below:

10.3.1 Biodiversity

The project area is located within an area which is under increasing pressure from mining activities. The focus area is predominantly located within the Sekhukhune Mountain Bushveld Habitat and located within the Sekhukhune Centre of Plant Endemism. Significant habitat loss has already occurred within this centre of endemism, largely attributable to the expansion of local communities and mines and associated mining exploration.

Currently the focus area, due to the increased level of protection afforded to it as a result of Anglo Platinum managing the land, is considered to be largely intact with representative vegetation types associated with the Sekhukhune Centre of Plant Endemism. As such, the overall species diversity and abundance of the focus area is a stark contrast to that of the surrounding area. Mining activities within the focus area will only serve to add to the loss of habitat, species abundance and species diversity as is currently being experienced in the region and will lead to the impairment of one of the areas of Sekhukhune Mountain Bushveld Habitat which is still the most intact.

The south shaft footprint, conveyor servitude, DMS stockpiles and associated PCD's will result in the long term loss of habitat and species in the region, which, when combined with the losses associated with the current proposed open-pit mining and waste rock dumps will lead to a significant cumulative loss of habitat, species diversity and species abundance in the focus area as well as the surrounding landscapes. The loss of breeding areas and breeding individuals will further impact upon regional population numbers. This is of significant importance with respect to the endemic cicada species *Pycna sylvia*, currently only known to occur in the Dwars River Valley system.

10.3.2 Groundwater and surface water

Water resources quality and quantity

Apart from the mine offices and staff accommodation camp that uses and will use borehole water supply, no other so called 'third party domestic' use occurs within the lease area of the Der Brochen Mine. However, a number of potential downstream groundwater uses were identified during the hydrocensus. Alterations to the flow of surface waters in the same catchment area may cause altered flow regimes and lead to potential conflicts and competition between water users and changes in water availability for communities and ecosystems.

Groundwater drawdown

The cumulative impact of the North open-pit and South shaft underground workings on the water level is shown in Figure 10-1. Groundwater inflows into the North open-pit will necessitate continuous dewatering of the pits during life of mine. Delta-H (2014) long-term dewatering estimates was between

1.2 and 4.6 L/s. The averaged estimated inflows of around 225 m³/d to 302 m³/d is in range with the current WUL (2017) (License no. 27/2/2/B741/9/9) that authorised the northern open-pit volume of 86 436 m³/a (or 237 m³/d).

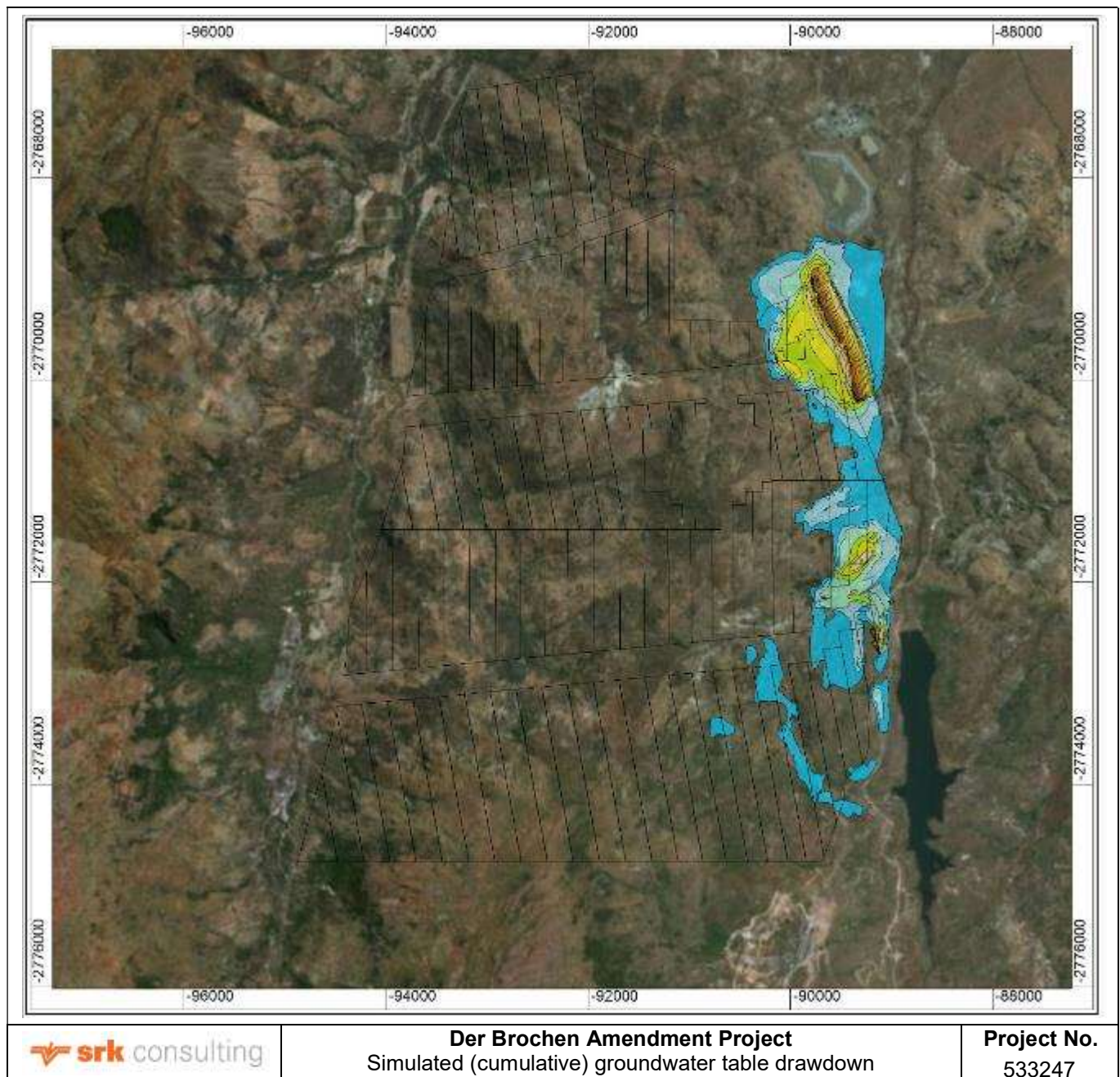


Figure 10-1: Simulated (cumulative) groundwater table drawdown in the weathered aquifer at LoM (mining areas indicated by black lines)

10.3.3 Social

The long history between the communities in the area and the mines must be considered. There is a potential that feelings of mistrust among the community and the mines can be used by community structures to unjustly influence public opinion about the proposed project. The strategic importance of mining in the region, should not be ignored.

The sub-sections below describe the cumulative social impacts that have been identified for the proposed project. The cumulative impacts will be most profound during the construction phase of the project.

Impact on local surface water resources used by the communities

The mine is situated in an area where water demand is growing as population increases and economic activities increase. Current water shortages are seen as part of a regional change in rainfall patterns associated with the impacts of climate change as well as the demand for water from mines and other economic activities. The Draft National Adaptation Strategy for Climate Change has already called on provinces and municipalities to build institutional capacity for response planning and implementation.

The DWS has also identified water scarcity in all major urban centres which anchor the country's economy. DWS is therefore focussing heavily on diversification of its water mix in order to prevent serious water shortages from adversely affecting the economy and peoples' livelihoods.

Comments received during the stakeholder engagement process indicate that the mining communities are concerned that their surface water resources are being negatively impacted on by all the mines in the area, specifically the Molotsi and Moletsane Rivers. Communities are also attributing the loss of their dogs and cattle to the contaminated water within these rivers. Water scarcity has been noted as an issue in the Pakaneng Village which can be extrapolated to several villages due to the natural dry climate of the region. The additional impact of this proposed project on water resources can therefore not be considered in isolation, and the continued negative impact on the communities and their daily functioning should be considered.

Blasting and noise impacts from mining on surrounding communities

There are several mining operations in the area surrounding the Der Brochen mine. In addition to the noise generated by mining operations (i.e. North open pit and associated infrastructure) and trucks, the communities consulted during the stakeholder engagement process have highlighted that blasting is a severe impact which has impacted on their houses and the noise generated from blasting activities is a nuisance. Der Brochen will add to the blasting and noise impacts already taking place in the area and therefore these impacts on the surrounding communities need to be assessed by means of a noise and vibration assessment.

Cumulative health impacts

The baseline has revealed a number of concerns for the socio-economic status of FTLM and TCLM. The incidence of HIV/AIDs, while less than previous years in FTLM, is still significant, particularly in the rural and peri-rural parts of the municipality. The TCLM still has one of the highest HIV prevalence rates in the Mpumalanga Province and few clinics and hospitals to service those affected specifically in the affected project area. It is advised that the mine together with the local municipality help address the need for additional health-care facilities as well as access the conditions aggravating the vulnerability of communities to HIV/AIDs such as poverty.

Job creation

From a cumulative impact perspective, it is anticipated that the construction of the activities at Der Brochen will have limited new job opportunities as the project is seen as a replacement project. Employees will be moved around from old sections of the mine to continue working at the new mine activities thereby allowing the mine to continue to operate with its current workforce of approximately 2350 people.

It is therefore anticipated that the cumulative positive impact of new job opportunities in the local area will only provide a marginal improvement in the overall status quo.

The net effect of the mining developments on local unemployment levels, given that there may be a larger worker pool due to influx, cannot be predicted at this stage.

It is anticipated that the cumulative impact of employment, and associated benefits will be most profound during the construction phase of the operation when employment opportunities will be at their highest, albeit of a temporary nature.

Based on the review of the potential environmental, social and economic impacts associated with the proposed project, the overall social benefit outweighs the potential negative impacts, which overall are of low significance.

10.3.4 Soil, land use and land capability

The surrounding areas within which the proposed mine is to occur are dominated by wildlife and wilderness land uses, and no significant cultivated agricultural activities were observed in the vicinity. This is largely attributable to the shallow nature of the surrounding soils. Therefore, the proposed mining project is anticipated to insignificantly contribute to the cumulative loss of arable land and low cumulative loss of the herbaceous material for grazing after mitigation measures have been put in place.

Therefore, from a soil and land capability point of view, the addition to the cumulative impact footprint of the region is considered relatively minor.

Surrounding areas can be broadly defined as non-arable land, thus the already approved Northern Pit and WRDs will lead to a negligibly low cumulative loss of arable land. However, high cumulative loss of herbaceous material for grazing is foreseen during the life/operation of these infrastructures due to their nature and extent in area. It is therefore imperative that mitigation measures, as outlined in this document, are carefully implemented during all phases of development to ensure that pre mining land uses commence post closure to avoid significant negative impacts.

10.3.5 Visual

The area in which the Der Brochen Mine is located has been subjected to mining activities for many years. Additional vegetation clearance, dust, mining infrastructure and vehicles travelling along haul roads will add to the cumulative visual impact of mining activities in the area. The visual impacts will be further exacerbated by already authorised activities (e.g. Helena and Richmond Waste Rock Dumps and Northern and Southern Open Pits) which have not yet been constructed.

The cumulative impact is reduced by the number of sensitive receptors in the area. The cumulative impact in terms of the visual aspect is assessed to be of low significance.

10.4 Possible Mitigation Measures that could be applied and the level of risk

As part of the impact assessment phase, potential impacts were identified and evaluated to determine the type and level of mitigation measures required. The recommended mitigation measures that will need to be implemented in respect of the impact/risk identified for the Der Brochen Amendment Project is detailed in Sections 10.2.1 to 10.2.5.

10.5 Summary of specialist recommendations

Several specialist studies were undertaken to inform the impact assessment and develop the associated management measures which has been included in Sections 10, 20 & 32. The specialist's area of investigation were considerably bigger than the required footprint of the proposed infrastructure to allow for alternative placement within the investigation area to avoid identified sensitive areas as far as possible within the footprint areas. Specialist recommendations which specifically informed the final site layout or designs, and which have been incorporated into the impact assessment and management measures stipulated in this report are listed in Table 10-8.

Table 10-8: Summary of specialist recommendation which informed the final site layout or design of the proposed infrastructure

Specialist Study	Recommendation
Air Quality	<ul style="list-style-type: none"> • It is recommended that the current dust fallout network be continued. Dust fallout rates to be below 1200 mg/m²/day in non-residential areas and 600 mg/m²/day in residential areas, averaged over 30 days. • Two PM₁₀ sampling campaigns are recommended at the closest sensitive receptor downwind of the Mareesburg TSF (northwest of the active TSF) prior to proposed operations to understand baseline levels and once proposed mitigated conveyor operations take place in order to ensure the impacts from the project are kept to a minimum at sensitive receptors. • Due to the proximity of sensitive receptors to the proposed project activities and the potential for cumulative impacts due to surrounding mining activities, it is recommended that mitigation measures on the main sources of fugitive dust be implemented to minimise impacts as far as possible: <ul style="list-style-type: none"> ○ Apply dust suppressants or vegetate bare areas not being used for construction. ○ Locate soil stockpiles within site boundaries considering the location of potential sensitive receptors and the predominant wind direction. ○ Set speed limits to minimise the creation of fugitive dust within the project boundary. ○ When stockpiling ore, the design specification of equipment should be considered to determine a suitable drop height to control the fall of materials which will reduce dust emissions. ○ Conduct routine site inspections to ensure that dust management measures are working efficiently
Ecology	<ul style="list-style-type: none"> • Pollutant and Waste Management <ul style="list-style-type: none"> ○ No discharge of effluents or other forms of dirty water are permitted directly into the watercourses or their surrounding environments within the focus area; and ○ If soil contamination occurs surrounding the watercourses (due to a spill), the soil should be removed from the site and disposed of appropriately. ○ Construction Equipment ○ Dedicated parking areas for construction vehicles must be located away from the delineated watercourses and the 100m zone of regulation (ZoR) GNR 704. Drip trays must be located beneath any parked and leaking equipment along with lubricant/fuel absorbing media (moss type products, sawdust) within the drip trays to contain spilled material. This must be undertaken firstly to prevent compaction of the soil due to standing vehicles, disturbance of the watercourse habitat and flow regime, and prevent pollution of surface water and soils; ○ All materials used to construct the proposed infrastructure components should not generate toxic leachates or lead to significant changes in pH or dissolved salt concentrations when surface water is present in the watercourses; and ○ No vehicles may indiscriminately be moved through the watercourses. During construction, the footprint areas of the proposed development activities must be kept to a minimum. All vehicles must use one single designated track and turn-around areas should be located outside of the riparian zone. • Soil management <ul style="list-style-type: none"> ○ Excavated soils removed should be stockpiled outside of the watercourses and 100m ZoR GNR 704; ○ Excavated materials should not be contaminated, and it should be ensured that the minimum surface area is taken up, however topsoil stockpiles may not exceed 2.5m in height; ○ Mixture of the lower and upper layers of the excavated topsoil should be kept to a minimum, to ensure best efficacy as part of rehabilitation activities;

Specialist Study	Recommendation
	<ul style="list-style-type: none"> ○ Berms must be placed around soil stockpiles to intercept runoff, reduce flow velocity and prevent sediment entering the watercourse; and ○ Berms constructed of compacted soil to be placed as far as possible from the toe of the stockpile, but at least 1 m from the toe to ensure trapping of sediments and management of edge effects. ○ All exposed soils on steep slopes must be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) in order to prevent dust generation resulting in vegetation smothering and sedimentation of the watercourses. ● Concrete Mixing <ul style="list-style-type: none"> ○ All wet and dry material should be stored within the construction camp, which is located outside of the delineated watercourses and 100 m ZoR GNR 704. These materials should be covered and contained to prevent contact with rainfall or runoff; ○ Concrete and cement-related mortars can be toxic to aquatic life. Proper handling and disposal should minimize or eliminate discharges into watercourses. High alkalinity associated with cement, which can dramatically affect and contaminate both soil and ground water. The following recommendations must be adhered to: ○ Fresh concrete and cement mortar should not be mixed near the watercourses. Mixing of cement may be done within the construction camp, may not be mixed on bare soil, and must be within a lined, bound or bunded portable mixer. Consideration must be taken to use ready mix concrete; ○ No mixed concrete shall be deposited directly onto the ground within the watercourses or its associated riparian habitat. A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited whilst it awaits placing; ○ A designated washout area should be designated outside of the watercourses and the 100 m ZoR GNR 704, and wash water should be treated on-site or discharged to a suitable sanitation system; ○ Cement bags must be disposed of in the demarcated hazardous waste receptacles and the used bags must be disposed of through the hazardous substance waste stream; and ○ Spilled or excess concrete must be disposed of at a suitable landfill site. Chain of custody documentation must be provided. ● Erosion and soil management <ul style="list-style-type: none"> ○ Exposed slopes especially along the riparian areas are highly prone to erosion, so drainage control features such as earth berms, perimeter berm/swales, or diversions (see below) can be used to intercept and convey runoff from above disturbed areas. This helps to reduce potential sedimentation from exposed areas (Walker et al. 1999 and USEPA 2005) ○ Brush layering is when branches are placed perpendicular to the slope contour. This method is effective for earth reinforcement and mass stability. Brush layers break up the slope length, preventing surface erosion, and reinforce the soil with branch stems and roots, providing resistance to sliding or shear displacement. Brush layers also trap debris, aid infiltration on dry slopes, dry excessively wet sites, and mitigate slope seepage by acting as horizontal drains. Brush layers facilitate vegetation establishment by providing a stable slope and a favourable microclimate for growth of vegetation (USEPA 2005); ○ Live gully repair is a technique that is similar to branch packing but is used to repair rills and gullies. Live gully repairs offer immediate reinforcement and reduce the velocity of concentrated flows. They also provide a filter barrier that reduces further rill and gully erosion and must be used where gully erosion is taking place on the project footprint (USEPA 2005). ○ Any gullies occurring as a result of erosion from the construction activities must be actively repaired; ○ Stream banks must be reprofiled to the pre-construction upstream and downstream slopes (a 1:3 profile ratio is not recommended as this will change the flood patterning of the watercourses. The existing embankments associated with the watercourses were noted to be steep. These embankments should be covered with a geotextile product such as hessian, with commercially available products such as Geojute, which is to be staked to the surface of the slopes and indigenous riparian vegetation should be re-instated for all areas disturbed by construction activities; and

Specialist Study	Recommendation
	<ul style="list-style-type: none"> ○ Edge effects of activities including erosion and alien/ weed control need to be strictly managed in these areas. ● Alien vegetation clearing <ul style="list-style-type: none"> ○ During the site inspection undertaken by the freshwater specialist, various alien and invasive plant species were identified within the watercourse riparian habitat, predominantly within existing disturbed areas such as road crossings; ○ Alien and invasive vegetation have a number of detrimental effects on water quality, from nutrient enrichment to increased erosion and excessive water use, which is especially relevant in dry areas or in important catchments. Invasive species are highly likely to colonise disturbed areas, even after rehabilitation and follow-up clearing must be done until healthy vegetation returns to the site (DWA.2008e, DWAF. Unknown date, MacFarlane, D.M., Wadeson. R et al, 2007). ○ Alien vegetation should be manually removed as far as feasibly possible and spot chemical treatment can be undertaken utilising products safe for within watercourses. All directions as stipulated on the proposed herbicide must be strictly adhered to. ○ All large tree species should be phased out slowly by stumping, with spot chemical treatment, or whatever is deemed most appropriate by a suitably qualified botanist. At no point should the roots of these trees be excavated as they assist with anchorage and embankment stability along the watercourses. All removed trees should be replaced with a suitable indigenous species, as guided by a suitably qualified botanist; ○ All removed alien plant species must be disposed of at a registered garden refuse site and may not be burned or mulched on site; and ○ No invasive plant species may be introduced to the development footprint and surrounding areas during the construction phases of the project and particular attention must be paid to ensure that any imported material is certified weed-free. ● Revegetation <ul style="list-style-type: none"> ○ All areas exposed and disturbed as a result of the construction must be further stabilised through re-vegetation with indigenous grasses and flora as soon as possible to prevent erosion; ○ Due to soil disturbance, soil will be exposed, and replanting/ reseeded should, therefore, take place immediately to prevent soil loss; and ○ Undertake reseeded/ revegetation ○ Instream construction activities associated with new road crossings □ It is imperative that all instream works be undertaken during the dry periods; ○ If construction activities take place during the summer rainfall period, diversion of watercourses may be necessary to enable construction. Should this be required, the diversion of flow will lead to an altered flow regime and inundation period of the reach of the Groot Dwars River downstream of the construction site. It is recommended that the diversion channel ensures that the pattern, flow and timing of the upstream area is retained through a diversion structure to the downstream reach; ○ Excavation within the watercourses should be limited in extent (only to what is necessary for the new culvert crossings) and the smallest construction equipment possible utilised in order to limit the impact within the active channel and to ensure that the hydrological patterns within the watercourse return to normal as soon as possible after construction; ○ Cobbles and sediment traps must be implemented within any required diversion channel as well as downstream of the construction dewatered area in order to prevent excess silt entering the downstream reaches of the system; ○ The diversion sandbags utilised for the dewatered area/coffer dam should be filled with in situ material so as to prevent foreign materials being introduced into the Groot Dwars River; ○ Sediment traps should be constructed downstream of the construction area and spaced at 20 metre intervals for 60 metres below the construction area. Sediment traps can be created by pegging an appropriate geotextile across the entire width of the channel held down by cobbles/boulders or by geotextile wrapped hay bales spanning the width of the channel and staked into position;

Specialist Study	Recommendation
	<ul style="list-style-type: none"> • Construction of culvert crossings: The design of culvert crossings must ensure that the applicable watercourse remains inundated with water after heavy rainfall events but without causing artificial ponding or concentration of flow. To achieve this, the following should be implemented: <ul style="list-style-type: none"> ○ The design of the road crossing should ensure adequate flow connectivity between the upstream and downstream portions of the watercourse; ○ The culvert structures must extend the width of the riparian zone of the watercourse to ensure recharge of the river downgradient of the crossing; ○ The crossing as a whole and the culverts must be sized to accommodate a 1:100 year flood; ○ Ensure that the concrete base slab and culvert invert is embedded below the natural ground level of the watercourse to prevent erosion and scouring and allowing for water flow and prevention of ponding (when surface water is present) as well as facilitate migrational movement of fish even under low flow conditions. This foundation should be buried deep enough to allow for scouring during high flows and to minimise or prevent the need for bed or bank reinforcement or bridge weirs or aprons; ○ Pre-cast concrete must be used when possible – special mention is made here of the box culvert floor slabs; ○ The extent to which culverts are used in the system should reach as far as possible (i.e. over the streambed and banks) to ensure that during freshets the broadest possible area becomes inundated, allowing for recharge of the marginal soils, to minimise or prevent the need for bed and bank reinforcement, reduce the risk of creating a barrier to faunal species and allows small faunal species passage under the structure. ○ The design of the culverts should have a cross fall (be slightly sloped) to accommodate the directional flow of the river. The inlet side of the crossing should be at a slightly higher elevation than that of the downstream outlet side, to facilitate the natural flow and velocity of water through the culverts; ○ It is recommended that energy-dissipating structures be constructed at the outlet side of the culvert crossing to reduce the concentration and velocity of flow and the creation of turbulent, erosive flow as a result of the placement of culverts within the watercourse. This will limit erosion of the watercourse and disruption of flow characteristics when surface water is present in the system. This would entail the installation of reno mattress aprons or the placement of rip rap to lower the velocity of flow through the culvert into the natural extent of the downstream reach of the watercourse; and ○ Energy dissipating structures should be constructed or installed at the culvert outlet, such as the use of reno mattresses, rip rap, concrete baffles and/or loose cobbles. • The use of concrete/grout during the construction of the crossing <ul style="list-style-type: none"> ○ No mixed concrete may be deposited outside of the designated construction footprint; ○ A batter/dagga board mixing trays and impermeable sumps should be provided, onto which any mixed concrete can be deposited while it awaits placing; and ○ Concrete spilled outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site. • Backfilling of the wingwalls and sloping of the embankments <ul style="list-style-type: none"> ○ Soil surrounding the wingwalls (only applicable if incorporated in the final design of the crossing) must be suitably backfilled and sloped (maximum of a 1:3 ratio, with a slope of 1:4 being preferred) using excavated soils/inert backfill material to achieve the correct gradient. Final finishing and shaping will require topsoil either from the study area or approved topsoil free from invasive species; ○ The slopes of the road crossing where it is transitioning from the river boundary into the terrestrial zone must also be suitably sloped (as recommended above) to ensure reasonable stability and to ensure that revegetation and slope stabilisation will be successful; and ○ The sloping of the embankments should allow for stormwater from the road crossing to freely drain into the watercourse and not in a concentrated manner, which could cause erosion or gully formation in the watercourse.

Specialist Study	Recommendation
	<ul style="list-style-type: none"> • Construction activities associated with the proposed conveyor within close proximity to several watercourses: <ul style="list-style-type: none"> ○ The conveyor system should be designed to protect watercourse pollution resulting from the material conveyed; ○ A suitable cover should enclose the conveyor to prevent material spilling into the watercourses; ○ The conveyor system must be designed to be non-erosive and structurally stable; ○ All conveyor watercourse crossings should be designed on pillars outside of the active channel to bridge the active channel of the watercourse; ○ The conveyor system crossing should be designed for a 1:100 year flood event as a minimum with no support structures under the 1:100 year floodline; ○ The construction conveyor crossing points will need to be adequately planned to avoid watercourse deterioration or impacts on watercourse dynamics; ○ The conveyor crossing must allow for water to flow through to maintain the stream flow as it was during the pre-construction phase; ○ The duration of impacts should be minimised as far as possible by ensuring that the duration of time in which any flow alterations may take place is minimised; ○ The conveyor crossing structures should be wide enough to allow for adequate flow (high flood conditions) in a downstream direction without causing inundation upstream and to prevent the build-up of debris under the crossing; ○ Throughout the construction and rehabilitation phases stream flow continuity in the system must be maintained; and ○ Sediment traps should be placed downstream of the construction site in the riverbed to prevent watercourse sedimentation. • Watercourse bank stabilisation <ul style="list-style-type: none"> ○ Watercourses must be avoided as far as possible during the construction of infrastructure; ○ Soil removed for excavations should be placed in the layers that it was removed and replaced according to the layers that it was removed; ○ Stream banks must be reprofiled to the pre-construction upstream and downstream slopes (a 1:3 profile ratio is not recommended as this will change the flood patterning of the watercourses); ○ Care must be taken to ensure that construction equipment used does not erode the embankments further; ○ Soil should be shallow-ripped and scoured prior to replanting and placing of an erosion blanket, i.e. geotextile (on steep slopes) to avoid soil erosion; ○ Erosion control blankets must be well anchored burying the edges and pegging the rest of the material. ○ Use biodegradable pegs only; ○ Plant plugs of indigenous graminoid species; ○ Plant plugs on 50 x 50 cm grid in holes punched through the erosion control blanket; ○ Water the planted plugs thoroughly immediately after planting and continue to water every three days in the absence of rainfall until plants are established; and ○ The area under rehabilitation should be protected from any disturbance. • Rehabilitation activities associated with the proposed conveyor within close proximity to several watercourses <ul style="list-style-type: none"> ○ The soil substrate soil that occurs naturally within the watercourse should be used with engineering solutions to prevent erosion and provide scour protection around the pillars; and ○ Engineering solutions may include gabion structures and reno-mattresses as well as the foundations required for the pillars to support the conveyor. • Revegetation

Specialist Study	Recommendation
	<ul style="list-style-type: none"> ○ All areas exposed and disturbed as a result of the construction must be further stabilised through re-vegetation with indigenous grasses and flora as soon as possible to prevent erosion. ○ Due to soil disturbance, soil will be exposed and replanting/ reseeded should, therefore, take place immediately to prevent soil loss. ○ Undertake reseeded/ revegetation ● New road crossings <ul style="list-style-type: none"> ○ The access and haul roads watercourse crossings should be regularly inspected for erosion of banks and beds, downstream of the crossing. Any areas affected by erosion should be identified and rehabilitated using crushed rock, gabions or reno mattresses; ○ Culverts must be inspected after storm events for blockages, which should be removed. ○ Proposed conveyor within close proximity to several watercourses: ○ Inspection and maintenance of the conveyor belt should be undertaken regularly as per engineering and supplier recommendations to ensure the conveyor is kept in serviceable condition; and ○ All spills as a result of belt failure must be cleaned immediately and be dealt with as indicated in the EMPr. ● Revegetation <ul style="list-style-type: none"> ○ All areas impacted by construction must be monitored post rehabilitation until basal vegetation cover has been re-established; ○ Should plants not successfully establish within two growing seasons after the revegetation, new plant material should be provided; and ○ Remove all alien invasive plant species by hand once a month during the first growing season.
Groundwater	<ul style="list-style-type: none"> ● From a water loss point of view, it is recommended that alternative means of containing the seepage from below the DMS be investigated during the feasibility stage and be incorporated into the risk study. The losses are not as substantive as in the TSF and alternative measures to intercept and contain the groundwater plume may be beneficial. These should entail a simplified (in comparison to a class C liner) liner system, interception trenches and/or scavenger boreholes. ● During the operational phase, mine water must be re-used or pumped to dirty water dams or pollution control facilities in order to avoid deterioration of the mine water quality. ● Monitoring of mine effluent and seepage should be performed to assure protection of the environment. Monitoring and field testing provide early detection of potential environmental issues, allowing evaluation and, if necessary, adaptive management interventions ● It recommended that the numerical model and geochemical study is updated biennially during the life of the mine in order to validate its results and to inform effective water management and closure planning.
Heritage	<ul style="list-style-type: none"> ● The developer should however note that due to the nature of archaeological material, such sites, objects or features, as well as graves and burials may be uncovered during construction activities on site. In such a case work should cease immediately and an archaeologist should be contacted as a matter of urgency to assess such occurrences. ● The following 'Chance find Procedure' will be followed if further historical features are identified within the project footprint: <ul style="list-style-type: none"> ○ Upon finding any archaeological or historical material all work at the affected area must cease. ○ The area should be demarcated in order to prevent any further work there until an investigation has been completed. ○ An archaeologist should be contacted immediately to advise the applicant and contractor of the required processes to be followed. ○ If needed, the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist. ○ The removal of such archaeological material will be done by the archaeologist in lieu of the approval given by SAHRA, including any conditions stipulated by the latter. ○ Work on site will only continue after removal of the archaeological/ historical material was done. ● A grave relocation process will comprise of the following steps:

Specialist Study	Recommendation
	<ul style="list-style-type: none"> ○ A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation. ○ Bilingual site and newspaper notices indicating the intent of the relocation. ○ Permits from all the relevant and legally required authorities. ○ An exhumation process that keeps the dignity of the remains and family intact. ○ An exhumation process that safeguards the legal rights of the families as well as that of the mining company. ○ The process must be done by a reputable company well versed in the mitigation of graves.
Hydropedology	<ul style="list-style-type: none"> • The contribution of bedrock flowpaths to the hydrological behaviour is minimal and evidence of lateral flow through the soils absent. The planned DMS stockpiles are unlikely to significantly impact the hydrological regime of streams and wetlands in lower lying areas. Care must, however, be taken to ensure that additional overland flow is not generated from the DMS stockpiles. Since overland flow is dominant, seepage and runoff from the DMS stockpiles could result in pollution of surface water following large rain event. Adequate measures must therefore be put in place to avoid runoff from the DMS stockpiles.
Noise and Vibration	<ul style="list-style-type: none"> • Equipment and/or machinery which radiate noise levels between 85.0dBA and 90.0dBA to be acoustically screened off. • The ventilation shaft outlet to face away from any residential area. • Emergency generators to be placed in such a manner that it is away from any residential area. • Noise monitoring to be carried out along the footprint boundaries at the Mototolo concentrator plant, decline shaft (south), ventilation shafts, ventilation plant, overland conveyor; • Noise monitoring at the residential areas and the mine boundaries to be done on a quarterly basis for a year after which the frequency can change to an annual basis; • Actively manage the process and the noise management plan must be used to ensure compliance to the noise regulations and/or standards. The levels to be evaluated in terms of the baseline noise levels. • Blasting to be done in terms of the safe blast techniques. • Ground vibration levels to be monitored at the noise receptor V. • Optimise blast design parameters and to control ground vibration at lowest possible levels. • Selecting equipment with lower sound power levels; • Installing silencers for fans; • Installing suitable mufflers on engine exhausts and compressor components; • Installing acoustic enclosures for equipment causing radiating noise; • Installing vibration isolation for mechanical equipment; • Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; • Taking advantage during the design stage of natural topography as a noise buffer; • Develop a mechanism to record and respond to complaints.
Social	<ul style="list-style-type: none"> • It is recommended that the Der Brochen mine's Environmental and Social Management System be updated to include the findings of the SIA and to incorporate the mitigations measures provided for the anticipated impacts. It is further recommended that management plans be devolved for influx management, employment and supplier management, contractor management and closure management. The identified impacts and associated mitigation measures should be re-assessed throughout the life span of the mine and updated on a regular basis. This process should contribute towards the closure plan for the mining operation. • Anglo should establish an overarching policy defining the environmental and social objectives and principles that guide the project to achieve sound environmental and social performance. Anglo should communicate the policy to all levels of its organization.

Specialist Study	Recommendation
	<ul style="list-style-type: none"> • Training should be provided to all staff, especially staff that will be responsible for implementing and managing the Environmental and Social System. Sufficient organisational capacity should be developed to implement the mitigation measures and management programmes proposed in this report. • Effective monitoring and reporting should take place on the social impacts highlighted in this report. Where possible, community members must be capacitated to assist in the identification of indicators and data collection
Soils, Land Use and Land Capability	<ul style="list-style-type: none"> • The footprint of the proposed infrastructure area should be clearly demarcated to restrict vegetation clearing activities within the infrastructure footprint as far as practically possible; • If possible, vegetation clearance and commencement of construction activities can be scheduled to coincide with low rainfall conditions when the erosive stormwater and wind are anticipated to be low; • Bare soils can be regularly dampened with water to suppress dust during the construction phase, especially when strong wind conditions are predicted according to the local weather forecast; • All disturbed areas adjacent to the infrastructural areas can be re-vegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission; • Temporary erosion control measures may be used to protect the disturbed soils during the construction phase until adequate vegetation has established • Infrastructure sites should be accessed through existing road network, where feasible to avoid unnecessary excavation; • Excavation and long-term stockpiling of soil should be limited within the demarcated areas as far as practically possible; • Separate stripping, stockpiling and replacing of soil horizons (A and B horizon) in the original natural sequence to combat hardsetting and compaction, and maintain soil fertility; • Stockpile should not exceed three (3) meters in height and should be treated with temporary soil stabilization and erosion control measures; • Stockpiles should be revegetated to establish a vegetation cover as an erosion control measure. These stockpiles should also be kept alien vegetation free at all times to prevent loss of soil quality; • Temporary berms can be installed, if necessary, around stockpile areas whilst vegetation cover has not established to avoid soil loss through erosion; • The recovered soils should be re-used to rehabilitate the mine footprint following mine closure; • Soil resources of similar characteristics must be imported back to the site to compensate for soil loss that will occur during activities associated with mining; and • The landscape should be reprofiled as to mimic the natural topography, in a manner that allows water to freely drain to the downgradient receiving environment post closure to avoid water ponding which will subsequently lead to water logging conditions.
Surface Water	<ul style="list-style-type: none"> • The proposed infrastructure is located outside of the 1:100 year floodline but the South Portal and Phase 3 of the new DMS stockpile will be in close proximity to the floodline. Flood protection berms should be constructed at the South Portal and Phase 3 of the DMS stockpile to minimise the potential for flooding; • Groot-Dwars River water quality in the vicinity of the Der Brochen Project area is generally well within the applicable standards and limits with the few exceptions to the WUL considered to be due to the natural geology and not related to the existing operations. To protect the surface water quality in the project area it is recommended that the proposed measures in this Report be implemented including ongoing monitoring at the existing WUL compliance monitoring points; • Water balances for the mine have been developed and demonstrate that the mine has limited water available under the current water authorisations to sustain the mine without water conservation and storage of excess water.

Specialist Study	Recommendation
	<ul style="list-style-type: none"> Based on the site assessment clean and dirty water separation measures in compliance with Regulation 704 have been developed and include the following: <ul style="list-style-type: none"> Additional dirty water storage has been sized in compliance with Regulation 704. It is recommended that the PCDs be provided with a formal engineered liner system appropriate to the containment of impacted waters for reuse purposes; Design criteria for the proposed water course crossings and proposed clean water diversions include appropriate erosion controls and energy dissipation to minimise the potential for erosion and subsequent sediment loads in the Groot-Dwars River; and Further design considerations for clean and dirty water separation will need to be informed by recommendations from the detailed survey and geotechnical, biodiversity and other specialist studies as appropriate. The identified potential surface water related environmental impacts associated with the proposed activities range from medium–high to very low significance in the absence of appropriate mitigation measures. The identified impacts can be largely mitigated reducing the significance to low-medium to very low. The proposed mitigation measures have been incorporated into a surface water management plan for the project area. The plan includes applicable best practices and requirements related to inspection, maintenance, monitoring and management of incidents. This plan should be further developed as more detailed project information becomes available.
Traffic	<ul style="list-style-type: none"> The following intersection upgrades are required to satisfy existing demand on the road network: <ul style="list-style-type: none"> Install Traffic Signals at the intersection of R577/D1262. Install Traffic Signals at the intersection D1261/R555. The cost of these upgrades are to be shared by all surrounding mines. It is also recommended that ongoing rehabilitation is carried out of the Mine Access Road by all mines along the road.
Visual	<ul style="list-style-type: none"> Adhere to the management measures regarding dust provided by the air quality specialist Appoint a rehabilitation specialist to implement the requirements of the Closure and Rehabilitation Plan

11 Environmental Impact Statement

11.1 Summary of key findings of the environmental impact assessment

The Der Brochen project area is located within the 66 000 km² eastern limb of the Bushveld Complex. The economic zones of geological interest to the proposed project include the platiniferous Merensky reef and the UG2 chromitite reef.

Due to the placement of certain project related infrastructure on undisturbed areas, the project will impact on the local fauna and flora habitats (that include protected flora species), archaeological, historical and cultural sites and the topography of the area.

Soils, land capability, surrounding land use and landscape character will also be impacted by the proposed project, as undisturbed areas will be used for the development of the project related infrastructure. These areas will however be restricted to only the extent of the new infrastructure. If soil pollution does occur during the construction phase, it will be mitigated through the various management measures set out in the impact assessment. Once rehabilitation is complete, the current anticipated end land-use will be grazing.

Surface water pollution due to run-off from South decline shaft complex area and the DMS stockpile area will have a negative impact on the environment. This will impact receptors which may be influenced by the mining activities including the users of the Groot-Dwars River and Mareesburg stream (aquatic species, livestock, wildlife). However, the approved existing water monitoring programme will be expanded and implemented to monitor the activities associated with the Der Brochen Mine in order to detect any change in the water quality of the surrounding environment. Adequate and appropriate stormwater management measures and infrastructure will also be implemented to prevent water pollution.

Seepage from DMS stockpile area will be limited due to the implementation of a barrier system during the construction of the facility. Groundwater ingress into the underground mining operation at the South decline shaft will be appropriately managed to reduce any potential groundwater contamination.

Short term air pollution can be expected during the construction phase and the commencement of the operational phase due to dust generated as a result of site clearing and construction activities as well as the transportation of ore from the South decline shaft area to the Mototolo Concentrator Plant. These impacts will be remediated through dust suppression actions and vehicles travelling at the correct speed limits.

The noise and vibration impact during the pre-construction, construction and decommissioning phases, of which most will be during daytime periods only, will be insignificant. There will be a slight noise increase during the operational phase of the project but not exceeding the 5.0dBA threshold value. Noise mitigatory measures must at all times be in place in order for the proposed mining activities to comply with the relevant noise and vibration standards.

Ground vibration during underground blasting South shaft operation will be below 0.5mm/s at the abutting noise receptors except at the Der Brochen dam wall during a blast of 75.0kg per delay at the UG 7 underground mining block where the ground vibration level at the dam wall will be 4.85mm/s. Vibration impacts will be mitigated by conducting the blast activities during daytime and through the use of safe blasting techniques. Ground vibration monitoring will be done at the nearest residential area during each blast.

The project will create temporary employment opportunities for local employees during the pre-construction, construction and rehabilitation phases of the project. The Der Brochen Amendment project is seen as a replacement project for the Borwa and Lebowa shafts, which previously formed part of the Mototolo Mine operation managed under a JV between RPM and Glencore. It is anticipated

that employees will be moved around from old sections of the mine to continue working at the new mine activities thereby allowing the mine to continue to operate with its current workforce.

11.1.1 Final land use

Post closure land use (PCLU) is determined in consultation with stakeholders so that the PCLU meets the requirements of the stakeholders, within the context of what can reasonably be achieved on site. This activity is undertaken for the whole mine lease area affected by mining activities and integrates stakeholder requirements with risk mitigation. As specific consultation regarding PCLU has not been undertaken at this stage of the closure process for the Der Brochen Amendment Project, nor has it been undertaken for the large mining rights area, for purposes of current planning and liability costing for the Der Brochen Amendment Project various assumptions relating to closure have been developed.

Some structures will remain permanently in the landscape (DMS and the TSF) with these unlikely to have associated closure alternatives that could be utilised sustainably by the community. However, where infrastructure is demolished (South Decline Shaft, stockpiles, roads, conveyors and upgrades at the Mototolo Concentrator Plant), there are opportunities that the footprints could be utilised for sustainable post closure uses.

Based on the limitations presented by the permanence of the disturbances associated with the mining activities, the overall post closure land use for the mine has been determined to be:

- Landforms, that sustain indigenous vegetation which limits water and wind erosion.
- Mosaic of nodes where existing infrastructure is utilised by stakeholders for a variety of post closure activities surrounded by areas rehabilitated back to a land capability possible of supporting indigenous vegetation, as well as land capable of supporting the various community initiatives in which the mine is involved.

The land capability developed on the footprints where covers are placed and vegetation established will be a land capability defined as grazing by the Chamber of Mines¹¹, with these covers expected to support landforms that support indigenous vegetation.

As the demographics of the areas surrounding the mine may change at closure as communities potentially move out to seek other livelihoods, pressures on the land may change. This may however, be countered by population growth between now and when the mine closes. It is likely that for the next 20 to 30 years, land use will be associated with mining and will remain so until closure. After closure, the mine is likely to enter into a period of care and maintenance on the rehabilitated areas, further limiting opportunities for community use. However, once sufficient data has been obtained to indicate that the mine has met its relinquishment criteria, use of rehabilitated areas may commence.

11.2 Final site map

Refer to Figure 25-1 for the Der Brochen Amendment Project's final site map, illustrating the location of the proposed project related infrastructure in relation to the identified environmental sensitivities of the project area, including buffers.

¹¹ Now known as Minerals Council South Africa

11.3 Summary of the positive and negative implications and risks of the proposed activity and identified alternatives

Various changes have been made to the initial project layout and project description since the pre-feasibility study and scoping phase of the project by RPM. Please refer to Section 19 for further details on the reasons for the deviations from the approved scoping report and plan of study.

Table 11-1 provides a summary of the positive and negative implications of the proposed project.

Table 11-1: Positive and negative impacts regarding project alternatives

Positive Impacts	Negative impacts
Combining open-pit and underground mining methods into the Der Brochen Mine Project	
<ul style="list-style-type: none"> North open-pit operation can commence as soon as possible, as the operation has been approved previously in the Der Brochen Consolidated EMPr of 2015. The commencement of the open-pit operation will provide for sustaining current workforce and contribute to the economic development of the region. Converting the previously South open-pit operation to an underground mining operation a smaller surface footprint area will be required, thereby reducing the environmental impacts associated with a conventional open-pit mining operation. 	<ul style="list-style-type: none"> Due to the extent of the underground workings at the South decline shaft operations, groundwater ingress volumes will need to be appropriately managed.
Mine residue deposits and stockpiles	
<ul style="list-style-type: none"> Due to the change in the mining methodology strategy, no additional TSF will be required nor the previously approved co-disposal facility. Only one DMS stockpile will be required instead of the initial contemplated three waste rock storage areas. The conveyor system required for the DMS material transportation to the DMS stockpile area will follow existing linear infrastructure servitudes. 	<ul style="list-style-type: none"> Additional diversion trenches will be required around the proposed DMS stockpile area.
DMS Plant	
<ul style="list-style-type: none"> The DMS material produced through the incorporation of a DMS Plant as part of the processing operation can provide material that can be used for alternative uses such as road aggregate material 	<ul style="list-style-type: none"> The DMS Plant will require additional services, such as electricity and water supply.
Transportation	
Trucking (to be used during the construction phase and at the start-up of the underground working operations)	
<ul style="list-style-type: none"> Use of existing road networks and alignment of new haul road along the ore conveyor route, thereby limiting the area of disturbance relating to access and haul roads. Existing prospecting roads will be used as maintenance roads to the proposed ventilation shafts. 	<ul style="list-style-type: none"> Short-term increase of traffic volumes on existing road networks. Increased possibilities for road accidents involving vehicles and pedestrians. Deterioration of existing road network due to additional heavy vehicles.
Conveying	
<ul style="list-style-type: none"> Larger volumes of ore can be transported by means of conveying. 	<ul style="list-style-type: none"> Increased noise levels due to operation of conveyor belt. Increase in dust fallout due to conveyor belt if not covered. Potential for surface water contamination at watercourse crossings.

12 Proposed impact management objectives

Objectives of the management measures as detailed in Table 12-1 have been provided with the associated time frame for the implementation of the identified management measures provided in Section 10. The significance rating of each impact have been re-evaluated post implementation of management commitments to provide an indication of the effectiveness of the management measures. Through the implementation of the management measures Mogalakwena Mine will aim to achieve the management objectives associated with the Expansion Project. The closure objectives detailed in Section 31.1.

Table 12-1: Impact management objectives

Aspect	Objective
Socio – Economic	<ul style="list-style-type: none"> To enhance benefits from the development of the mine To maximise opportunities for local residents To facilitate employment of local labour on the mine To avoid creating unrealistic expectations To prevent or minimise negative impacts resulting from the construction and operation of the Der Brochen mine
Surface and Ground Water	<ul style="list-style-type: none"> Manage water use (including abstraction, storage, use and discharge) at the mine in an efficient and effective manner to minimise disturbance to water resources and the users of those resources Limit erosion and the consequent degradation of soil and pollution of air and water Manage clean and dirty water systems effectively Linear infrastructure will be designed to minimise the impact on the flow of water in affected watercourses Locate, design and construct mine infrastructure to minimise the risk of flooding both to the mine and to any other riparian users
Air Quality	<ul style="list-style-type: none"> Manage DMS stockpile and product stockpiles to minimise risk of injury to humans and animals; damage to infrastructure; and contamination of the environment Manage mine water storage facilities to minimise risk of injury to humans and animals; damage to infrastructure; and contamination of the environment Minimise the risk of pollution associated with the road transport of material Minimise the risk of pollution arising from mine residue deposits post closure Monitor surface water and groundwater quality during the life of the mine and post closure To minimise the amount of dry material susceptible to wind erosion To minimise the entrainment potential of dust To respond with corrective action to public complaints about dust related health and nuisance impacts To reduce the emissions from the vehicles responsible waste residue disposal
Cultural Heritage	<ul style="list-style-type: none"> To respect the culture and heritage of the people in the area To avoid disturbance of graves and where not possible to undertake exhumation and relocation actions according to legal requirements and to determine mitigation in consultation with the relevant stakeholders
Biodiversity	<ul style="list-style-type: none"> To define the minimum requirements to manage biodiversity in all phases of operation to achieve Net Positive Impact (NPI) and maximise biodiversity opportunities To demonstrate active stewardship of land and biodiversity To avoid the damage or loss of plants and where not possible to ensure the conservation of representative habitats To avoid the loss or disturbance of fauna populations and migration paths and where not possible to ensure the conservation of representative habitats Mitigate impacts of the surrounding water resources such that the quantity of water, quality of water, soil and vegetation is protected.

Aspect	Objective
Soils and Land Capability	<ul style="list-style-type: none"> To remove and store soil to enable its reuse for rehabilitation To prevent and minimise soil erosion and contamination
Noise	<ul style="list-style-type: none"> To minimise adverse noise impacts from construction and operation To respond with corrective action to public complaints about noise

13 Aspects for inclusion as conditions of Authorisation

All management measures set out in this EIA/EMPr must be complied to. The mine must further comply with any conditions set out under other authorisations related to this project.

14 Description of any assumptions, uncertainties and gaps in knowledge

The following assumptions, limitations and constraints (as summarised in Table 14-1) were highlighted by the specialists involved in the assessment of the Der Brochen Amendment Project:

Table 14-1: Assumptions, limitations and constraints

Study aspect	Assumption/limitation/constraint
General	<ul style="list-style-type: none"> The impact assessment was conducted based on the design information provided by the client at the time of compiling this report and it is assumed that these designs are up to date and accurate and will remain unchanged for the duration of the integrated environmental authorisation process.
Aquatics	<ul style="list-style-type: none"> The determination of the freshwater resource boundaries and the assessment thereof, is confined to the focus area. The freshwater resources within 500 m of the focus area were delineated in fulfilment of Regulation GN 509 of the NWA using various desktop methods including use of topographic maps, historical and current digital satellite imagery and aerial photographs. The general surroundings were, however, considered in the desktop assessment of the focus area; Due to the terrain, portions of some drainage systems were inaccessible particularly in the eastern portions of the focus area. Nonetheless, sufficient data was gathered during the site assessment to enable accurate delineations using desktop methods where necessary to augment the delineations undertaken in the field; Similarly, portions of the investigation area, particularly in the north and west were inaccessible due to these being restricted areas (active mining areas). Thus, whilst every effort was made to ensure that all freshwater resources potentially within the 500 m investigation area were identified and delineated, less distinct features within these access-controlled areas may not have been identified. Nevertheless, where information had been obtained during the course of previous studies in these areas, such data was utilised in this report where necessary; The delineations as presented in aquatic impact assessment report are thus regarded as a best estimate of the riparian zones associated with ephemeral drainage lines and the Groot Dwars River based on the site conditions present at the time of assessment; Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies due to the use of handheld GPS instrumentation may occur. If more accurate assessments are required, the wetland will need to be surveyed and pegged according to surveying principles and with survey equipment; Wetland, riparian and terrestrial zones create transitional areas where an ecotone is formed as vegetation species change from terrestrial to obligate/facultative species. Within this transition zone, some variation of opinion on the freshwater resource boundary may occur. However, if the DWAF (2008) method is followed, all assessors should get largely similar results; With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked. However, it is expected that the proposed development activities have been accurately assessed and considered, based on

Study aspect	Assumption/limitation/constraint
	<p>the field observations and the consideration of existing studies and monitoring data in terms of riparian and wetland ecology;</p> <ul style="list-style-type: none"> It should be noted that at the time that the aquatic study was conducted neither a geohydrological study or a surface water study had been completed for the proposed Der Brochen Amendment project. Therefore, whilst potential risks such as decant from the proposed underground shaft, the development of a groundwater pollution plume, and loss of catchment yield were considered in the impact assessment, accurate assessment of the significance thereof could not be determined since the aforementioned data had not been generated. Reference conditions are unknown. Considering existing mining activities in the larger catchment, the composition of aquatic biota in the focus area, prior to disturbance, is largely unknown. For this reason, reference conditions are partly hypothetical, and are based on historical biomonitoring data in the area (dating back to April 2007), professional judgement and inferred from desktop data available such as the DWS's Resource Quality Information Services (RQIS) PES/EIS database. These sources indicate that the system is highly sensitive with a very high ecological importance and ecological sensitivity rating; It is important to note however that at the time of the assessment, detailed layouts of some infrastructure areas (e.g. the auxiliary infrastructure associated with the South Decline Shaft) had not been finalized. The impact assessment is therefore based on general investigation areas provided by the proponent and the impact significance of some perceived impacts could change. The impact assessment was therefore based on a "worst case scenario".
Fauna and flora	<ul style="list-style-type: none"> The terrestrial ecological assessment is confined to the various infrastructure expansion areas within the focus area and does not include the entire focus area, nor the mining right area or neighbouring and adjacent properties; these were however considered as part of the desktop assessment; Due to the nature and habits of most faunal taxa it is unlikely that all species would have been observed during a site assessment of limited duration. Therefore, site observations are compared with literature studies where necessary; With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most faunal and floral communities have been accurately assessed and considered and the information provided is considered sufficient to allow informed decision making to take place and facilitate integrated environmental management; Sampling by its nature, means that not all individuals are assessed and identified. Some species and taxa within the various expansion infrastructure areas may therefore have been missed during the assessment.
Heritage	<ul style="list-style-type: none"> Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites, as well as the density of vegetation cover found in some areas. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted. Such observed or located heritage features and/or objects may not be disturbed or removed in any way, until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply.
Noise and vibration	<ul style="list-style-type: none"> The prevailing ambient noise levels for the study area was created by far and near noise sources associated with traffic, mining activities and seasonal agricultural activities with the result that the prevailing ambient noise level may change at times; The noise from the ventilation shafts were based on up-cast ventilation shafts; The underground blasting calculations was based on 75 kg explosives per delay;

Study aspect	Assumption/limitation/constraint
	<ul style="list-style-type: none"> Noise measurements in the presence of winds in excess of 3.0 m/s may impact the outcome of the environmental noise results; The influx of traffic into an area will have an influence on the prevailing ambient noise levels and was considered during the noise impact assessment process; There will be a difference in the prevailing ambient noise levels between the summer and winter periods as the insect activities such as crickets and cicadas raise the prevailing ambient noise levels during the summer period whereas the prevailing ambient noise levels will not be influenced by insects during the winter period. The distances and topography between the proposed mining establishment activities and the residential areas will play a role in the noise propagation and how the sound from the proposed mining establishment will be perceived.
Social	<ul style="list-style-type: none"> It is essential that the Social Impact Assessment (SIA) are based on current and accurate project information. Similarly, the geographic extent of the SIA is influenced by project design and overall planning processes. The SIA report is based on current information received while compiling the SIA and the report therefore takes into consideration project information relating to planning and design, implementation and infrastructure placement available to SRK during the compilation of this report. The timeframes associated with the construction and operational phases of the proposed project, as specified in the SIA, are dependent on the outcome of the Environmental Application currently underway.
Soil and land capability	<ul style="list-style-type: none"> The soil survey conducted as part of the land capability assessment was confined within the focus area, which is considered adequate for the purpose of this investigation; Sampling by definition means that not all areas are assessed, and therefore some aspects of soil and land capability may have been overlooked in this assessment. However, it is the opinion of the specialist that this assessment was carried out with sufficient sampling and in sufficient detail to enable the proponent, the Environmental Assessment Practitioner (EAP) and the regulating authorities to make an informed decision regarding the proposed mining activities; Land Capability was classified according to current soil restrictions, with respect to prevailing climatic conditions on site; however, it is virtually impossible to achieve 100% purity in soil mapping, the delineated soil map units could include other soil type(s) as the boundaries between the mapped soils are not absolute but rather form a continuum and gradually change from one type to another. Soil mapping and the findings of this assessment were therefore inferred from extrapolations from individual observation points; Since soils occur in a continuum with infinite variances, it is often problematic to classify any given soils as one form, or another. for this reason, the classifications presented in this report are based on the "best fit" to the soil classification system of South Africa; Soil chemical analyses has not yet taken place since the data will be used for baseline purposes and hence chemical analyses will take place once final layouts have been developed to ensure optimal sampling locality choices to allow for the best utilisable baseline soil chemistry data; and Soil fertility status was not considered a limitation, seeing as inherent nutrient deficiencies and/or toxicities would be rectified by appropriate liming and/or fertilization prior to cultivation.
Surface water	<ul style="list-style-type: none"> Key assumptions used in the preparation of the water balance are listed in Table 9-1. The current larger surface area of 649 700 m² has been used and not the final area at increased height (1 145 mamsl) as this area will be confirmed on completion of the extension design. The following data limitations are noted as pertaining to the surface water impact assessment: <ul style="list-style-type: none"> Floodlines are included based on the 2014 EMP submission with an update on the Dam break analysis provided by Knight Piésold Consulting. The floodlines for the general area are assessed on the basis of 1 in 5 contour spacing. Knight Piésold Consulting provided a further update based on

Study aspect	Assumption/limitation/constraint
	<p>LIDAR survey data for the small section of the Groot-Dwars River located adjacent to the proposed DMS stockpiles. This resulted in a narrower floodline than that based on the 1 in 5 m survey (Knight Piésold Consulting's Report DB-2018B-09-01, 2019). Knight Piésold Consulting also noted that the new bridge at the Mareesburg pipeline has not been modelled, and may cause a restraint upstream of the bridge;</p> <ul style="list-style-type: none"> ○ Drawings received from Knight Piésold Consulting were not supplied with georeferenced data and have therefore been provided as an inset to the figures; ○ Crossing consolidation is still pending
Visual	<ul style="list-style-type: none"> • Visual assessment is not, by nature, a purely objective, quantitative process, and depends to some extent on subjective judgments. Where subjective judgments are required, appropriate criteria and motivations for these are clearly stated; • The study is based on technical information supplied to SRK, which is assumed to be accurate. This includes the proposed locations, dimensions and layouts of the project components; • The focus of the Visual Impact Study (VIS) is on the components of the project that are anticipated to have the greatest visual impact because of their height and/or scale, namely the DMS stockpile and the RoM silo. However, the other components of the project are considered in the assessment of the overall visual impact; • The study area is defined as the area within a maximum 15 km radius of the site as the visual impact beyond this distance can be considered negligible; • This study does not provide motivation for or against the project, but rather seeks to give insight into the visual context of the area; and • The viewshed calculation uses 20 m contour intervals. The viewshed depicts the area from which the project might be visible. It does not take localised undulations, vegetation and existing man-made structures - which may obscure views - into account. This means that the project is not necessarily visible from everywhere within the viewshed, i.e. from some places the project may be obscured by existing structures, vegetation or local variations in topography. It therefore indicates a "maximum exposure" or "worst case" scenario.
Closure and Rehabilitation	<p>A number of assumptions were made during the development of the Closure and Rehabilitation Plan, as information relating to certain aspects were not available for definitive actions to be developed. Information therefore needs to be collected to confirm the assumptions. These primarily relate to:</p> <ul style="list-style-type: none"> • A potential shortfall in growth medium required to support vegetation covers on rehabilitated and restored footprints. Alternative growth media sources need to be explored. • The final slopes of the DMS need to be determined to identify slopes which are likely to be sustainable in the post closure environment. • Post closure water management.

15 Reasoned opinion as to whether the proposed activity should or should not be authorised

15.1 Reasons why the activity should be authorised or not

The impact assessment undertaken by the EAP, as part of the integrated environmental authorisation process for the Der Brochen Amendment Project, followed due process to inform the findings of the EIA study in accordance with the EIA Regulations of 2014, as amended. The EIA process included an assessment of potential impacts identified, further investigations by specialists in their respective fields, and the undertaking of the legislated required participation with interested and affected parties.

The impact assessment (as summarised in Section 10 of this report) considered both the biophysical and socio-economic aspects of the environment within which the Der Brochen Amendment Project will be located.

The assessment of the biophysical environment revealed that the project area is located within the Sekhukhune Centre of Plant Endemism. Significant habitat loss has already occurred within this centre of endemism, largely attributable to the expansion of local communities and mines and associated mining exploration. Although the proposed project will result in the long term loss of habitat and species in the region, appropriate mitigation measures have been developed for this project to minimise these anticipated impacts and which are aligned with the minimum requirements of AAP's Biodiversity Strategy to achieve Net Positive Impact (NPI) and maximise biodiversity opportunities.

In addition, a detailed site investigation further assessed RPM is determining the least intrusive areas where the project related infrastructure and activities can be placed.

From a socio-economic point of view, the Der Brochen Amendment Project will create temporary employment opportunities for local employees during the pre-construction, construction and rehabilitation phases of the project. The Der Brochen Amendment project is seen as a replacement project for the Borwa and Lebowa shafts, which previously formed part of the Mototolo Mine operation managed under a JV between RPM and Glencore. It is anticipated that employees will be moved around from old sections of the mine to continue working at the new mine activities thereby allowing the mine to continue to operate with its current workforce.

Assuming all phases of the project adhere to the mitigation and management commitments stipulated in this EIA/EMPr, it is believed that all of the negative impacts identified for the proposed project can be mitigated and managed to such an extent to either avoid or where not possible, at least minimise and remediate the impact that may occur.

It is therefore the EAP's opinion that based on the process that has been followed and the findings of the impact assessment, in conjunction with the proposed mitigation measures, that no unmanageable adverse impacts are expected to occur. Some positive impacts are also expected to occur in terms of the continued provision of employment opportunities to the current mine's workforce.

15.2 Conditions that must be included in the authorisation

Should the DMR grant authorisation for this project, the following aspects should be considered during the compilation of the authorisation:

- The project should remain in full compliance with the requirements of the EMPr and any other conditions set out in other authorisations;
- The EMPr should be implemented by qualified environmental personnel who have the competence and credibility to interpret the requirements of the EMPr. Such persons must be issued with a written mandate by mine management to provide guidance and instructions to employees and contractors; and
- Stakeholder engagement must be maintained during the construction, operational and closure/rehabilitation phases of the proposed project.

15.3 Rehabilitation requirements

A schedule of actions for final rehabilitation, decommissioning and closure, which will ensure avoidance, rehabilitation and management of impacts is presented in Table 12-1 below (marked where applicable with "X". These actions aligns with the Rehabilitation Plan and Closure Actions detailed in Sections 31.3 and 31.4 of this report respectively.

The schedule is linked to RPM's intention to undertake rehabilitation activities over a two-year closure period at the end of Der Brochen Mine's LoM (2077).

Table 15-1: Schedule for closure

Description	Yr 1	Yr 2	Yr 3-13
Closure Action required	Closure Period		Post Closure Period
DMS Stockpile	X	X	
South Decline Shaft	X		
WRD Embankment Facility		X	
Upgrades at Mototolo Conc.	X		
Monitoring			
Stability			X
Vegetation			X
Dust			X
Surface water			X

16 Period for which the Environmental Authorisation is required

The environmental authorisation is required to be in line with the mining right and LoM of the Der Brochen Project, which is up to 2077.

17 Undertaking

The undertaking required to meet the requirements of Part A (EIA) is provided for at the end of the EMPr (Part B) (refer to Section 35).

18 Financial Provision

The infrastructure and activities associated with the proposed Der Brochen Amendment Project will increase the existing Der Brochen Project's liability by an amount of R 76 607 997-00. Refer to Table 15-2 in Appendix D10 for the closure quantum calculations.

18.1 Methodology of the Quantum of Financial Provision

The liability has been estimated using the approach documented in the "DMR Guideline" (Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine – 2005). Rates have been annually updated with the prevailing Consumer Price Index (CPI) as obtained from StatsSA. The rates included in the assessment are those relevant for 2019.

18.2 Measure to provide for financial provision

RPM will provide for the closure liability associated with the project through the purchase of a Bank Guarantee as allowed by the Financial Provision for Prospecting, Exploration, Mining or Production Operations Regulations, with the Bank Guarantee provided to the DMR following authorisation of the Der Brochen Amendment Project.

19 Deviations from the approved scoping report and plan of study

At the time of submitting the application for environmental authorisation and the final Scoping Report relating to the Der Brochen Amendment Project to the DMR for consideration, the proposed project description consisted of the following:

The Der Brochen Amendment Project will entail the development and operation of the following additional mining related infrastructure as part of the mine's development strategy:

- **Two new decline shafts** (North and South decline shafts) to access new underground mining operation areas to be mined through the bord-and-pillar mining method.
 - RPM intends to locate the North and South decline shafts within the previously approved footprint areas of the North and South Open Pit areas, respectively. The underground workings at the proposed North and South Shafts will serve as replacement projects for the current Borwa and Lebowa shafts (current underground operation at the recent acquired Mototolo Mine) respectively in the near future.
- **Six up-cast ventilation shafts** required for the underground workings (three ventilation shafts per new decline shafts);
- **A central ventilation complex** consisting of up-cast ventilation shafts and a control room will service both proposed decline shafts;
- **A DMS Plant** to be located within the existing footprint area of the Mototolo Concentrator area;
- **A DMS Stockpile** area (covering an area of approximately 100 ha) and associated PCDs (covering a combined area of 5 ha). The DMS Stockpile and PCDs will be developed in phases;
- **The conversion of the existing Mototolo chrome recovery plant** from a final tailings' arrangement to an inter-stage arrangement;
- **Additional Run of Mine stockpiles and associated silos;**
- **Change houses and office complex** to be located at each of the proposed decline shafts areas;
- An **explosive destruction bay** area to be located near the proposed South decline shaft, which will service both proposed decline shafts;
- **Staff accommodation** camp to be located near the Der Brochen Dam; and
- **Additional linear infrastructure**, i.e.:
 - Two conveyor systems. One conveyor belt system will be constructed to connect the proposed South and North decline shafts with the proposed DMS Plant that will be located in the existing footprint area of the Mototolo Concentrator Plant, for the purpose of transporting ore from the shafts to the plant area. Another conveyor belt system will be required to transport DMS material from the proposed DMS Plant to the proposed DMS Stockpile area. It is currently anticipated that the DMS conveyor system will run along the exiting Mareesburg tailings pipeline system; and
 - Access and haul roads. New access roads to the proposed ventilation shafts will be required for maintenance purposes. Certain existing roads will also be required to be upgraded to provide sufficient access roads to the project related infrastructure such as the shaft areas and offices. The mine is also considering including a haul road within the proposed corridor associated with the ore conveyor belt system to transport ore from the proposed decline shafts to the Mototolo Concentrator Plant area, whilst the conveyor belt system is being constructed.

Subsequent to the submission of the environmental authorisation application to the DMR and the approval of the final Scoping Report by the department, RPM decided to integrate the previously approved North open-pit (as approved in the 2015 Der Brochen Consolidated Environmental Management Programme (EMPr)) into the Der Brochen Amendment Project.

The integration of the previously approved open-pit operation into the Der Brochen Amendment Project will allow RPM the opportunity to investigate possibilities in the future as to access the underground reserve via the open-pit area.

As a result, the Der Brochen Amendment Project's description were amended, as stipulated in this report, to comprise of the following infrastructure:

- The **South Decline Shaft** with associated infrastructure, i.e. water management infrastructure;
- The **previously approved North open-pit area** with associated infrastructure as previously approved in 2015, i.e. water management infrastructure and waste rock stockpiles;
- **Three up-cast ventilation shafts** required for the underground workings at the South Decline Shaft;
- A **DMS Plant** to be located within the existing footprint area of the Mototolo Concentrator area;
- A **DMS Stockpile** with associated water management infrastructure;
- The **conversion of the existing Mototolo chrome recovery plant** from a final tailings' arrangement to an inter-stage arrangement;
- Additional **Run of Mine stockpiles and associated silos**;
- **Change houses and office complex** to be located at the proposed South decline shaft area;
- An **explosive destruction bay** area to be located near the proposed South decline shaft;
- **Staff accommodation facilities** to be located near the Der Brochen Dam; and
- **Additional linear infrastructure**, i.e.:
 - Two conveyor systems:
One conveyor belt system will be constructed to connect the proposed South Decline Shaft with the proposed DMS Plant that will be located in the existing footprint area of the Mototolo Concentrator Plant, for the purpose of transporting ore from the South Decline Shaft to the plant area.
Another conveyor belt system will be required to transport DMS material from the proposed DMS Plant to the proposed DMS Stockpile area. It is currently anticipated that the DMS conveyor system will run along the exiting Mareesburg tailings pipeline system.
 - Access and haul roads:
New access roads to the proposed ventilation shafts will be required for maintenance purposes. Certain existing roads will also be required to be upgraded to provide sufficient access roads to the project related infrastructure such as the North open-pit area, the South Decline Shaft and offices. The mine is also considering including a haul road within the proposed corridor associated with the ore conveyor belt system to transport ore from the proposed South Decline Shaft to the Mototolo Concentrator Plant area as an interim measure, whilst the conveyor belt system is being constructed.

Based on the significant changes brought about by the above mentioned modifications to the proposed project description, RPM notified the DMR in writing during August 2019 that the NEMA regulated timeframe associated with the Der Brochen Amendment Project will need to be extended by 50 calendar days in terms of Regulation 23(1)(b) of the NEMA EIA Regulations of 2014, as amended.

The key motivation for the extension of the regulated timeframe was to provide the specialists with sufficient time to re-assess the impacts that may be associated with the newly amended project description.

The updated project description as well as the reason for the changes to the proposed project will be highlighted to the public during the public participation process that will be undertaken from 01 October to 31 October 2019.

20 Other information required by the Competent Authority

The DMR approved the final Scoping Report on 31 May 2019, and requested that the items listed in Table 1-2 be addressed as part of the EIA/EMPr report. Responses to the information requested have been included in Table 1-2.

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

All of the surface infrastructure associated with the Der Brochen Amendment Project will fall within the land owned by RPM. The only additional land requirement which has been identified, is for the proposed DMS stockpile which extends over Portion 1 of the farm Mareesburg 8 JT, which is currently owned by Samancor.

Samancor currently leases Portion 1 of the farm Mareesburg 8 JT to Lion's Head Platinum (Pty) Ltd (Lion's Head). RPM have been in consultation with Samancor and Lion's Head regarding Portion 1 of the farm Mareesburg 8 JT and RPM's intention to construct a DMS stockpile over a section of Portion 1 of the farm Mareesburg 8 JT. Refer to Appendix C1 for the letters of consent received from Samancor and Lion's Head in this regard.

There are currently no lease agreements in place for land in the Der Brochen area, and no immediate need for any leases has been identified.

All of the infrastructure for the selected alternatives falls within the area which has been rezoned to Mining 1. The stockpiles however fall outside of the rezoned area and a possible further rezoning application will have to be lodged for these areas.

There are land claims pending over most of the land owned by RPM in the Der Brochen area. These land claims have been brought to the attention of the Joint Land Claims Working Committee which has been established between Anglo American and the various Regional Land Claims Commissions and the outcomes of the land claims are being closely monitored. There is still however a risk to the security of land tenure should these claims be successful and the claimants insist on occupation. In this instance lease agreements might have to be concluded with successful claimants, should RPM determine that the surface rights are required.

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

Table 20-1 provides a summary of the type of heritage impact that may be associated with the proposed project including the mitigation measures that will be implemented to avoid, minimise and/or effectively manage the impacts if and when they occur.

Table 20-1: Impacts on heritage sites due to the Der Brochen Amendment Project

Heritage aspect to be impacted	Proposed mitigation measure
Destruction of confirmed graves	<ul style="list-style-type: none"> The mine will consider amending the development footprint to allow for the in-situ preservation of these sites. However, should it not be possible to preserve these sites in situ, a grave relocation process must be undertaken. A grave relocation process will comprise of the following steps: <ul style="list-style-type: none"> A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation. Bilingual site and newspaper notices indicating the intent of the relocation. Permits from all the relevant and legally required authorities. An exhumation process that keeps the dignity of the remains and family intact. An exhumation process that safeguards the legal rights of the families as well as that of the mining company. The process must be done by a reputable company well versed in the mitigation of graves.
Destruction of heritage site and potential disturbance of grave	<ul style="list-style-type: none"> The mine will undertake a social consultation process to assess whether any local residents or the wider public is aware of the presence of graves at the sites. If graves are confirmed, the positions of all unmarked graves must be fenced, signposted and plotted on all project and construction maps. A permit application to SAHRA for archaeological mitigation to take place.

Heritage aspect to be impacted	Proposed mitigation measure
	<ul style="list-style-type: none"> • Once the permit is received, a surface collection of the potsherds from each site can be made. • Limited archaeological test excavations may also be required, should a deposit be identified. • An archaeological mitigation report must be compiled. The completed mitigation report must be submitted to the relevant heritage authorities. .
Destruction of Middle Stone Age lithics and Late Iron Age stonewalled settlements	<ul style="list-style-type: none"> • An archaeological site layout plan must be compiled using accepted archaeological techniques. • During the recording of the archaeological site layout plan, an attempt must be made to identify any archaeological middens associated with these sites. Should such middens be identified, archaeological test excavations would be required. If no such middens are found, the next two mitigation measures comprising an archaeological excavation permit application and archaeological test excavations would not be required. • A permit application to SAHRA for archaeological test excavations to take place. • Once the permit is received, limited archaeological test excavations may also be required, should a deposit be identified. • Limited archaeological test excavations may also be required, should a deposit be identified. • An archaeological mitigation report must be compiled. The completed mitigation report must be submitted to the relevant heritage authorities. • A destruction permit application must be lodged with to allow for the destruction of the site.

21 Other matters required in terms of Sections 24(4)(a) and (b) of the Act

Not Applicable.