mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

FINAL

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).

NAME OF APPLICANT: Anglo American Platinum Limited (AAP) – Mogalakwena Mine

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FILE REFERENCE NUMBER SAMRAD: LP30/5/1/2/2/50 MR

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

Mogalakwena Mine (MM) is a wholly owned subsidiary of Anglo American Platinum Limited (AAP) and is situated approximately 30 km north-west of the town of Mokopane (formerly Potgietersrus) within the Mogalakwena Local Municipality, which forms part of the greater Waterberg District Municipality of the Limpopo Province.

MM's mining right falls on the following farms:

- Portion 0 of the farm Drenthe 778 LR;
- Portion 0 Remaining Extent of the farm Gillimberg 861 LR (Previously Witrivier 777 LR);
- Portion 0 of the farm Overysel 815 LR;
- Portion 0 of the farm Zwartfontein 818 LR;
- Portion 0, Remaining Extent of the farm Blinkwater 820 LR;
- Portion 0 of the farm Sandsloot 236 KR;
- Portion 0 of the farm Vaalkop 819 LR;
- Portion 0 of the farm Knapdaar 234 KR;
- Portion 1, 2 Remaining Extent and 3 of the farm Tweefontein 238 KR; and
- Portion 0 of the farm Rietfontein 240 KR.

In addition to the above farms, MM currently operates three wellfields (PPL, Blinkwater and Commandodrift wellfields) to obtain potable water to be used on the mine. MM currently operates under several existing approved Environmental Management Programmes (EMPrs), two Water Use Licences (WULs) (approved in March 2007 and October 2017) and two Waste Management Licences (WMLs).

Project Description

It is the intension of MM to expand its existing operations and add additional infrastructure to its operations in order to improve production capacity and therefore the EMPrs and associated environmental authorisations (EA) need to be amended. The proposed expansion will be located within MM's mining right and surface lease areas on remaining extent of portions 0 of the farm Blinkwater 820 LR and Portions 0 of the farms Overysel 815 LR, Zwartfontein 818 LR, Vaalkop 819 LR and Sandsloot 236 KR.

The infrastructure and activities associated with the proposed Expansion Project, require the amendment of the mine's existing EMPrs, a WML and a WUL to authorise specific aspects of the following key infrastructure:

- A new third concentrator plant and associated water management infrastructure located in close proximity to the North concentrator and associated crusher plant and conveyor systems;
- Expansion of the approved second compartment of the existing Blinkwater tailings storage facility (TSF), including associated additional water management infrastructure; and
- A new waste rock dump (WRD) planned to be situated to the north of the North pit and associated haul roads.

The above key infrastructure will have secondary infrastructure and activities associated with them, which includes:

- A buffer water storage dam located west of the existing Vaalkop TSF and return water dams;
- Upgrading of the existing South concentrator plant;
- Potential contractor's camp;
- Upgrade of the existing sewage treatment plant (STP) located at the North concentrator;
- A contractor's laydown area located adjacent to the existing North concentrator plant;

- Expansion of the existing mine fleet workshop area located at the North mine workshop area;
- Change house to be situated close to the North mining main offices and existing change house facilities;
- Upgrade of an existing section of an internal mine road; and
- Re-alignment of the previously approved Groot Sandsloot River (Pholotsi) diversion.

The proposed expansion will be located within Mogalakwena Mine's mining right and surface lease areas.

Outcomes of the impact assessment

The impact assessment undertaken by the EAP, as part of the integrated environmental authorisation process for the Mogalakwena Expansion 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 Mogalakwena Expansion Project will be located.

Based on the review of the potential environmental, social and economic impacts associated with the proposed project, the main concern that has been identified through the stakeholder engagement was legacy issues, as well as the lack in employment opportunities available for the immediately affected communities. The social impacts can be mitigated where negative, however by enhancing the positive impacts, the mine will have a overall positive impact, through the implementation of AAP policies and the proposed management measures as detailed in the EMPr.

Significant impacts identified relates to the following environmental aspects:

- Soil, land use and land capability;
- Social;
- Ground and surface water resources;
- Archaeological and cultural resources; and
- Biodiversity

Assuming all phases of the project adhere to the mitigation and management commitments stipulated in this EIA/EMPr, it is believed that significant impacts identified during the impact assessment phase can be mitigated and managed to reduce the level of significance of the initial impact.

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, impacts can be effectively managed.

As far as possible, all labour requirements associated with the construction of the proposed Expansion Project will be prioritised for local temporary employment. External labour will only be sourced if skilled candidates are not available locally. It is currently anticipated that approximately 1 500 temporary contract workers may be employed during the construction phase of the project (approximate duration of 18 months). In the current planning, the labour requirements for the operation of the new third concentrator (M3C) will be met by existing employees.

Over the operational life of Mogalakwena Mine, additional permanent job opportunities may be created as the open pit mining operations are ramped up. Apart from the direct opportunities such a potential employment during construction, there are opportunities for indirect benefits such as providing goods and services to the construction project and operational phase. The Mogalakwena Mine is committed to procuring and recruiting locally as far as possible in line with Anglo American Platinum policies.

Should the proposed Expansion Project not be implemented, Mogalakwena Mine will continue to operate at its current capacity and any additional local economic development opportunities associated with the procurement of local goods and services to support the mine activities will not be realised.

Conclusion

The environmental authorisation process associated with the proposed Expansion Project for Mogalakwena Mine was undertaken in terms of the relevant environmental authorisation requirements as detailed in Section 5. The environmental authorisation process was underpinned by an extensive stakeholder engagement process with in-depth consultation undertaken through various forms of engagement as detailed in Section 13. As part of this engagement, additional pre-application meetings with the leadership structures were conducted prior to the commencement of the environmental authorisation process.

During the consultation processes, various comments were received as detailed in the CRR in Appendix 15. Many of these comments related to historical issues which have been summarised in Section 13.8. The specialists' studies as detailed in Section 14 were undertaken and the findings took into account and addressed (as far as practically possible) the project-specific issues which were raised.

In terms of the locality of the proposed project related infrastructure, areas of sensitivity were taken into consideration during the design phase and were avoided as far as practically possible. Where avoidance could not be achieved in terms of the design requirements of the proposed infrastructure, appropriate mitigation measures were developed to be implemented to reduce the impacts on the environment, as detailed in Section 18. The proposed mitigation measures were developed based on the nature, duration, severity and probability of the impact and based on the recommendations made by the specialists, as presented in Appendix 16.

In addition, since Mogalakwena Mine is an existing operational mine, mine personnel are presently managing impacts in line with exiting environmental management requirement. These impacts are of a similar nature to the proposed Expansion Project.

It is SRK's reasoned opinion that this project should be authorised based on the following:

- The impacts which have been identified can be mitigated through the implementation of the identified management measures in Section 18;
- The proposed Expansion Project is unlikely to result in the generation of any significant cumulative impacts when managed in accordance with the management measures specified in Section 18; and
- Should the proposed Expansion Project not be implemented, Mogalakwena Mine will continue to operate at its current capacity and any additional local economic development opportunities as well as procurement of local goods and services to support the mine activities will not be realised. In addition to this, projected temporary employment opportunities during the construction phase will not be fulfilled.

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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 Mogalakwena Mine (Pty) Ltd (MM) . The opinions in this Report are provided in response to a specific request from MM to do so. 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
AEL	African Explosives Limited
ANPP	Ammonium Nitrate Porous Prills
BA	Basic Assessment
BID	Background Information Document
BME	Bulk Mining Explosives
CA	Competent Authority
CMA	Catchment Management Agency
CV	Curriculum Vitae
CW	Coffer Well
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DMR	Department of Minerals Resources
DSR	Draft Scoping Report
DWA	Department of Water Affairs
DWD	Dirty Water Dam
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECP	Environmental Conservation Act (Act No. 73 of 1989)
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Programme
EMPr	Environmental Management Programme Report
FDRCP	Final Decommissioning, Rehabilitation and Closure Plan
FOS	Fine Ore Stockpile
GM	General Manager
GN	Government Notice
GTLM	Greater Tubatse Local Municipality
GTM	Greater Tubatse Municipality
HPGR	High Pressure Grinding Roll
I&APs	Interested and Affected Parties
ICC	In-circuit crushing
IDP	Integrated Development Plan
IWWMP	Integrated Water and Waste Management Plan
JCI	Johannesburg Consolidated Investments
JWF	Joint Water Forum
LEDET	Limpopo Department of Economic Development Environment and Tourism
LoM	Life of Mine

Mamsl	Meters above mean sea level
MHSA	Mine Health Safety Act, 1996 (Act No. 29 of 1996)
MM	Mogalakwena Mine
M3C	Mogalakwena third concentrator
MNC	Mogalakwena North Concentrator
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MSC	Mogalakwena South Concentrator
MWP	Mine Works Program
NEM:AQA	National Environmental Management: Air Quality Act, 2004 (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, 2008 (Act No. 59 of 2008)
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NFA	The National Forestry Act, 1998 (Act No. 84 of 1998)
NHRA	The National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PCD	Pollution Control Dam
PGM	Platinum group metals
PVC	Polyvinyl chloride
RBCA	Guide to Risk-Based Corrective Action
RoD	Record of Decision
RPM	Rustenburg Platinum Mines
Rpm	Revolutions per minute
RSA	Republic of South Africa
RSIP	Rehabilitation Strategy Implementation Plan
RWD	Return Water Dam
SEMA	Specific Environmental Management Acts
S&EIA	Scoping and Environmental Impact Assessment
SHE	Safety, Health and Environment
SIA	Social Impact Assessment
SKC	Sekhukhune centre of endemism
SRK	SRK Consulting (Pty) Limited
SRM	Sekhukhune District Municipality
STP	Sewage Treatment Plant
TA	Traditional Authority
TFW	Temporary Filter Wells
ToR	Terms of Reference
TSF	Tailings Storage Facility
VMP	Vegetation Management Plan
WMA	Water Management Area
WML	Waste Management Licence
WRD	Waste Rock Dump

WUL	Water Use Licence
WULA	Water Use Licence Application

Units of measurement

Ha	Hectare
Km	Kilometre
Km^2	Square kilometres
ktpm	Kilo tones per month
L	Litre
M	Meter
m^3	Cubic meter
Ml	Mega liter
Ml/d	Megaliter/day
mm	millimetre
Tpa	Tonnes per annum

NOTE: This Report comprises of **Part A**: The Environmental Impact Assessment (EIA) and **Part B**: the Environmental Management Programme (EMPr) of the Mogalakwena Mine Expansion 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).

1 Part A: Environmental Impact Assessment (EIA) Report

1.1 Introduction, background and scope of the EIA

Mogalakwena Mine is a wholly owned subsidiary of Anglo American Platinum Limited (AAP) and was originally called the Potgietersrust Platinum Mine. In March 2008 the name was changed to Mogalakwena Platinum Mine and in 2010 became Anglo American Platinum Limited Mogalakwena Mine. The mine is now officially referred to as Anglo American Platinum, Rustenburg Platinum Mines, Mogalakwena Complex.

Mogalakwena Mine is situated approximately 30 km north-west of the town of Mokopane (formerly Potgietersrus) within the Mogalakwena Local Municipality, which forms part of the greater Waterberg District Municipality of the Limpopo Province. The Mogalakwena Mine lease area covers approximately 51.05 km^2 and stretches over approximately 8 km from east to west and approximately 13 km from north to south. To the east of Mogalakwena Mine lies the National N11 highway. This is the main access route to the mine as well as the key transport corridor between Mokopane and the South Africa-Botswana border (refer to Figure 1-1 or Appendix 1).

Mogalakwena Mine's mining right falls on the following farms:

- Portion 0 of the farm Drenthe 778 LR;
- Portion 0 Remaining Extent of the farm Gillimberg 861 LR (Previously Witrivier 777 LR);
- Portion 0 of the farm Overysel 815 LR;
- Portion 0 of the farm Zwartfontein 818 LR;
- Portion 0, Remaining Extent of the farm Blinkwater 820 LR;
- Portion 0 of the farm Sandsloot 236 KR;
- Portion 0 of the farm Vaalkop 819 LR;
- Portion 0 of the farm Knapdaar 234 KR;
- Portion 1, 2 Remaining Extent and 3 of the farm Tweefontein 238 KR; and
- Portion 0 of the farm Rietfontein 240 KR.

In addition to the above farms, Mogalakwena Mine currently operates three wellfields (Potgietersrus Platinum Limited (PPL), Blinkwater and Commandodrift wellfields) to obtain potable water for use on the mine. The PPL wellfield abstraction boreholes fall within the mining lease area of Mogalakwena Mine. The Commandodrift wellfield (located on the farms Commando Drift 228 KR, Molendraai 811 LR, and Moordkopje 813 LR) and the abstraction boreholes of the Blinkwater wellfield (located on the farm Rietfontein 240 KR and Blinkwater 244 KR) are situated outside the mining lease area of Mogalakwena Mine.

Mogalakwena Mine currently operates under several existing approved Environmental Management Programmes (EMPrs) (refer to Figure 1-2); two Water Use Licences (WULs) (approved in March 2007 and October 2017) and four Waste Management Licences (WMLs).

Existing activities and infrastructure associated with the Mogalakwena Mine, as authorised through the mine's approved EMPrs, current WULs and WMLs, are presented in Section 4.2.

1.2 Expansion project

It is the intention of Mogalakwena Mine to expand its existing operations and add additional infrastructure to its operations to improve production capacity. Therefore, the EMPrs and associated environmental authorisations (EA) need to be amended through the development of one comprehensive document[1] (this report) that will be in line with the legislated requirements of the NEMA. The updated information and data from the following documents were used to develop this report:

- Specialist studies;
- Monitoring results;
- Environmental assessments;
- Design information for the expansion components;
- Information associated with the Water Use Licence (WUL) including the Integrated Water and Waste Management Plan (IWWMP) and Rehabilitation Strategy Implementation Plan (RSIP);
- Final Rehabilitation, Decommissioning and Mine Closure Plan – 2018; and
- Information supplied by Mogalakwena Mine relating to the current operations.

The proposed expansion will be located within Mogalakwena Mine's mining right and surface lease areas on remaining extent of portions 0 of the farm Blinkwater 820 LR and Portions 0 of the farms Overysel 815 LR, Zwartfontein 818 LR, Vaalkop 819 LR and Sandsloot 236 KR.

The infrastructure and activities associated with the proposed Expansion Project requires the amendment of the mine's existing EMPrs, a Waste Management Licence (WML) and a WUL to authorise specific aspects of the following key infrastructure:

- A new Third Concentrator (M3C) plant and associated water management infrastructure located in close proximity to the Mogalakwena North Concentrator (MNC) and associated crusher plant and conveyor systems;
- Expansion of the approved second compartment of the existing Blinkwater tailings storage facility (TSF) – (Blinkwater 2 TSF), including associated additional water management infrastructure; and
- A new waste rock dump (North WRD) planned to be situated to the north of the North pit and associated haul roads.

The above proposed key infrastructure will have secondary infrastructure and activities associated with them, which includes:

- A buffer water storage dam located west of the existing Vaalkop TSF and return water dams;
- Upgrading of the existing Mogalakwena South Concentrator (MSC) Plant;
- Potential contractor's camp;
- Upgrade of the existing sewage treatment plant (STP) located at the MNC;
- A contractor's laydown area located adjacent to the existing MNC plant;
- Expansion of the existing mine fleet workshop area located at the North mine workshop area;
- Change house to be situated close to the North mining main offices and existing change house facilities[2];
- Upgrade of an existing section of an internal mine road; and
- Re-alignment of the previously approved section of the Sandsloot (Pholotsi) River diversion.

A detailed description of the study areas and the proposed infrastructure is provided in Section 6 and shown in Figure 6-2.

[1] The DMR requested that the existing Mogalakwena Mine EMPrs be combined as part of the amendment process.

[2] Specialist studies were conducted in the area where the proposed change house will be located and indicated that no sensitive areas are located within the proposed footprint. The change house does not trigger any listed activities.

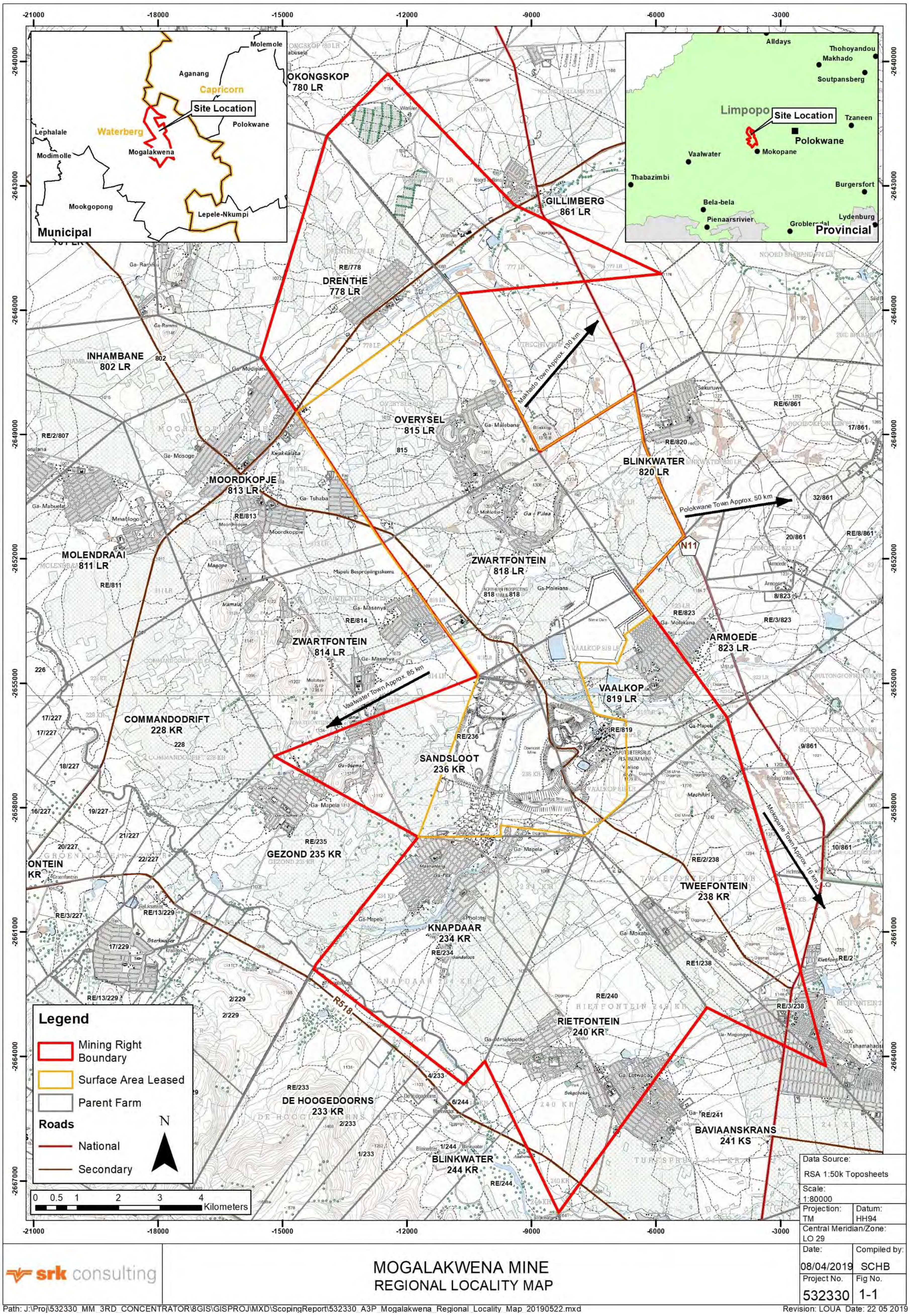

Figure 1-1: Regional locality of Mogalakwena Mine

1.3 EMPr amendment and related permitting requirements

During the amendment of the Mogalakwena Mine EMPr to include the activities and infrastructure associated with the proposed Expansion Project, the original approved EMPr and the amendments to the EMPr, as shown in Figure 1-2, have been described in the Mogalakwena Mine EMPr 2019 document. This EMPr will provide Mogalakwena Mine with a more effective environmental management tool for their current operation as it will:

- Bring the authorised activities in line with what is taking place on the ground;
- Describe the existing approved infrastructure and activities in one document;
- Update the status of environmental impacts and associated management measures based on the current activities;
- Allow for a greater level of alignment between the different EMPrs in terms of management measures and monitoring reporting requirements; and
- Rationalise repeated information and management measures contained within the previous approved EMPrs.

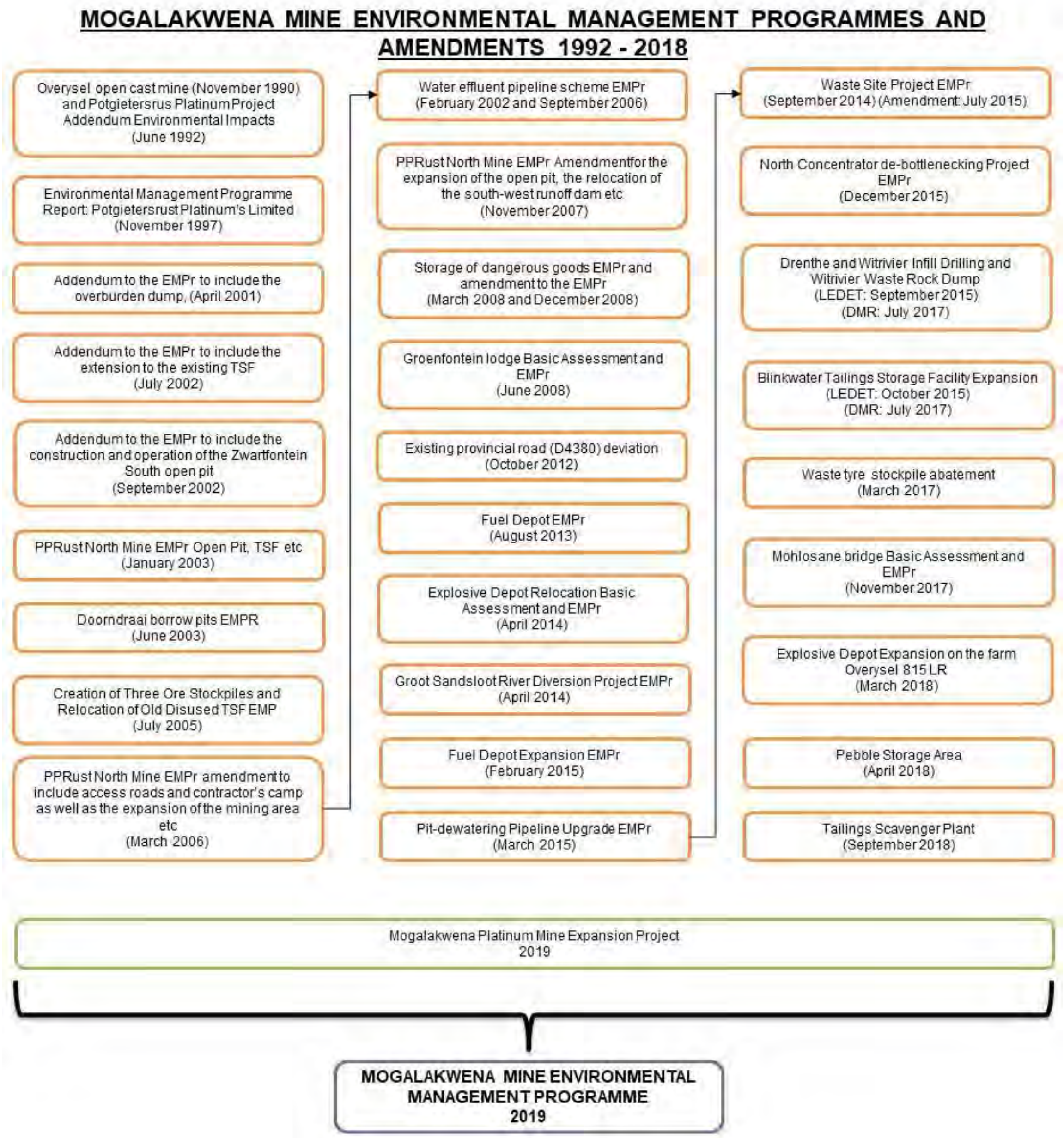

Figure 1-2: Mogalakwena Mine Environmental Management Programmes and Amendments

Whilst all of the EMPrs are associated with Mogalakwena Mine, some of the approved infrastructure, including the Doorndraai borrow pits and pipeline and the Groenfontein Lodge, approvals fall outside of the Mogalakwena Mine mining right area. These have been described in the EMPr, however, the management measures have not been included in this EIA/EMPr. The Record of Decisions (RoDs)/Approvals associated with each of the EMPrs listed in Figure 1-2 is provided in Appendix 2.

Before Mogalakwena Mine can commence with development of any of the additional Expansion Project and infrastructure, certain EAs and amendments to existing authorisations need to be undertaken in terms of the following key national legislations (see Section 5 for details on each legislative requirement for the project):

- The Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA): For any amendments EMPr in accordance with Section 102 of the MPRDA;
- The National Environmental Management Act (Act No. 107 of 1998) (NEMA): For any project-related listed activities stipulated in the NEMA Environmental Impact Assessment (EIA) Regulations of 2014, as amended in 2017;
- The National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA): For any project-related waste management activities stipulated in GN R 921, promulgated under NEM:WA; and
- The National Water Act (Act No. 36 of 1998) (NWA): For any project related water uses stipulated under Section 21 of NWA.

An integrated environmental authorisation process has been undertaken based on the above regulatory requirements. A schematic showing the integrated environmental authorisation process is provided in Figure 1-3[3]. The authorisations in terms of NEMA, NEM:WA and MPRDA have been applied for from the Limpopo Province's Department of Mineral Resources (DMR), whilst authorisation in respect of the NWA has been applied for from the Department of Water and Sanitation (DWS). Both of these competent authorities (CA) are located in Polokwane.

[3] Extension to the NEMA regulated timeframe for the submission of the Final EIA/EMPr was requested from the DMR and granted on 3 September 2019. Refer to Appendix 4 for the relevant communication.

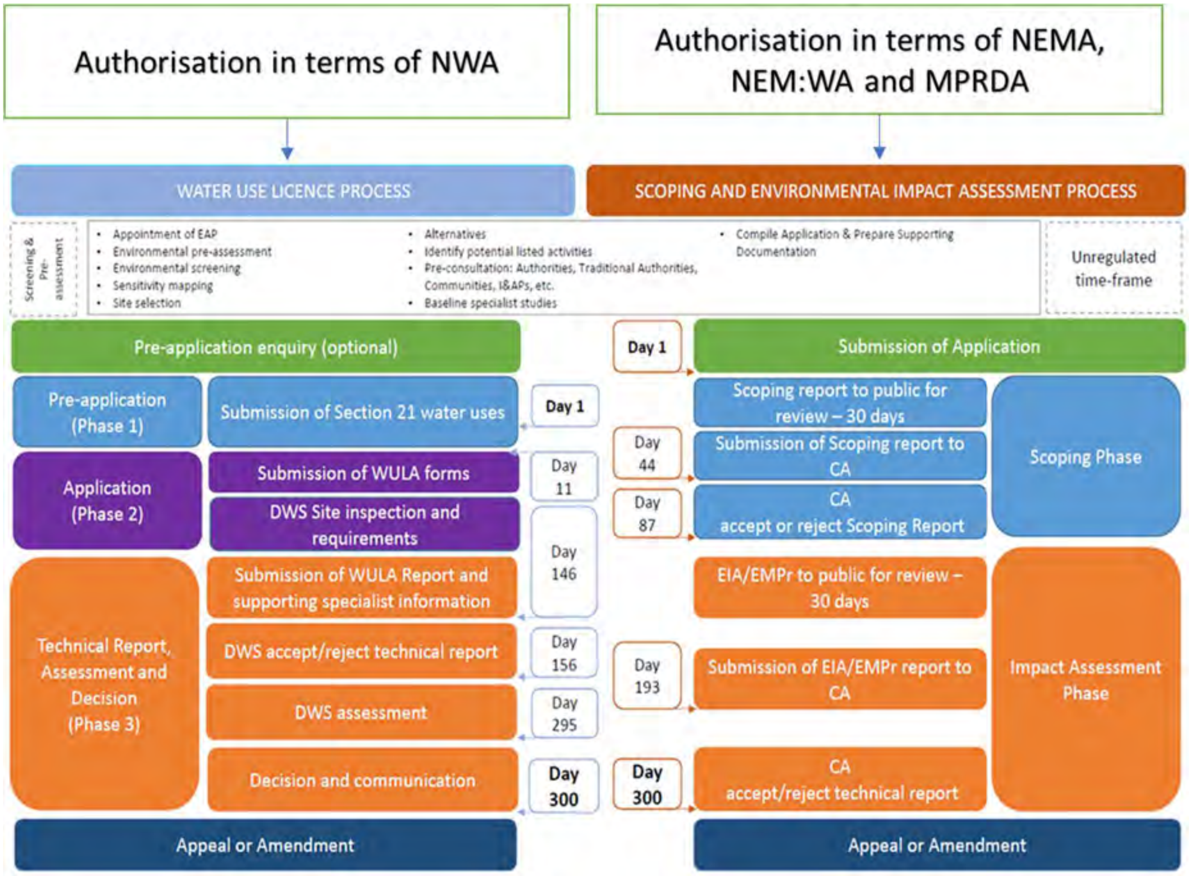

Figure 1-3: Integrated authorisation process

1.4 Purpose and structure of this report

This Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr) has been compiled in terms of the provisions of Appendix 3 and 4 of the NEMA EIA Regulations of 2014, as amended (GNR 982), as well as the requirements of the EIA/EMPr template issued by the DMR. A summary of the requirements of an EIA/EMPr report including cross-references to sections in this report where these requirements have been addressed is provided in Table 1-1 for the EIA and Table 29-1 for the EMPr.

Prior to the EIA phase and the compilation of the Draft EIA/EMPr, 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 (Appendix 4) and the requirements contained in that letter have been addressed in this report (see Table 1-2).

In addition to this, specific requirements for the Department of Water and Sanitation (DWS) in respect of waste disposal sites in terms of the Waste Management Licence Application (WMLA) (included as a combined application with the NEMA application attached in Appendix 3) have been addressed in Table 1-3.

This report is titled Final Environmental Impact Assessment Report and Management Programme (Final EIA/EMPr) and fulfils the requirements for an EIA/EMPr as contemplated in the NEMA 2014 EIA Regulations, as amended.

Table 1-1: Structure of the EIA reporting in terms of Legislation Requirements as detailed in Appendix 3 (contents of an EIA report) of GNR 982

Appendix 3	Legislated requirements as per the NEMA GNR 982 in Appendix 3	Relevant Report Section
(1)(a)	details of-	
	(i) the EAP who prepared the EMPr	Section 2.1
	(ii) the expertise of the EAP, including a curriculum vitae;	Section 2.2 and Appendix 5
(1)(b)	The location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including:	Section 1.1 and Figure 1-1
	(i) The 21-digit Surveyor General code of each cadastral land parcel	Section 3, Table 3-1
	(ii) where available, the physical address and farm name; and	Section 3, Table 3-1
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	N/A
(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 -	Figure 6-1 and Figure 6-2
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken	N/A
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken.	N/A
(1)(d)	A description of the scope of the proposed activity, including	
	(i) a listed and specified activities triggered and being applied for; and	Section 6.1
	(ii) a description of the associated structures and infrastructure related to the development	Section 6.2 and Section 8
(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 7
(1)(g)	A motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report	Section 11
(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:	
	(i) details of the development footprint considered	Section 11.1
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs	Section 13

Appendix 3	Legislated requirements as per the NEMA GNR 982 in Appendix 3	Relevant Report Section
	(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;	Section 13.8
	(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	Section 14
	(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	Section 18
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of the potential environmental impacts and risks	Section 18.3
	(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	Section 18.4
	(viii) the possible mitigation measures that could be applied and the level of residual risk	Section 18.4
	(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such; and	Section 16
	(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report.	Section 17
(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 18.1
	(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process, and	Section 18.2
	(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.	Section 18.2
(1)(j)	An assessment of each identified potentially significant impact and risk, including -	Section 18.4
	(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	

Appendix 3	Legislated requirements as per the NEMA GNR 982 in Appendix 3	Relevant Report Section
	(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 19
(1)(l)	An environmental impact statement which contains-	
	(i) a summary of the key findings of the environmental impact assessment	Section 20
	(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	Figure 26-1 and Appendix 11
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	Section 18.2
(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 18.2
(1)(n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment	Section 21.1
(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 28
(1)(p)	A description of any assumptions, uncertainties and gaps in the knowledge which relate to the assessment and mitigation measures provided.	Section 21.3
(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 22
(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 22.1
(1)(s)	An undertaking under oath or affirmation by the EAP in relation to:	Section 31.8
	(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	

Appendix 3	Legislated requirements as per the NEMA GNR 982 in Appendix 3	Relevant Report Section
(1)(t)	Where applicable, details of any financial provisions for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts	Section 30
(1)(u)	An indication of any deviation from the approved Scoping Report, including the plan of study, including-	Section 24
	(i) and deviation from the methodology used in determining the significance of potential environmental impacts and risks, and	N/A
	(ii) a motivation for the deviation	N/A
(1)(v)	Any specific information that may be required by the competent authority; and	Acceptance of the Scoping Report by DMR – refer to Appendix 4
(1)(w)	Any other matters required in terms of section (24)(4)(a) and (b) of the Act	N/A
(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.	N/A

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

No.	DMR comment/requirements	Relevant Report Section where comment has been addressed
1	The Department has evaluated the submitted SR and Plan of Study for Environmental Impact Assessment submitted on 26th April 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.	Refer to Appendix 4 for DMR Scoping Acceptance Letter
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 (EIAR). 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 EIAR. Should you be unable to obtain comments, proof of the attempts that were made to obtain comments should be submitted to the Department.	Comments from all relevant stakeholders have been included in the Comments and Responses Report (Appendix 15). Proof of communication with commenting authorities has been included in Appendix 4 and with other stakeholders has been included in Appendix 15
4	In addition, the following amendments and additional information are required for the EIAR and EMPr:	
	a) Details of the future land use for the site and infrastructure after decommissioning in 20-30 years	Refer to Appendix 18 for the Closure Report
	b) The total footprint of the proposed development should be indicated	Refer to Section 6.1
	c) Possible impacts and effects of the development on the vegetation ecology with regard to lowland-highland interface in the locality should be indicated	Refer to Section 18 and Appendix 16
	d) Possible impacts and effects of the development on the surrounding industrial area	N/A
	e) A construction and operational phase EMPr to include mitigation and monitoring measures	Refer to Section 29
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 EIAR 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: • Maps are relatable to one another; • Co-ordinates; • Legible legends; • Indicate alternatives; • Scale	All maps relevant to the EIA have been included in Appendix 1, 12, 16, 17 and 19 and throughout the EIA/EMPr report

No.	DMR comment/requirements	Relevant Report Section where comment has been addressed
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 3 for proof of the NEMA application form indicating an application for a NEMA Scoping and EIA/EMPr as well as a NEM:WA Scoping and EIA/EMPr
8	You are requested to submit three (3) hard copies of the EIAR and EMPr and at least one electronic copy (CD /DVD) of the complete EIAR and EMPr to this Regional Office	Noted – Final EIA/EMPr submitted on 6 November 2019
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

Table 1-3: DWS RoD Requirements: In respect of waste disposal site for WMLA

No.	DWS RoD Requirement	Comment/Relevant Report section or reference where requirements has been addressed
1	**Waste management licence application form**	See Appendix 3 for the NEMA Application form which includes the combined application for environmental authorisation and a waste management licence
2	**Classification of waste**	Refer to Section 29.2.3
3	**Hydrogeological study**	
	Hydrocensus	Refer to Section 14.8.3
	Geophysical investigation	Refer to Appendix 16 (Geohydrological Report) as well as the WULA Report
	Description of geology	Refer to Section 14.2
	Aquifer type and aquifer classification	Refer to Section 14.8.1 and Appendix 16 (Geohydrological Report)
	Aquifer vulnerability assessment	
	Aquifer characterisation	
	Groundwater quality	Refer to Section 14.8.4 and refer to Appendix 16 (Geohydrological Report)
	Groundwater flow	Refer to Section 14.8.5 and refer to Appendix 16 (Geohydrological Report)
	Groundwater monitoring	Refer to Section 31.4.1 and the WULA
4	**Stormwater management plan**	Refer to Figure 6-5 and Figure 6-6 as well as Section 8.26 and the WULA
5	**Freshwater Assessment Report/Wetland delineation report**	See Appendix 16 for the Wetland delineation report

No.	DWS RoD Requirement	Comment/Relevant Report section or reference where requirements has been addressed
6	**Methodology**	
	Watercourse or Wetland identification and mapping	See Section 14.9.1 and refer to Appendix 16 for the Wetland delineation report
	Determination and mapping of 1 in 100 year flood line and riparian area	See Section 14.9.3 and refer to Appendix 16 for the Wetland delineation report
	Wetland delineation	See Appendix 16 for the Wetland delineation report
	Wetland functional assessment	
	Determining the ecological integrity of the watercourse or wetlands	
	Determining the Present Ecological State of watercourse or wetlands	
	Determining the Ecological Importance and Sensitivity of watercourse or wetlands	
	Ecological classification and description	
7	**Results**	
	Description of watercourse or wetland type	See section 14.9.3 and refer to Appendix 16 for the surface hydrology report and the Wetland delineation report
	General functional description of watercourse or wetland types	
	Watercourse or Wetland ecological functional assessment	Refer to Appendix 16 for the surface hydrology report and Wetland delineation report
	The ecological health assessment of the opencast mining area	
	The PES assessment of the remaining watercourse or wetland areas	
	The EIS assessment of the remaining watercourse or wetland areas	
8	**Impact assessment discussions**	Refer to Section 18
9	**Conclusions and recommendations**	Refer to Section 19 as well as specifically to Appendix 16 for the surface hydrology report and the Wetland delineation report. All conclusions and recommendations from the specialist studies are contained within the specialists reports in Appendix 16.
10	**References**	Refer to Section 33

No.	DWS RoD Requirement	Comment/Relevant Report section or reference where requirements has been addressed
Containment Barriers		
	Waste rock dump: The waste rock samples have been classified as a Type 3 waste and would require a Class C liner. It is also considered that a polyvinyl chloride (PVC) type liner will not be effective as the waste rock tipping and dozing is likely to tear the liner and render it ineffective, with on-going maintenance of the liner not possible beneath the WRD. Furthermore, a clay liner would require a significant volume of clay and would result in destabilisation of the WRD foundation and potential for failure in the dump slopes. The recommended WRD surface and foundation drainage, in conjunction with the dirty water disposal system is considered more effective in controlling the pollution potential.	Refer to the WULA
	Ore stockpiles: The four low grade ore stockpiles will be located north and north-west of the existing MNC stockpile and proposed new M3C. The design of the ore stockpile includes a platform on which the ore will be stockpiled will be made up of an engineered fill sloped towards the concrete lined channels. Channels have been designed around the new stockpiles, which will also act as a passageway, large enough to allow vehicles to travel around the stockpile areas. This ring road collects stormwater from the stockpile areas, discharges it into the main channel, before continuing to discharge into the PCD through silt traps. The dirty water channels were designed to convey dirty water runoff from the stockpile areas to the PCD, thereby preventing dirty water from entering and polluting the natural environment. All Channels have been designed as trapezoidal concrete lined channels. The channels were sized to accommodate a 1:50-year storm event.	Refer to the WULA Report . Additional information on the liner requirements can be found in the preliminary design report for the M3C stockpile and PCD liner systems (SRK Report No. 522200/01/DWS, 2019).
	Buffer dam: It is anticipated that the buffer dam will be a lined facility consisting of either one or two compartments and silt traps, with a pipeline system connecting the buffer dam with the M3C, RWDs of the Vaalkop TSF and Dam 1160.	Refer to the WULA Report . Other relevant design criteria associated with the proposed buffer dam is included in Section 6.2.2
	Blinkwater 2 TSF: The proposed Blinkwater 2 TSF, included in the WULA, has been designed with a modified Class C liner system to contain seepage.	Refer to the WULA Report. The design detail of the Blinkwater 2 TSF can be found in the Blinkwater 2 TSF WULA Design Report (SRK Report 544487, 2019)

2 Contact Person and Correspondence Address

SRK Consulting (South Africa) (Pty) Ltd (SRK) were appointed by Mogalakwena Mine as the independent environmental assessment practitioner (EAP) to manage and facilitate the integrated EA and associated public participation process in accordance with NEMA, NEM:WA, NWA and MPRDA. Below are the details of the EAP, Mogalakwena Mine contact person, specialist, provincial authorities, municipal and ward contacts.

2.1 Details of EAP who prepared the report

The EAPs involved in the compilation of this amended EMPrs and associated environmental authorisation (EA) and their contact details are provided in Table 2-1.

Table 2-1: EAP contact details

Name	Contact Number	Fax Number	Email Address
Darryll Kilian	011 441 1111 (x1297)	086 506 1737	dkilian@srk.co.za
Franciska Lake	011 441 1111 (x1024)	086 555 0886	flake@srk.co.za
Ashleigh Maritz	011 441 1111 (x1154)	086 503 1222	amaritz@srk.co.za
Kavilan Naidoo	011 441 1111 (x1010)	086 503 6825	knaidoo@srk.co.za

2.2 Expertise of the EAP

The section below provides the qualifications of the EAP, summary of EAP project experience and Mogalakwena contact details.

2.2.1 Qualifications of the EAP

The qualifications of the EAPs are provided for in Table 2-2 and copies of the qualifications are provided in Appendix 5.

Table 2-2: EAP Qualifications

Name	Qualifications	Professional registration	Years' Experience
Darryll Kilian	MA (Environmental and Geographical Science)	CEAPSA	25
Franciska Lake	B.Sc. Hons (Zoology)	PrSciNat (400248/05)	18
Ashleigh Maritz	MSc (Biochemistry)	PrSciNat (400331/11)	11
Kavilan Naidoo	BSoc. Geography & Environmental Management	-	4

2.2.2 Summary of EAPs past experience

The EAPs' expertise is provided for in Table 2-3 Detailed curricula vitae of the project team are provided in Appendix 5.

Table 2-3: EAP expertise

EAP Name	Expertise
Darryll Kilian	Darryll Kilian has been involved in the field of environmental management, consulting and research work in Africa for the past 25 years. His expertise includes: • Environmental and social impact assessment • Due diligence reviews • Project performance monitoring and review

EAP Name	Expertise
	• Environmental reporting • Strategy and policy development • Environmental and social research • Stakeholder engagement
Franciska Lake	Franciska Lake has been involved in water management environmental impact assessments and environmental management programmes for the last 18 years. Her expertise includes: • Water management • Water use licensing for mines and industry • General environmental management • Environmental impact assessments • Environmental management programmes • Environmental audits
Ashleigh Maritz	Ashleigh has over 11 years of experience in the environmental consulting field. Ashleigh's experience thus far was focussed mainly on environmental authorisation processes relating to mining developments in terms of the MPRDA, NEMA & NEM:WA and NWA legislation. Her expertise includes: • General environmental management • Environmental impact assessments • Environmental management programmes • Environmental audits
Kavilan Naidoo	Kavilan has been involved in the field of environmental science since 2014. His expertise includes: • General environmental management • Environmental impact assessments • Environmental management programmes • Stakeholder consultation and social baseline development

2.3 Mogalakwena Mine details

The physical and postal address of Mogalakwena Mine is provided in Table 2-4 and details of the responsible persons at Mogalakwena Mine are presented in Table 2-5.

Table 2-4: Physical and postal address for Mogalakwena Mine

Address	Details
Physical address:	Sandsloot Farm, N11 Groblers Bridge Road, Mokopane
Postal address:	Anglo American Platinum Ltd, Mogalakwena Mine, Private Bag X2463, Mokopane, 0600

Table 2-5: Mogalakwena Mine responsible persons

Name	Designation	Responsibilities
Richard Cox	General Manager (GM)	GM for Mogalakwena Complex
Mike Molefe	Safety, Health and Environment (SHE) Manager	All SHE activities at Mogalakwena Complex
Lebang Gaobepe	Social Performance Manager	Social performance management
Frank Pieterse	Environmental Manager	Environmental Management of Anglo American Platinum operations in the Eastern Limb of the Limpopo Province
Timothy Seimela	Environmental Coordinator Mogalakwena Complex	All Environmental matters at Mogalakwena Complex

2.4 Details of specialists

Extensive specialist studies were undertaken for each of the Mogalakwena Mine's existing approved EMPrs. As part of the impact assessment phase for the proposed Expansion Project, further specialist assessments were undertaken for areas where the infrastructure and associated activities are proposed to take place (see Section 14). Most of these areas are considered to be brownfields sites and an expansion to existing infrastructure. However, the North WRD and expansion of the second compartment of the NEMA approved Blinkwater 2 TSF infrastructure are proposed on sites that are considered greenfield.

Specialists were appointed to undertake various specialist investigations. The studies investigated the baseline environment and the potential impact (including cumulative impacts) of each component of the proposed Expansion Project in relation to the construction, operational, closure, decommissioning and rehabilitation phases. All specialists have developed appropriate and implementable mitigation measures to avoid, reduce and/or mitigate the potential impacts that have been identified in support of the development of the management program, with the appropriate measures being included in Section 29. The specialists also addressed (as far as practically possible) the comments and recommendations obtained through the stakeholder engagement process which has been undertaken to date. Table 2-6 outlines the specialist studies that have been undertaken for the proposed Expansion Project.

An example of the specialist terms of reference is provided for in Appendix 6. The specialists impact assessment methodology used to assess the potential impacts is described in Section 18.1

A summary of the previous specialist studies undertaken as part of the approved EMPrs for Mogalakwena Mine have been included in Appendix 7.

Table 2-6: Specialist studies undertaken for the proposed Expansion Project

Specialist Study	Conducted by	Qualifications and registration
Air Quality	SRK Consulting Mr Dhiren Naidoo	BSc Hons Environmental Monitoring and Modelling Registered Professional Natural Scientist (Pr.Sci.Nat)
Socio-Economic	SRK Consulting Ms Adel Malebana Ms Jessica Edwards	MSc Development Planning MA Environment and Society
Rehabilitation and Closure	SRK Consulting Mr James Lake	MSc Environmental Geochemistry Registered Professional Natural Scientist (Pr.Sci.Nat)
Biodiversity (including wetlands)	BioAssets Dr Wynand Vlok	PhD Zoology Registered Professional Natural Scientist (Pr.Sci.Nat)
Hydrology	SRK Consulting Mr Peter Shepherd	BSc Hons Hydrology Registered Professional Natural Scientist (Pr.Sci.Nat)
Geohydrology	ITASCA Ms Di Duthe	Masters in Science Hydrogeology Registered Professional Natural Scientist (Pr.Sci.Nat)
Noise	dBAcoustics Mr Barend van der Merwe	MSc Environmental Management Registrations: SAAI, NACA, IAIASA and SAIOH
Visual	SRK Consulting Mr Wouter Jordaan	BSc Hons Geography and Environmental Management Registered Professional Natural Scientist (Pr.Sci.Nat)
Heritage	PGS Heritage Mr Polke Birkholtz	BA Hons Archaeology Registration: ASAPA
Soil, land use and land capability	Earth Science Solutions Mr Ian Jones	BSc Geology Registered Professional Natural Scientist (Pr.Sci.Nat)

2.5 Provincial authorities' details

Environmental authorisation for the proposed Expansion Project is required from the DMR whose details is provided in Table 2-7.

Table 2-7: Competent authority details

Department	Contact Person	Contact Details	
DMR (Polokwane Office)	Mr Thivhulawi Kolani	Telephone:	015 230 3600
		Email:	Thuvhulawi.Kolani@dmr.gov.za

2.6 Municipality and ward details

Mogalakwena Mine is situated within the Mogalakwena Local Municipality, which forms part of the greater Waterberg District Municipality in the Limpopo Province. Details of the relevant municipalities and wards are provided Table 2-8 and shown in Figure 2-1.

Table 2-8: Local and district municipality details

Municipality	Contact Person	Designation	Office number
Mogalakwena Local Municipality	Mr Kenneth Malluleke	Municipal Manager	015 491 6604
Mogalakwena Local Municipality	Ms Solane Ntshane	Town planning officer	015 491 9699
Mogalakwena Local Municipality	Cllr MJ Mampane	Ward Councillor (Ward 13)	015 491 9600
Mogalakwena Local Municipality	Cllr LE Laka	Ward Councillor (Ward 14)	015 491 9600
Mogalakwena Local Municipality	Cllr ME Seema	Ward Councillor (Ward 17)	015 491 9685
Mogalakwena Local Municipality	Cllr MS Letwaba	Ward Councillor (Ward 18)	015 491 9685
Mogalakwena Local Municipality	Cllr MA Ratema	Ward Councillor (Ward 19)	015 491 9600
Mogalakwena Local Municipality	Cllr M.T Mogale	Ward Councillor (Ward 20)	015 491 9600
Waterberg District Municipality	Mr Morris Maluleka	Municipal Manager	014 718 3321
Waterberg District Municipality	Mr Peter Makondo	Acting Executive Manager of the environmental department	014 718 3341

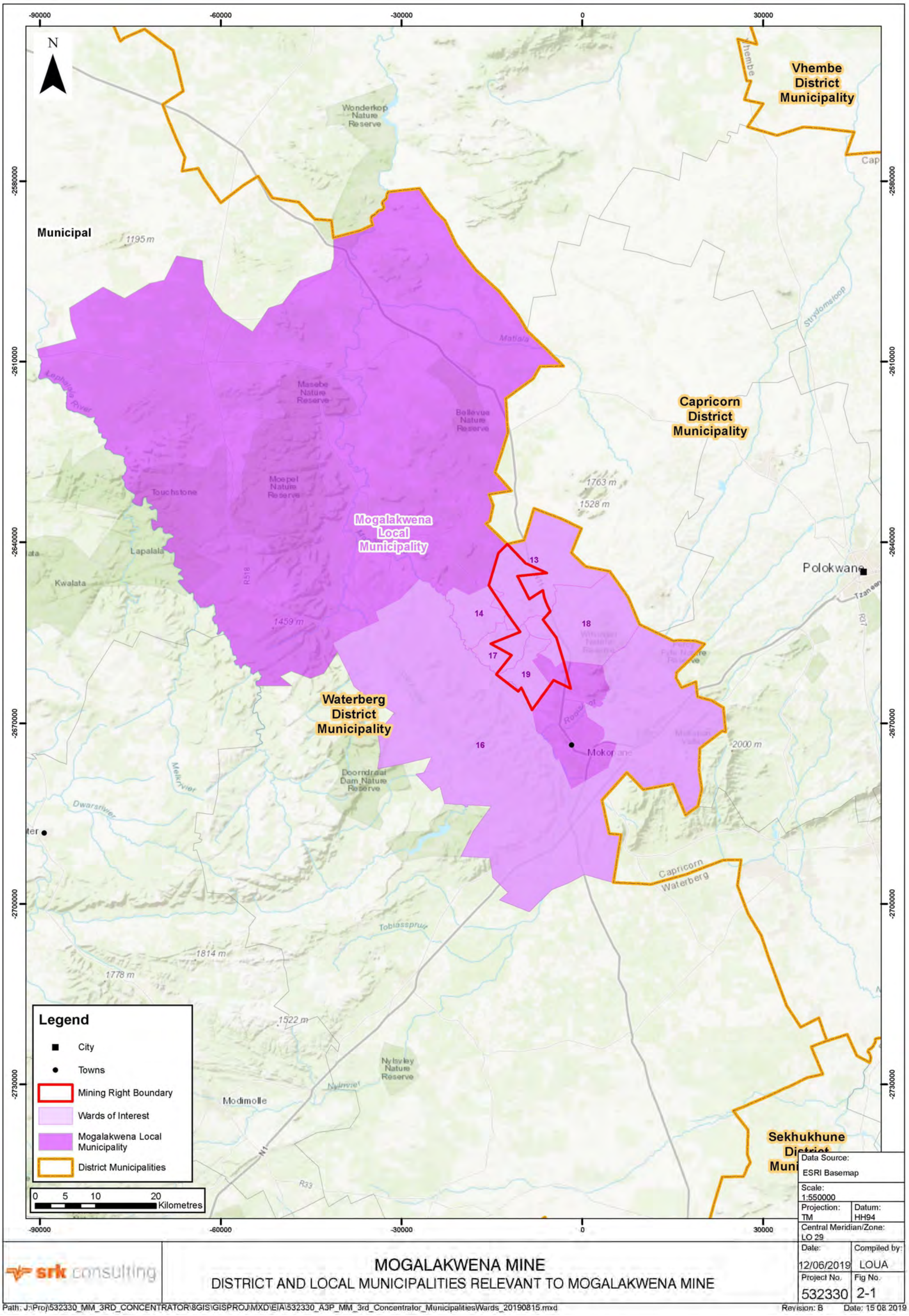

Figure 2-1: District and local municipalities and wards relevant to Mogalakwena Mine

3 Description of Property

The properties, owner and mining and surface rights information associated with Mogalakwena Mine's mining right and lease area are shown in Table 3-1. The properties where the proposed Expansion Project infrastructure will be placed are highlighted and in bold letters. Land ownership has been determined using WINDEED and the property information obtained from WINDEED has been provided in Appendix 8.

The infrastructure and activities associated with the proposed Expansion Project will take place on the following farms and associated farm portions:

- Portion 0 of the farm Overysel 815 LR;
- Portion 0 of the farm Zwartfontein 818 LR;
- Portion 0 remainder of the farm Blinkwater 820 LR;
- Portion 0 of the farm Sandsloot 236 KR; and
- Portion 0 of the farm Vaalkop 819 LR.

The property and ownership information pertaining to the proposed Expansion Project (i.e. portion numbers, areas and title deed numbers) are presented in Table 3-2.

Table 3-1: Properties associated with Mogalakwena Mine's mining and proposed Expansion Project areas

Farm Name	Farm Portions	Owner	Mogalakwena Mine Area
Knapdaar 234 KR	Portion 0	National Government of the RSA	Mining
Blinkwater 820 LR	**Portion 0 – Remaining Extent**	**National Government of the RSA***	**Mining and surface (Mapela lease)**
Armoede 823 LR	Portion 0, Remaining Extent	Rustenburg Platinum Mines Ltd	Surface (Owner)
Tweefontein 238 KR	Portion 1	National Government of the RSA	Mining
Tweefontein 238 KR	Portion 2 Remaining Extent	National Government of the RSA	Mining
Tweefontein 238 KR	Portion 3	National Government of the RSA	Mining
Rietfontein 240 KR	Portion 0	National Government of the RSA	Mining
Sandsloot 236 KR	**Portion 0**	**National Government of the RSA***	**Mining and surface (Mapela and Mokopane leases)**
Drenthe 778 LR	Portion 0	National Government of the RSA	Mining
Overysel 815 LR	**Portion 0**	**National Government of the RSA***	**Mining and surface (Mapela lease) -**
Zwartfontein 818 LR	**Portion 0**	**National Government of the RSA***	**Mining and surface (Mapela lease)**
Vaalkop 819 LR	**Portion 0**	**National Government of the RSA***	**Mining and surface (Mapela lease)**
Gillimberg 861 LR (Previously Witrivier 777 LR)	Portion 0 Remaining Extent	National Government of the RSA	Mining

*Held in Trust by the National Government of the Republic of South Africa on behalf of the Mapela and Mokopane Traditional Authorities (TAs).

Table 3-2: Information for the Property information where the proposed Expansion Project will take place

Property	SG Code	Surface Owner	Title Deed	Total Area (ha)
Overysel 815 LR, Portion 0	TOLR00000000081500000	National Government of the RSA* (Mapela TA)	T22441/1942	1851.95 ha
Zwartfontein 818 LR, Portion 0	TOLR00000000081800000	National Government of the RSA* (Mapela TA)	T6601/1913	1729.57 ha
Remainder of Blinkwater 820 LR, Portion 0	TOLR00000000082000000	National Government of the RSA* (Mapela TA)	T22441/1942	1542.11 ha
Sandsloot 236 KR, Portion 0	T0KR00000000023600000	National Government of the RSA* (Mapela and Mokopane TAs)	T2463/1887	1825.56 ha
Vaalkop 819 LR, Portion 0	T0LR00000000081900000	National Government of the RSA* (Mapela TA)	T22441/1942	1600.99 ha

*Held in Trust by the National Government of the Republic of South Africa on behalf of the Mapela and Mokopane Traditional Authorities.

3.1 Adjacent properties associated with Mogalakwena Mine

The section below described the properties adjacent to the Mogalakwena Mine proposed Expansion Project area and Mining Right as well as the properties where the wellfields and Groenfontein Community Farm is situated.

3.1.1 Properties adjacent to the proposed Expansion Project and Mining Right

Details of the properties directly adjacent to the proposed Expansion Project as well as properties adjacent to the Mogalakwena Mine Mining Right is provided in Table 3-3.

Table 3-3: Properties adjacent to proposed Expansion Project and Mogalakwena Mine mining right area

Farm Name	Farm Portions	Owner	Adjacent to Expansion Project	Adjacent to the Mining Right
Knapdaar 234 KR	Portion 0	National Government of the RSA	X	
Drenthe 778 LR	Portion 0	National Government of the RSA	X	
Groningen 779 LR	Portion 0	National Government of the RSA		X
Malolongskop 780 LR	Portion 0	Langa Bakenberg Tribe		X
Gillimberg 861 LR (Previously Witrivier 777 LR)	Portion 0 Remaining Extent	National Government of the RSA		X
Blinkwater 820 LR	Portion 0 – Remaining Extent	National Government of the RSA*	X	X
Armoede 823 LR	Portion 0, Remaining Extent	Rustenburg Platinum Mines Ltd	X	X
Rietfontein 2 KS	Portion 2, Remaining Extent	National Government of the RSA		X
Baviaanskrans 241 KS	Portion 0	National Government of the RSA		X

Farm Name	Farm Portions	Owner	Adjacent to Expansion Project	Adjacent to the Mining Right
Blinkwater 244 KR	Portions 0 to 7	Lebelo Property Association		X
De Hoogedoorns 233 KR	Portion 0	Blinkwater Farms 244 KR Pty Ltd		X
	Portion 1	Rustenburg Platinum Mines Ltd		X
	Portion 2	Blinkwater Farms 244 KR Pty Ltd		X
	Portion 3	Blinkwater Farms 244 KR Pty Ltd		X
	Portion 4	Blinkwater Farms 244 KR Pty Ltd		X
Gezond 235 KR	Portion 0	National Government of the RSA		X
Commandodrift 228 KR	Portion 0	National Government of the RSA*.		X
Moordkopje 813 LR	Portion 0	National Government of the RSA*.	X	X
Zwartfontein 814 LR	Portion 0	National Government of the RSA	X	X
Tweetontein 238 KR	Portions 1, 2 and 3	National Government of the RSA	X	
Vaalkop 819 LR	Portion 0	National Government of the RSA*	X	

*Held in Trust by the National Government of the Republic of South Africa on behalf of the Mapela and Mokopane Traditional Authorities.

3.1.2 Properties associated with the Mogalakwena Mine wellfields

Mogalakwena Mine currently operates three wellfields (PPL, Blinkwater and Commandodrift wellfields) to obtain potable water for use on the mine. The PPL wellfield abstraction boreholes fall within the mining lease area of Mogalakwena Mine.

The Commandodrift wellfield (located on the farms Commando Drift 228 KR, Molendraai 811 LR, and Moordkopje 813 LR) and the abstraction boreholes of the Blinkwater wellfield (located on the farm Rietfontein 240 KR and Blinkwater 244 KR) are located outside the mining lease area of Mogalakwena Mine (Refer to Appendix 17 for the localities of the wellfields on the water uses map).

The abstraction of groundwater at these wellfields have been authorised by the DWS (previously the Department of Water Affairs (DWA)) under Mogalakwena Mine's WUL (reference number 27059655). The mine sources some of its potable and process water from two wellfields that lie outside the mine's surface lease area. These properties are presented in Table 3-4.

Table 3-4: PPL, Blinkwater and Commandodrift Wellfield Farms

Property	Wellfield	Owner
Vaalkop 819 LR	PPL	Held in Trust by the National Government of the Republic of South Africa
Overysel 815 LR	PPL	
Zwartfontein 818 LR	PPL	
Sandsloot 236 KR	PPL	
Blinkwater 820 LR	Blinkwater	
Rietfontein 240 KR	Blinkwater	

Property	Wellfield	Owner
Molendraai 811 LR	Commandodrift	
Moordkopje 813 LR	Commandodrift	
Commandodrift 228 KR	Commandodrift	

3.1.3 Groenfontein farm

Mogalakwena Mine's Groenfontein farm is home to the mine sponsored Agricultural Incubator and Environmental training centre. The training centre focuses on surrounding villages and offers courses in permaculture and cattle management to neighbouring communities. The farm is supported by a multi-purpose environmental training centre that is also used to host external events and an eco-schools programme. For the youth, it offers a sustainable development course. Building on the success of the training centre, an agricultural incubator was established on Groenfontein farm in October 2014. The incubator offers a combination of farming education, hands-on training and infrastructure to help farmers launch new agricultural businesses on their own or communal land. The Incubator focuses on the development of black owned agricultural businesses and also assists these businesses with access to markets. The details associated with the Groenfontein property are included in Table 3-5.

Table 3-5: Groenfontein property information

Farm Name	Farm Portions	Owner
Groenfontein 227 KR	Portion 3	Rustenburg Platinum Mines Ltd

3.2 Details of the closest towns to Mogalakwena Mine

Table 3-6 includes the distance of the mine to the closest major towns in the area as measured from the MNC. Refer to Section 14.11 for further information relating to the communities in close proximity to the proposed infrastructure associated with the proposed Expansion Project.

Table 3-6: Project area in relation to adjacent towns

Major town	Approximate Distance and Direction to major towns in relation to the project
Mokopane	25km in a south-south easterly direction
Polokwane	55km in an easterly direction
Modimolle	93km in a south-westerly direction

3.3 Traditional authorities associated with Mogalakwena Mine

The mine is surrounded by 42 villages under the Mapela Traditional Authority (Mapela TA), and 20 villages falling under the Mokopane Traditional Authority (Mokopane TA). Mogalakwena Mine has a long history with these communities, based on its mining rights area extending into and impacting on these communities. With prospecting commencing in 1926 and Mogalakwena Mine becoming operational in 1993, several communities had to relocate to make way for mining activities. These are Ga-Pila, Motlhotlo (Ga Sekhaolelo) and Motlhotlo (Ga-Puka). The proposed Expansion Project activities fall on land owned by the Mapela TA, with the land owned by the Mokopane TA located immediately adjacent to the proposed Expansion Project areas. Refer to Section 14.11 for further information relating to the communities in close proximity to the proposed infrastructure associated.

3.4 Details of the affected surface areas of Mogalakwena Mine

Details of surface areas of Mogalakwena Mine affected by existing and proposed activities are tabulated in Table 3-7. For ease of reference, the activities associated with the proposed Expansion Project are highlighted in grey, while existing authorised activities remain un-highlighted.

Table 3-7: Description of properties where the existing and proposed Mogalakwena Mine activities occur

Farm name: Gillimberg 861 LR (previously Witrivier 777 LR) **Portion:** 0 Remaining Extent **Surface rights owner:** National Government of the Republic of South Africa (Held in Trust by the National Government of the Republic of South Africa on behalf of the Mapela Traditional Authority. **Title deeds:** T34563/2016PTA **SG code (21-digit code):** T0LR00000000086100000	
EMPr/EMP Reference	**Mining Related Infrastructure**
Drenthe and Witrivier Infill Drilling and WRD EMPr, 2017	• WRD with associated water management infrastructure • Access and mining haul roads associated with the WRD • Infill drilling: no permanent surface infrastructure will be located on the farms
Farm name: Overysel 815 LR **Portion**: 0 **Surface rights owner**: National Government of the Republic of South Africa (Held in Trust by the National Government of the Republic of South Africa on behalf of the Mapela Traditional Authority. **Title deeds:** T22441/1942PTA **SG code (21-digit code):** T0LR00000000081500000	
EMPr/EMP Reference	**Mining Related Infrastructure**
Environmental Management Programme Report: Potgietersrust Platinum's Limited November 1997	• Mogalakwena North pit • WRDs • PPL wellfield – abstraction boreholes
PPRust North Mine Addendum January 2003	• Overysel open pit • Crushing and screening plant • Concentrator • Two waste residue management facilities (east and west of the pit) • Processing plant • Roads • Surface conveyors • Water supply take-off pipeline • Sewage plant • Stores, offices, boardrooms, workshops, training centre, security offices, fuel bay • 310 Ml rockfill dam (Dam 1160)

Creation of 3 ore stockpiles and relocation of old disused TSF EMP (Addendum to Zwart South EMPr) July 2005	• Three ore stockpiles (low-low grade; high-low grade; oxidised ore)
PPRust North Mine EMP Amendment March 2006	• Eastern WRD • Western WRD • PPRust North open pit • WRD run-off water dam No. 1 • Ore stockpiles
PPRust North Mine Environmental Management Plan (EMP) Amendment November 2007	• No additional infrastructure
Mogalakwena Mine Road Deviation October 2012	• Deviation of the existing Provincial Road (D4380)
Drenthe and Witrivier Infill Drilling and Witrivier WRD July 2017	• Infill drilling: no permanent surface infrastructure will be located on the farms
Explosive Depot Expansion March 2018	• Four 200-ton Bulk Mining Explosives (BME) emulsion silos and bunded areas • Six 40-ton African Explosives Limited (AEL) emulsion silos and bunded areas • Two 50-ton Ammonium Nitrate Porous Prills (ANPP) silos and bunded areas, accessory and equipment stores, security houses, water infrastructure (pipelines, 15000L water tank)
Mogalakwena Platinum Mine Expansion Project 2019	Additional WRD that will provide additional storage capacity for the placement of waste rock generated by the current mining operation. The new WRD will cover an area of 130 ha and will include water management infrastructures to manage surface water runoff from the site.
Farm name: Zwartfontein 818 LR **Portion:** 0 **Surface rights owner:** National Government of the Republic of South Africa (Held in Trust by the National Government of the Republic of South Africa on behalf of the Mapela Traditional Authority. **Title deeds:** T6601/1913 **SG code (21-digit code):** TOLR00000000081800000	
EMPr/EMP Reference	**Mining Related Infrastructure**
Environmental Management Programme Report: Potgietersrust Platinum's Limited November 1997	• Mogalakwena central pit • Mogalakwena south pit • Section of the Zwartfontein pit • Contractors camp • Sewage works at contractor's camp

	• Domestic waste disposal site (landfill) • Industrial waste disposal site (salvage yard) • Office complex • MNC plant with primary crusher • Sewage works at MNC • Section of the TSF Complex (original and extension) • PPL Wellfield – abstraction boreholes • Return Water Dam (RWD) extension • Pollution control dams (PCD) • Clean and dirty water management infrastructure • WRDs
Extension of Tailings dam July 2002	• Expansion of Vaalkop TSF • Additional water management infrastructure
Zwartfontein South Project Addendum September 2002	• New opencast mining area (Zwartfontein pit) • Additional service infrastructure including access and haul roads, electricity supply and water management infrastructure
PPRust North Mine Addendum January 2003	• Eastern WRD • Western WRD • PPRust North open pit • Crushing and screening plant • Concentrator • Two waste residue management facilities (east and west of the pit) • Processing plant • Roads • Surface conveyors • Water supply take-off pipeline • Sewage plant • Stores, offices, boardrooms, workshops, training centre, security offices, fuel bay • 310 Ml rockfill dam (Dam 1160)
PPRust North Mine EMP Amendment March 2006	• Zwartfontein South open pit • WRD run-off water dam No. 2 • Pipelines, conveyers, roads • Existing tailings dam

	• Ore stockpiles
PPRust North Mine EMP Amendment November 2007	• New WRD run-off water dam No. 2A • New haul road position
Storage of Dangerous Goods EA March 2008	• A Permanent facility to store dangerous good in 6X 46 000L Horizontal Tanks • A Temporary facility with a 5-year life with 6 X 14 000L vertical tanks for lubricants • 8 X 83 000L horizontal tanks for fuel • 1 X 23 000L underground tank for petrol
Proposed relocation of Explosive Depot EMP April 2014	• Relocation of 6 emulsions silos and a gassing room • The erection of two ANPP silos, gassing room and six emulsion silos • Deregistering and decommissioning of four existing ANPP silos and two explosive magazines
Waste Site EMP 2015	• Waste site (4.6 ha) for general waste and temporary storage of hazardous waste • Gravel roads to link the site to the existing mine • Room and toilet for security at the site
De-bottlenecking EMP (DMR-December 2015)	• New crushing circuit (two cone crushers, screens, feed bins, high rate thickener and conveyors at the Mogalakwena MNC plant • 940m long pipeline (450 mm diameter)
Blinkwater TSF Expansion EMP July 2017	• A section of the Southern attenuation dam • A section of the RWD complex • As alternative to the Southern attenuation dam - a section of the alternative proposed pipeline
Bridge over the Mohlosane November 2017	• Bridge • Gravel road
Pebble Storage Area EA April 2018	• Ore pebble stockpile area (20 000-ton capacity)
Tailings Scavenger Plant EMP Amendment September 2018	• In-line tailings scavenger plant • Offices and parking area • Transformer bay • Workshop area • Weigh bridge
Mogalakwena Platinum Mine Expansion Project 2019	• M3C in close proximity to the MNC • Bulk ore sorting facility and associated ore stockpiles • Conveyor crossing • Crusher plant

<table>
<tr><td></td><td>Workshop expansion
Contractors Laydown area
Buffer dam
Paste plants</td></tr>
<tr><td colspan="2">Farm name: Blinkwater 820 LR
Portion: 0 Remaining Extent
Surface rights owner: National Government of the Republic of South Africa (Held in Trust by the National Government of the Republic of South Africa on behalf of the Mapela Traditional Authority.
Title deeds: T22441/1942PTA
SG code (21-digit code): TOLR00000000082000000</td></tr>
<tr><td>EMPr/EMP Reference</td><td>Mining Related Infrastructure</td></tr>
<tr><td>PPRust North Mine Addendum January 2003</td><td>Blinkwater 1 TSF
Stormwater diversions</td></tr>
<tr><td>PPRust North Mine EMP Amendment March 2006</td><td>Blinkwater wellfield
Blinkwater 1 TSF</td></tr>
<tr><td>PPRust North Mine EMP Amendment November 2007</td><td>No additional infrastructure only changes to the proposed mine layout including
Extension of the mine area further southwards to close proximity to the Mohlosane River
Location of the runoff dam south-west of the pit to fall within the footprint of the proposed pit
Realignment of the position of the haul road</td></tr>
<tr><td>De-bottlenecking EMP 2015 (DMR -December 2015)</td><td>Two new pipelines. One 450mm diameter pipeline will be 940m long and run between the existing return water dam and the MNC plant. The other pipeline will also be 450mm in diameter to transport tailings from the Mogalakwena MNC plant to the TSF at Blinkwater, over a distance of 2km from MNC plant</td></tr>
<tr><td>Blinkwater TSF Expansion EMP July 2017</td><td>Expansion of the Blinkwater 2 TSF
Additional RWDs and attenuation dams
River diversion of the Mohlosane River
Additional tailings pipelines
Additional access and haul roads</td></tr>
<tr><td>Mogalakwena Platinum Mine Expansion Project 2019</td><td>Expansion of the approved Blinkwater 2 TSF and associated water management infrastructure</td></tr>
<tr><td colspan="2">Farm name: Vaalkop 819 LR
Portion: 0
Surface rights owner: National Government of the Republic of South Africa (Held in Trust by the National Government of the Republic of South Africa on behalf of the Mapela Traditional Authority.</td></tr>
</table>

Title deeds: T22441/1942PTA **SG code (21-digit code):** T0LR00000000081900000	
EMPr/EMP Reference	**Mining Related Infrastructure**
Environmental Management Programme Report: Potgietersrust Platinum's Limited November 1997	• Vaalkop TSF 1 • Vaalkop RWD • Plant complex • Mogalakwena Mine offices • A portion of the Sandsloot pit
Extension of the Tailings Dam Addendum July 2002	• Vaalkop TSF Complex 1 and 2 (original and extension) • WRD (W01, W04, W10 and W07) • MSC plant with crusher • Sewage works at MSC • Section of the Zwartfontein pit • Section of the Sandsloot pit • Ore stockpiles • Landfill site • Zinc dam • Existing RWD on Vaalkop • Clean and dirty water management infrastructure • Stormwater sump • Settling pond • Oil sump 1 and 2 • Process water dam (Dam 1160) • PPL Wellfield – abstraction boreholes
Mogalakwena Platinum Mine Expansion Project 2019	Upgrade of MSC and associated water management infrastructure Buffer dam
Farm name: Sandsloot 236 KR **Portion:** 0 **Surface rights owner:** National Government of the Republic of South Africa (Held in Trust by the National Government of the Republic of South Africa on behalf of the Mapela and Mokopane Traditional Authorities).Title deeds: T2463/1887PTA **SG code (21-digit code):** T0KR00000000023600000	
EMPr/EMP Reference	**Mining Related Infrastructure**

Environmental Management Programme Report: Potgietersrust Platinum's Limited November 1997	• Sandsloot pit • Section of the Zwartfontein pit • WRDs • Stockpiles • Groot Sandsloot (Pholotsi) River diversion (number 1) • Four decommissioned ANPP silos and two decommissioned explosive magazines
Overburden Dump April 2001	• Additional WRD • Additional stormwater control infrastructure • Overburden dump at Sandsloot Pit
Fuel Depot EMP August 2013	• Fuel depot including: o A secondary containment area with four (4) diesel storage tanks, each with a capacity of 58 000L (combined capacity of 232 000L) o A tank containing OHC 10W oil with a total capacity of 26000L o A tank containing OEC 15W40 motor oil with a total capacity of 26000L o A tank containing TELLUS 46 oil with a total capacity of 10 000L o A tank containing ODT 30 oil with a total capacity of 10 000L o Transfer pumps o A wash bay o A bulk loading and offloading area o An interceptor separator for the recovery of oil o Service bay area 1. This will be the field service bay o Service bay area 2 o The services workshop will have an APEX top roof structure and a lower steel roof structure, with U/S IBR cladding. A spoon drain will be installed that will lead to the sand trap o A green building with a store area
Explosive Depot EMP April 2014	The two ANPP silos are located in the existing Sandsloot explosives magazine area
Groot Sandsloot River Diversion EMP 2014	• One culvert crossing • Diversion of Groot Sandsloot (Pholotsi) River
Pit-dewatering pipeline upgrade EMP 2015	• Two 17km long parallel pipelines with a 450mm diameter
Fuel Depot Expansion EMP 2015	• Eight diesel storage tanks of 70m3 each at the existing depot
Waste tyre stockpile abatement plan March 2017	• Waste tyre abatement

<table>
<tr><th>Mogalakwena Platinum Mine Expansion Project 2019</th><th>Realignment of approved Sandsloot (Pholotsi) River diversion and application for Water Use Licence
Buffer dam</th></tr>
<tr><td colspan="2">Farm name: Drenthe 778 LR
Portion: 0
Surface rights owner: National Government of the Republic of South Africa
Title deeds: T4581/1895PTA
SG code (21-digit code):TOLR00000000077800000</td></tr>
<tr><td>EMPr/EMP Reference</td><td>Mining Related Infrastructure</td></tr>
<tr><td>Drenthe and Witrivier Infill Drilling and Witrivier WRD July 2017</td><td>• Infill drilling for prospecting purposes
• A WRD is planned to be located on a portion of the farm Witrivier</td></tr>
<tr><td colspan="2">Farm name: Armoede 823 LR
Portion: 0 Remaining Extent
Surface rights owner: Rustenburg Platinum Mines LTD
Title deeds: T65590/2004PTA
SG code (21-digit code): T0LR00000000082300000</td></tr>
<tr><td>EMPr/EMP Reference</td><td>Mining Related Infrastructure</td></tr>
<tr><td>Environmental Management Programme Report: Potgietersrust Platinum’s Limited November 1997</td><td>No mining related infrastructure of activities located on this property</td></tr>
<tr><td colspan="2">Farm name: Tweefontein 238 KR,
Portions: 1, 2 Remaining Extent and 3
Surface rights owner: National Government of the Republic of South Africa
Title deeds: Portion 1 -T101177/1999PTA, Portion 2 - T2995/1938PTA; BC27065/1999PTA; Portion 3 - T8608/1937PTA
SG code (21-digit code):
Portion 1:- T0KR00000000023800001
Portion 2: T0KR00000000023800002
Portion 3: T0KR00000000023800003</td></tr>
<tr><td>EMPr/EMP Reference</td><td>Mining Related Infrastructure</td></tr>
<tr><td>Environmental Management Programme Report: Potgietersrust Platinum’s Limited November 1997</td><td>No mining related infrastructure of activities located on this property</td></tr>
</table>

4 Background and Overview of Mogalakwena Mine

Mogalakwena Mine has been operational since the early 1990’s and through the years, AAP have applied for a number of additional activities as mining has progressed and developed. This section presents the background to Mogalakwena Mine including a description of the previous EMPrs (Table 4-1) which have been authorised for Mogalakwena Mine for the mine’s existing activities (Table 4-2 and Table 29-4).

4.1 Mogalakwena Mine background

Mogalakwena Mine has been operational since 1992. An initial environmental management plan was undertaken by Johannesburg Consolidated Investment (JCI) Limited in 1991 for mine establishment. This EMPr was conducted in terms of the Environmental Conservation Act (Act No. 73 of 1989) (ECA) and the Mines and Works Act (Act No. 27 of 1956). Subsequent to compilation of the 1991 management plan, a number of EMPr Amendments were developed (refer to Table 4-1) and approved under the previous Minerals Act (Act No. 50 of 1991), the MPRDA (Act No. 28 of 2002) and the NEMA (Act No. 107 of 1998) for additional mining and processing activities on areas that were not included in the 1991 EMPr. The management measures associated with each of the EMPrs have been consolidated and are included in Appendix 9.

Platinum group metals (PGMs) and various base metals are currently mined at Mogalakwena Mine via five open pits, namely the Sandsloot, Zwartfontein, South, Central and North Pits. The ore is beneficiated by the MNC and MSC into concentrate, which is transported to the AAP Polokwane Smelter for smelting, to produce furnace matte. The matte then undergoes an acid converting process at the Waterval Smelter complex in Rustenburg. Mogalakwena Mine also operates three TSFs; Vaalkop (original and expansion) and Blinkwater 1 TSF. Open pit mining could ultimately be supplemented by underground mining with initial access via decline shafts in the footwall of the Sandsloot Pit. Mogalakwena Mine 's life of mine (LoM) extends well beyond 2080 and could potentially continue for a further period of some 100 years.

Table 4-1: Mogalakwena Mine's existing and approved EMPrs

Name	Description	Approval status	DMR/LEDET reference number
Overysel Open Cast Mine and Addendum Environmental Impacts Potgietersrus Platinum Project	Addendum of environmental impacts to include the dumping sites for slimes	Approved under the Minerals Act in June 1992	DMR: I.M.P.B 37/1/7
Environmental Management Programme Report Potgietersrus Platinum's Limited	EMPr to include additional open pits, underground mining, incline shafts, TSF and water management infrastructure	Approved under the Minerals Act in November 1997	DMR: 6/2/2/160
Addendum to the EMPr for the overburden dump at Potgietersrus Platinum's Limited	Addendum to the EMPr to include the overburden dump, extension to the existing TSF as well as the construction and operation of a new TSF	Approved under the Minerals Act in April 2001	DMR: 6/2/2/160
Addendum to the EMPr for the extension to the tailings dam at Potgietersrus Platinum's Limited	Addendum to the EMPr to include the extension to the existing TSF	Approved under the Minerals Act in July 2002	DMR: 6/2/2/160
Addendum Potgietersrus Platinum's Limited Zwartfontein South Project addendum to the EMPr	Addendum to the EMPr to include the construction and operation of the Zwartfontein South open pit	Approved under the Minerals Act in September 2002	DMR: 6/2/2/160
Potgietersrus Platinum's Limited PPRust North Mine addendum to the EMPr	Addendum to the EMPr for the construction and operation of PPRust North Mine's open pit, TSF, overburden dumps, waste residue facilities, processing plant, water reservoirs, conveyor, sewage plant, access roads, explosives stores and workshops	Approved under the Minerals Act in January 2003	DMR: 6/2/2/160
Environmental Management Programme Droondraai water pipeline-borrow pits at Potgietersrus Platinum's Limited	EMPr to establish the Droondraai water pipeline-borrow pits	Approved under the Mineral Act in June 2003	DMR: 6/2/2/160
Doorndraai borrow pits EMPr	Rehabilitation of Section 13 of the National Route 11 (N11) including borrow pots and a hard quarry along the route	May 2003	DEA/EIA/0000438/2011
EMPr Addendum for the creation of three ore stockpiles and relocation of old disused TSF	Addendum to the EMPr for the construction and operation of three ore stockpiles and relocation of an old disused TSF	Approved under the Minerals Act in July 2005	DMR: 6/2/2/160
Potgietersrus Platinum's Limited PPRust North Mine amendment to the EMPr	Amendment to the EMPr to include additional access roads and contractor's camp as well as the expansion of the mining area and the relocation of the crusher, the workshop, rock dump runoff dam, villages and a school	Approved under the MPRDA in March 2006	DMR: 6/2/2160

Name	Description	Approval status	DMR/LEDET reference number
Environmental Management Programme Water effluent pipeline scheme	EMPr for the water effluent pipeline scheme	Approved under the Environmental Conservation Act in January 2006	LEDET: 16/1/3/4-23
Potgietersrus Platinum's Limited PPRust North Mine amendment to the EMPr	Amendment to the EMPr for the expansion of the open pit, the relocation of the south-west runoff dam and the realignment of haul roads	Approved under the MPRDA in November 2007	DMR: 6/2/2/318
Environmental Impact Assessment for the storage of dangerous goods at Potgietersrus Platinum Mine	EIA for the proposed storage of dangerous goods at Potgietersrus Platinum Mine	Approved under NEMA in March 2008	LEDET: 16/1/7/3 – W4
Amendment for the storage of dangerous goods at Potgietersrus Platinum Mine	Amendment of the EA for the storage of dangerous goods at Potgietersrus Platinum Mine	Approved under NEMA in December 2008	LEDET: 16/1/7/3 – W4
Basic Assessment for the Construction of Groenfontein Lodge	BA for the Construction of Groenfontein Lodge within the Mogalakwena Local Municipality	Approved under NEMA in June 2008	LEDET: 12/1/9-6/16b-W12
Basic Assessment for the deviation of the existing Provincial Road	BA for the proposed deviation of the existing provincial road (D4380) within the Mogalakwena Local Municipal Area of Waterberg	Approved under NEMA in October 2012	LEDET: 12/1/9/1-W37
Mogalakwena Platinum Mine EMPr for the construction of a fuel depot on the farm Sandsloot 236 KR	EMPr to establish a permanent diesel depot on site which included associated infrastructure such as service workshop, tanks, service bays and containment areas	Approved under NEMA in August 2013	LEDET: 12/1/9/2-W21
Mogalakwena Platinum Mine EMPr for the relocation of six emulsion silos on the farms Sandsloot 236 KR and Zwartfontein 818 LR	EMPr for the relocation of six emulsion silos from Sandsloot to Zwartfontein as well as the erection of two ammonium nitrate porous prill (ANPP) silos on Zwartfontein within the Mogalakwena Mine premises. The EMPr also included the deregistering and decommissioning of four existing ANPP silos and two explosives magazines on Sandsloot	Approved under NEMA in April 2014	LEDET: 12/1/9/1-W58
Mogalakwena Platinum Mine EMPr for the proposed diversion of Groot Sandsloot (Pholotsi) River on the farm Sandsloot 236 KR	EMPr for the diversion of the Groot Sandsloot (Pholotsi) River within the mine surface lease area	Approved under NEMA in March 2015	LEDET: 12/1/9/3-W12
Mogalakwena Mine EMPr for the proposed expansion of a fuel depot located on the farm Sandsloot 236 KR	EMPr to expand an existing fuel depot located on the farm Sandsloot 236 KR through the additional of eight diesel storage tanks required for strategic reserves of diesel for the mine	Approved under NEMA in February 2015	LEDET: 12/1/9/1-W94

Name	Description	Approval status	DMR/LEDET reference number
Mogalakwena Mine EMPr for the proposed dewatering pipeline located on the Farm Sandsloot 236 KR	EMPr to construct a new 17km double pipeline required for the transportation of rain and seepage water from the pits at Mogalakwena Mine to a storage dam on the mine	Approved under NEMA in March 2015	LEDET: 12/1/9/1-W92
Mogalakwena Mine EMPr for the proposed development of a waste site on the farm Zwartfontein 818 LR	EMPr to obtain a waste licence construct a waste site on the farm Zwartfontein 818 LR to dispose of mainly non-hazardous and domestic waste which cannot be recycled	Approved under NEM:WA in September 2014 Amendment approved under NEM:WA in July 2015	DEA: 12/9/11/L621/5
Mogalakwena Platinum Mine EMPr for the proposed expansion of the MNC de-bottlenecking plant	EMPr to undertake the proposed expansion to the MNC in order to enhance production capacity of the MNC plant from 600 ktpm to 750 ktpm	Approved under the MPRDA in December 2015	DMR: (LP) 30/5/1/1/3/2/1/50 EM
Mogalakwena Mine EMPr for the Drenthe and Witrivier infill drilling and Witrivier WRD establishment on the farm Witrivier 777 LR	EMPr to conduct infill drilling, amend Mogalakwena Mine's mining right area to include the remaining portion and Portion 1 of the farm Witrivier 777 LR and the farm Drenthe 778 LR in the current mining right area, develop the Witrivier WRD, a potential diversion of two tributaries of the Witrivier River around the proposed Witrivier WRD and establishment of access and mining haul roads to the proposed new Witrivier WRD	Approved under NEMA in September 2015 (LEDET) and in July 2017 (DMR)	DMR: LP 30/5/1/3/2/1 (050) EM LEDET: 12/1/9/2-W61
Mogalakwena Mine EMPr for the expansion of the Blinkwater TSF and additional water management infrastructure on the farms Blinkwater 820 LR and Zwartfonitein 818 LR	EMPr for the expansion to the existing Blinkwater TSF, development of a return water dam (RWD) and attenuation dam, potential development of a pipeline along the existing tailings pipeline of Mogalakwena Mine, diversion of a section of a tributary of the Mohlosane River and establishment of access roads to the Blinkwater TSF expansion section and new water management infrastructure	Approved under NEMA in October 2015 (LEDET) and in July 2017 (DMR)	DMR: LP 30/5/1/3/2/1 (050) EM LEDET: 12/1/9/2-W62
Waste tyre stockpile abatement plan	Approval of the Mogalakwena stockpile abatement plan	Approved under NEM:WA (March 2017)	DEA – WT0SREG0034LIM
Basic Assessment for Mohlosane bridge	Basic Assessment for the proposed construction of the bridge and the gravel road situated in the Waterberg municipality	Approved under NEMA in November 2017	DMR: LP30/5/1/2/3/2/1 (050) EM

Name	Description	Approval status	DMR/LEDET reference number
Mogalakwena Mine EMPr for the expansion of an existing explosives depot on the farm Overysel 815 LR	The expansion of the current explosive's magazine situated on the top of the existing WRD No 2. The expansion activity will consist of the storage of more than 80m^3 of explosives in the explosives magazine section as well as the construction (relocation), storage and handling of an ANPP and emulsion storage and handling section	Approved under NEMA in March 2018	DMR: LP30/5/1/2/3/2/1 (050) EM
Part 1 Amendment of the EMPr for Mogalakwena Mine to establish a pebble stockpile on the farm Zwartfontein 818 LR	The establishment of an additional ore pebble stockpile in close proximity to the MNC area where the ore pebbles from MSC will be placed for further processing	Approved under NEMA in April 2018	DMR: LP30/5/1/2/3/2/1 (00050) EM
Mogalakwena Mine EMPr amendment to the proposed construction of the tailings scavenger plant on the farm Zwartfontein 818 LR	The construction of an in-line tailings scavenger plant between the existing MNC and Blinkwater TSF to extract residual PGMs from the wet tailings generated at the MNC which is transported via an existing pipeline system, prior to the deposition of the tailings to the Blinkwater TSF	Approved under NEMA in September 2018	DMR: LP30/5/1/2/3/2/1 (050) EM

4.2 Overview of existing activities and infrastructure at Mogalakwena Mine

The Mogalakwena Mine is divided into three operational areas, namely:

- Mining;
- Mogalakwena South Concentrator; and
- Mogalakwena North Concentrator.

Table 4-2 provides a summary of the current mining and process operations as well as the water and waste management systems at Mogalakwena Mine. Further details on the existing infrastructure is provided in Section 8.

Table 4-2: Overview of the Mogalakwena Mine operations

Aspect	Description
Mining Operations	
Target minerals	• Platinum group metals • Base metals: copper, nickel and cobalt
Ore body	Platreef
Products	Platinum concentrate which is transported off site to the Polokwane metallurgical complex for smelting
Life of mine	Operations are 365 days per year, 24 hours per day LoM extends well beyond 2080 and could continue for a further period of approximately 100 years.
Mining method	Mogalakwena Mine currently has five pits, namely: • North; • Central; • South; • Zwartfontein Pit situated on the farms Zwartfontein 818 LR, Vaalkop 819 LR and Sandsloot 236 KR; and • Sandsloot pit situated on the farm Sandsloot 236 KR. • North, Central and South pits will in future be mined as one large pit. Open pit mining could ultimately be supplemented by underground mining with initial access via decline shafts in the footwall of the Sandsloot Pit. . Mogalakwena Mine 's life of mine (LoM) extends well beyond 2080 and could potentially continue for a further period of some 100 years.
North and South Concentrator operations	
Concentrator complex	• There are two mineral processing plants at the mine, MNC and MSC. • The ore is processed by the MSC and MNC Plants. The MSC has the capacity to process 385 ktpm. The MNC plant has a capacity of 800 ktpm, and in future an additional 4.8 mtpa could be processed. Therefore, the total future potential capacity of the MNC is a 1200 ktpm. • Ore is transported by haul trucks to the gyratory crusher and by means of conveyors to the mineral processing plant, as well as within the plant • Crushing is achieved in three phases using a gyratory crusher as a primary crusher in an open circuit, followed by secondary and tertiary crushing with associated screening. • Conveyor feeds the primary mills from the crushed ore stockpiles • Following exposure of the PGM and base metal surfaces in the milling circuit, reagents are added to the milled product streams to prepare the minerals for flotation • Concentrate is dewatered prior to dispatch to the smelter in Polokwane via road

Aspect	Description
	• Tailings from the MNC are pumped to the Blinkwater 1 TSF whilst the Vaalkop TSF complex (original and extension) receives tailings from the MSC
Waste and residue disposal	
Waste Rock Dumps	• **Overysel 815 LR:** The WRDs include dump W02 to the west of the North pit and dump W020 to the East of the North pit. These form part of the original East and West WRD footprint areas and includes the Western bundwall dump and the Eastern bundwall dump. • **Zwartfontein 818 LR:** WRD W01 situated to the northeast of South pit • **Sandsloot 236 KR:** Two WRDs are situated on this farm, namely; RS3 situated to the West of the Sandsloot pit and W07 situated to the south of Sandsloot pit. W07 also extends onto Vaalkop 819LR • **Vaalkop 819 LR:** WRD situated to the East of the Sandsloot pit • **Gillimberg 861 LR** : Witrivier WRD located on Gillimberg 861 LR (Previously Witrivier 777 LR – not developed)[4]
Ore Stockpiles and oxidized dumps	• A number of low grade ore and ore pebble stockpiles are situated at various locations on the mine. • Ore stockpiles are situated in various locations on the farms Overysel 815 LR, Vaalkop 819 LR, Zwartfontein 818 LR and Sandsloot 236 KR • Ore stockpiles are dynamic dumps feeding the concentrators as required
Topsoil and subsoil dumps	Topsoil and subsoil dumps are maintained on site until they will be utilised for rehabilitation

Tailings Storage Facilities	Mogalakwena Mine operate 3 TSFs namely:
	• The Vaalkop TSF Complex (original dam compartment 1 and extension compartment 2), situated on the farms Zwartfontein 818 LR and Vaalkop 819 LR and the return water stored for re-use in the RWD and RWD extension)
	  o Vaalkop TSF 1 was designed for 1 909 200 tons per annum (tpa) dry tonnes,
	  o Vaalkop TSF 2 was designed for 2 532 000 dry tpa,
	• The Blinkwater 1 TSF is located on the farm Blinkwater 820 KR and was commissioned in 2011, and supernatant from the Blinkwater 1 TSF is discharged into the RWD extension
	  o Blinkwater 1 TSF is designed for 112 472 651 m³;
	  o The extension to the Blinkwater 2 TSF, which has not been constructed, obtained environmental authorisation in 2017 but does not have a WUL.[5]

Sewage treatment plants	• The mine is served by a waterborne sewage system • Three STPs currently operate on the mine, namely MSC, MNC and Contractors' Camp and sewage is piped by gravitational flow to the various STPs

[4] The Witrivier WRD was authorized in terms of NEMA in 2017 however it does not have a WUL.

[5] The extension of the approved Blinkwater comparing 2 forms part of the proposed Expansion Project and the environmental authorisation will be amended as part of the environmental authorisation process.

Aspect	Description
	• The treated sewage effluent at MSC, with a design capacity of 120 m^3/day, is pumped back into the plant process water circuit • The treated sewage effluent at MNC, with a design capacity of 180 m^3/day, is pumped back into the plant process water circuit and overflow/excess is pumped to the return water dam extension • The contractor's camp STP consists of a series of lined oxidation ponds and is designed to cater for a throughput of 78 m^3/day. The treated sewage effluent is pumped via the main pit dewatering pipeline to Dam 1160 and is authorised in the 2017 WUL for use in dust suppression
Domestic, general and hazardous waste disposal	• Mogalakwena Mine operates its own general and small waste disposal site (classified as type G:S:B) and is approximately 2.24 ha in size. The site is located at the MSC on the farm Vaalkop 819 LR. This waste disposal site was constructed in 1992 as part of the original infrastructure required for the mine. Only small items of non-hazardous waste may be mixed with domestic waste at this site • Materials such as glass, paper and plastics are sent for recycling • Industrial waste that cannot be salvaged or returned to suppliers for recycling is sorted at designated salvage areas at both the MNC and MSC Concentrators before being removed off site. • Hazardous waste is sorted at designated salvage areas at both the MNC and MSC's before being taken to Interwaste in Gauteng, for further recycling or disposal to a hazardous waste landfill • A new authorised Class B facility for waste disposal, sorting facility and treatment of contaminated waste has been developed on the farm Zwartfontein 818 LR, in the centre of the mine. • The mine has set itself very strict goals of achieving Zero waste to Landfill by 2020 and are working closely with Interwaste and local waste contractors to achieve this goal.
Waste tyre and processing site.	• All waste tyres are taken to a licensed Waste Tyre Storage Area on WRD WO7. • Waste Tyres are downsized into rubber chips and metal on site and is then taken to a licensed Waste Tyre Processing Facility within the storage area as approved by the Waste Bureau.
Other mine infrastructure	
Surface conveyors	Conveyors are operated and utilised at and within the mineral processing plants to transport ore for processing
Potable water supply	• Potable water is obtained from the Commandodrift, PPL and Blinkwater wellfields • The abstraction of groundwater at these wellfields has been authorised by DWS under Mogalakwena Mine's WUL (reference number 27059655) • Additional boreholes situated on the mine site have been authorised for abstraction and potable water use under the new WUL (No. 14/A61G/GICABJ/5053). These boreholes are in addition to the wellfield boreholes that are authorised under the original WUL • Majority of the wellfield water is used for domestic purposes and only a small percentage is used in the process at MSC as a back-up supply.
Process water supply	Process water is obtained from: • Recycled sewage effluent from the MNC and MSC STPs and the contractors camp STP

Aspect	Description
	• Mokopane (up to 6 Mℓ/d is authorized) and Polokwane (up to 20 Mℓ/d is authorized) municipal STPs • Pit dewatering • Return water from the TSFs • Dirty runoff collected in stormwater dams The process water dam (Dam 1160) and the RWD and extension with associated pump and pipeline systems are established as part of the combined water system for the mine These water storage facilities manage the availability of water to processing activities with limited interruptions
Roads	• Roads within the mine area consist of existing internal mine and haul roads and roadways into the open pits. Access roads are tarred. • Haul roads are gravel and are sprayed with a commercial dust suppressant according to a detailed schedule.
Pipelines	• Treated sewage effluent from Mokopane and Polokwane municipal STPs is pumped to the process water dam, Dam 1160, via a pipeline system • A pipeline system has been constructed to transfer excess water from the pits to Dam 1160 and the RWD and extension • Tailings slurry from the MNC is transported to the Blinkwater 1 TSF and from the MSC to the Vaalkop TSF Complex via pipelines • Two pipelines carry dirty water from the Blinkwater 1 TSF section to the RWD extension and from Vaalkop Dam to the RWD • Water from the original RWD travels via pipeline to the MSC and Dam 1160 and from the RWD Extension to the MNC. • Run-off water from the rock dumps, offices and workshops is collected in a WRD run off pollution control dam and then pumped via pipeline to the RWD.
Other	The mine complex and concentrator complexes include infrastructure such as change houses, stores, offices, boardrooms, workshops, training centres, clinic, security offices, fuel/lube bays, green/conservation areas, dispatch and other supporting buildings, and clean and dirty water separation systems.

5 Policy and Legislative Context

This section provides an overview of the policy and legislative context within which the proposed Expansion Project will operate. It identifies all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process, which may be applicable or have relevance to the proposed Expansion Project.

5.1 The Constitution of South Africa, 1996 (Act No. 108 of 1996)

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:

"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".

The Constitution of South Africa is the overarching framework legalisation driving the NEMA principles and therefore EIA process. 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.

5.2 Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA)

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.

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.

5.3 National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)

Listed Activities 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. The EA must be obtained prior to the commencement of those listed activities.

5.4 National Water Act, 1998 (Act No. 36 of 1998) (NWA)

Mogalakwena Mine currently operates under two Water Use Licences (WULs) (approved in March 2007 and October 2017).

5.5 Other applicable legislation

5.5.1 The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA)

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.

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.

5.5.2 The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA)

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.

5.5.3 National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA)

The National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEM:WA) commenced on 1 July 2009. In terms of this Act, 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. Licence applications for activities involving hazardous waste must be submitted to the national authority, the Department of Environmental Affairs (DEA) and those for general waste to the provincial authority.

NEM:WA previously excluded mine residues controlled under the MPRDA but the NEM:WA Amendment Act (NEM:WAA) came into effect on 2 June 2014 (Act No 26 of 2014, Government Gazette 37714) and makes provision for inclusion of mine residue deposits and stockpiles under Schedule 3 (defined wastes) of NEM:WA. Although the Minister of the Department of Mineral Resources (DMR) is the licensing authority for residue stockpiles and residue deposits, their management must be in accordance with the NEM:WA Regulations as prescribed by the Minister of the Department of Environmental Affairs (DEA). The list of Waste Management Activities that may require licensing in terms of NEM:WA include:

- 29 November 2013 (Government Notice (GN) 921, Government Gazette No 37083) List of waste management activities that have, or are likely to have, a detrimental effect on the environment,
- 24 July 2015 (Government Gazette GG 39020, GN: R632). Regulations regarding the planning and management of residue stockpiles and residue deposits[6];

Part 8 of Chapter 4 of the NEM:WA came into effect on the 2 May 2014 (Government Gazette 37547, Proclamation no. 26). This section of the NEM:WA pertains to land contamination where

[6] The requirements in terms of this regulation have been addressed in the various sections of this report.

"contaminated'', in relation to Part 8 of Chapter 4, means the "*presence in or under any land, site, buildings or structures of a substance or micro-organism above the concentration that is normally present in or under that land, which substance or micro-organism directly or indirectly affects or may affect the quality of soil or the environment adversely*". The NEM:WA requires the land owner to register land that is contaminated with the Department of Environmental Affairs (DEA).

Regulations and National Norms and Standards that have relevance to the planning and management of mine residues and stockpiles and general waste and contaminated land management include the following:

- Government Gazette No. 39020, GN: R632, 24 July 2015: deals with characterisation and classification of the residue; investigation and the selection of sites; design; assessment/prediction of impacts; analysis of risk relating to the management of residue stockpiles and deposits; duties of permit holders; monitoring and reporting; dust management; and decommissioning, closure and post-closure management.
- Government Gazette 41777, GN: 715, 18 July 2018: Waste Exclusion Regulations for the exclusion of a waste stream or portion of waste stream for beneficial use from the definition of waste.
- Government Gazette 41920, GN: R990, 21 Sep 2018: Amendment to GNR632 to allow for pollution control measures required for residue stockpiles and deposits to be determined on a case by case basis, based on a risk analysis conducted by a competent person.
- National Norms and Standards in Government Gazette No. 36784, 23 August 2013 for Waste Classification and Management (GN R364), Assessment of Waste for Landfill Disposal (GN R365) and Disposal of Waste to Landfill (GN R636).
- National Norms and Standards in Government Gazette No 37083, 29 November 2013 for Storage of Waste (GN 926). GN926 require that general and hazardous waste storage facilities that can handle in excess of 100 m^3 and 80 m^3 of waste continuously, respectively should be registered. Biannual internal audits and biennial external audits of the registered facilities against the requirements of GN926 are required. This has relevance to the salvage yard at Hackney shaft.
- National Norms and Standards in Government Gazette No. 37603, 2 May 2014 for Remediation of Contaminated Land and Soil Quality in the Republic of South Africa (GN331). A Site Assessment Report may be required for the land where the soil contamination is assessed in regard to the Norms and Standards.

5.5.4 National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM:AQA)

The main objectives of NEM:AQA are to protect the environment by providing reasonable legislative and other measures to:

- Prevent air pollution and ecological degradation;
- Promote conservation; and
- 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.

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.

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 ($mg/m^2/day$) 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 ($mg/m^2/day$) taken over a 30 day average (with no more than 2 exceedances per year, in non-sequential months).

The National Greenhouse Gas 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. In addition to this, the reporting system is part of South Africa's Intended Nationally Determined Contribution under the Paris Climate Accord. According to Annexure 1 of the regulations, Mogalakwena Mine is required to report according to activity 1A2i of Annexure 1. Mining is a key category for South Africa and thus reporting of emissions on either Tier 2 or Tier 3 is required. Mining has a specific stationary combustion category within the IPCC Regulations (1A2i Mining and Quarrying). However, emissions produced by a mining company are not all unique to this category of emissions. All stationary combustion emissions (from fuel use for example) should be reported in this sector.

5.5.5 The National Forestry Act, 1998 (Act No. 84 of 1998) (NFA)

The NFA protects against the cutting, disturbance, damage, destruction or removal of protected trees.

5.6 Municipal plans and policies

5.6.1 Mogalakwena Municipality Integrated Development Plan

The Mogalakwena Local Municipality (MLM) Integrated Development Plan (IDP) identified mining as the main economic contributer to the MLM. The IDP states industrial developments in the municipal area support the mining sector.

The IDP also identifies a number of environmental issues in the Mogalakwena area that are associated with mining. According to the IDP, mining activities in Mogalakwena predominantly take place in rural landscapes where biodiversity corridors occur.

5.7 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 Environment Way, which is governing framework for the management of environmental impacts for all environmental projects. The Board seeks assurance of compliance with the Anglo American Environment Way standards through regular self-assessments, peer review and third party audits.

The Anglo American Safety, Health and Environmental (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 mindset: 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;
- Non-negotiable standards and rules: common, non-negotiable;
- Environmental Performance Standards and Procedures shall be applied throughout the Group as a minimum requirement; and
- The Anglo American policies will guide and inform the study phase inputs.

5.7.1 Anglo American Platinum strategy and values

AAP'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. AAP has the following six company values (see Figure 5-1).

Figure 5-1: Anglo American Platinum Values

5.7.2 Anglo American Platinum environmental policy

Mogalakwena Mine is committed to the implementation of the AAP 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, AAP 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; and
- Respect people's culture and heritage.

5.7.3 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.

5.7.4 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.

5.7.5 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);
- 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.

Table 5-1 outlines the legislation applicable to the proposed Expansion Project.

Table 5-1: Policy and legislative context

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process);	**REFERENCE WHERE APPLIED** (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	**HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT** (e.g. In terms of the National Water Act: Water Use Licence has/has not been applied for).
Constitution of the Republic of South Africa, (No. 108 of 1996)	Throughout the scoping and EIA process	Chapter 2 – Bill of Rights Section 24 – Environmental rights The Constitution of South Africa is the overarching framework legalisation driving the NEMA principles and therefore EIA process. 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. The proposed activities shall be conducted in such a manner that significant environmental impacts are avoided, where significant impacts cannot all together avoided be minimised and mitigated in order to protect the environmental rights of South Africans
Minerals and Petroleum Resources Development Act 28 of 2002	Throughout the scoping and EIA process	The existing EMPrs and amendment to the EMPrs will be amended to include the proposed infrastructure and activities associated with the proposed Expansion Project. In addition to this, the potential impacts and management measures for these impacts have been assessed and provided in in Sections 18 and 29.
National Environmental Management Act (No. 107 of 1998)	Throughout the scoping and EIA process	Section 24 – Environmental Authorisation (control of activities which may have a detrimental effect on the environment) Section 28 – Duty of care and remediation of environmental damage Environmental management principles
		Mogalakwena Mine has EAs authorised under NEMA. The Expansion Project triggers activities listed in GNR 983 and 984 and require an EA from the DMR. According to GNR 982 of the NEMA, activities listed in GNR 984 require that a full S&EIA be undertaken
National Environmental Management Act, 1998 (Act 107 of 1998) and the EIA Regulations 2014 (Government Notice (GN) 984), as amended		**Applicable Listing Notice 1 (GNR983) activities:** **Activity 9**: The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water **Activity 10**: The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, wastewater, return water, industrial discharge or slimes

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process);	**REFERENCE WHERE APPLIED** (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	**HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT** (e.g. In terms of the National Water Act: Water Use Licence has/has not been applied for).
		Activity 12: The development of dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or infrastructure or structures with a physical footprint of 100 square metres or more, within 32m of a watercourse **Activity 19**: The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse **Activity 24**: The development of a road with a reserve wider than 13.5 meters, or where no reserve exists where the road is wider than 8 metres **Activity 27**: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation **Activity 34**: The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution **Activity 46**: The expansion and related operation of infrastructure for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes where the existing infrastructure **Activity 56**: Widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre **Applicable Listing Notice 2 (GNR984) activities:** **Activity 6**: The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent **Activity 15**: The clearance of an area of 20 hectares or more of indigenous vegetation **Activity 16**: The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the highwater mark of the dam covers an area of 10 hectares or more **Activity 17**: Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the MPRDA

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process);	**REFERENCE WHERE APPLIED** (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	**HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT** (e.g. In terms of the National Water Act: Water Use Licence has/has not been applied for).
Department of Environmental Affairs (DEA) Integrated Environmental Management Guideline Series, Guideline 5: Assessment of the EIA Regulations, 2012 (Government Gazette 805)	Throughout the scoping and EIA process	Environmental impacts will be generated primarily in the construction phase of this project with associated operational phase impacts. These potential impacts have been assessed as part the EIA, Section 18.
Integrated Environmental Assessment Guideline Series 11, published by the DEA in 2004		
Review in Environmental Impact Assessment, Integrated Environmental Management, Information Series 13, Department of Environmental Affairs and Tourism (DEAT), Pretoria.		An Environmental Impact Assessment has been undertaken for the proposed project as activities are triggered under GNR 983 and GNR 984
DEA 2017, Guideline on Need and Desirability, Department of Environmental Affairs, Pretoria, South Africa	Throughout the scoping and EIA process	The need and desirability guideline highlights the importance of establishing and assessing the need and desirability for a project. The consideration of need and desirability in the EIA decision making process requires the consideration of the strategic importance of the development alongside the broader societal need and public interests. A detailed need and desirability assessment has been undertaken as part of the Expansion Project and informed the summary provided in Section 7.
DEA 2017, Public Participation guideline in terms of NEMA EIA Regulations, Department of Environmental Affairs, Pretoria, South Africa	Throughout the scoping and EIA process	A comprehensive public participation process has been undertaken as part of the EA process associated with the proposed Expansion Project. Details relating to the public participation process is provided in Section 12.
National Water Act, 1998 (Act 36 of 1998)	Throughout the scoping and EIA process, including the WULA – pertaining to all water related aspects	Mogalakwena Mine water activities are authorised by two Water Use Licences (WULs) Licence No. 27059655 issued on 12 March 2007 and Licence No. 14/A61G/GICABJ/5053, issued 2 October 2017.In addition, Mogalakwena Mine submits annual IWWMPs to DWS. The Expansion Project will require Section 21 (c) and (i) and (g) water uses to be authorised. A WULA will be submitted to the DWS as part of the integrated environmental authorisation process for the proposed Expansion Project. The water uses being applied for includes the following: • Section 21 (c)Impeding or diverting the flow of water in a watercourse and Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse: All activities taking place within 500 m of a wetland or 100 m of a watercourse, including the diversion of the Sandsloot (Pholotsi) River will be licensed under Section 21 (c) and (i.) These activities include pipe bridge and gantry crossings

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		which will support tailings and dirty water pipelines as well as conveyors, powerlines and service roads; and • 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource: Due to the proposed mining activities, Additional Section 21(g) activities relevant for the Expansion project include the North WRD, PCD at the MNC , M3C, Bulk Ore Sorter Facility, the expansion of the existing approved Blinkwater 2 TSF and a number of ore stockpiles.
National Environmental Management Waste Act (Act No. 36 of 1998) (NEM:WA)	Throughout the scoping and EIA process	GNR 921 listed activities (Category B and C) are triggered by the proposed Expansion Project and requires a waste management licence (WML). The application for a WML forms part of the integrated environmental authorisation process for the proposed expansion project.
National Environmental Management Air Quality Act (Act No. 39 of 2004) (NEM:AQA) including the National Greenhouse Gas emission reporting regulations (Notice 275 of 2017)	Throughout the scoping and EIA process Air quality assessment	Air quality management: • Section 32 – Dust control • Section 35 – Control of offensive odours An air quality emissions licence (AEL) is not required as part of the proposed expansion project.
The National Forestry Act, 1998 (Act No. 84 of 1998) (NFA)	Throughout the scoping and EIA process Biodiversity assessment	The NFA protects against the cutting, disturbance, damage, destruction or removal of protected trees. If any protected tree species need to be removed as part of the proposed Expansion Project, a tree removal permit will need to be applied for from the Department of Agriculture, Forestry and Fisheries (DAFF).
The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA)	Throughout the scoping and EIA process Biodiversity Assessment	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. The Act provides for listing of threatened or protected ecosystems, in one of four categories: critically endangered, endangered, vulnerable or protected. During the EIA process, biodiversity hotspots and bio-regions have been investigated to determine the potential impacts that the project may have on the receiving environment. The management and control of alien invasive species on the impacted areas during all the phases of the project will be governed by the

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process);	**REFERENCE WHERE APPLIED** (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	**HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT** (e.g. In terms of the National Water Act: Water Use Licence has/has not been applied for).
		NEM:BA. The NEM:BA ensures that provision is made by the site developer to remove any alien species, which have been introduced to the site or are present on the site
Mine Health Safety Act, 1996 (Act No. 29 of 1996) (MHSA)		The Mine Health and Safety Act (Act No. 29 of 1996) (MHSA) aims to provide for protection of the health and safety of all employees and other personnel at the mines of South Africa The proposed project is located within a mining area and Mogalakwena Mine will therefore need to ensure that employees, contractors, sub-contractors and visiting personnel, adhere to this Act and subsequent amendment regulations on site
Environment Conservation Act, (Act No. 73 of 1989) (ECA)	Throughout the scoping and EIA process Specialist studies	The ECA (Act 73 of 1989) was, prior to the promulgation of the NEMA, the backbone of environmental legislation in South Africa. To date the majority of the ECA has been repealed by various other acts, however Section 25 of the Act and the noise regulations (GNR 154 of 1992) promulgated under this section are still in effect. These regulations serve to control noise and general prohibitions relating to noise impact and nuisance. It requires the landowner to manage agricultural resources i.e. the removal of invasive species, protect soils against water and wind erosion and manage of water resources.
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	Throughout the scoping and EIA process Biodiversity Assessment	Control measures for erosion Control measures for alien and invasive plant species
National Heritage Resources Act 25 of 1999 (NHRA)	Heritage assessment	Numerous heritage assessments have historically been undertaken within the Mogalakwena Mine area. The location identified heritage sites associated with the proposed project have been included in Figure 14-20 and A composite map and summary table of all the archaeological and cultural heritage sites identified within the Mogalakwena Mine mining right area to date is shown in Appendix 10.
The World Heritage Convention Act, (Act No. 49 of 1999) (WHCA)	Heritage assessment	South Africa became a signatory to and ratified the World Heritage Convention, 1972 (WHC) in 1997. It thereby voluntarily agreed to identify and conserve world heritage areas of universal value for the benefit of mankind. South Africa currently has eight world heritage sites (WHS) in its territory. Governance of these sites is regulated in terms of an extensive legal framework, mainly consisting of environmental and incidental laws. The primary act is the World Heritage Convention Act (WHCA) which incorporated the WHC into South African law. It

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		provides for the recognition, establishment and management of WHS in South Africa Baseline permits will be required for the destruction or removal of any heritage resources affected by the development; this will include all buildings and graves that will be impacted by this project
Spatial Planning and Land Use Management Act, (Act No. 16 of 2013) (SPLUMA)	Throughout the scoping and EIA process	The Spatial Planning and Land Use Management Act (Act 16 of 2013) (SPLUMA) was promulgated in May 2015 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.
The Promotion of Administrative Justice Act, (Act No. 3 of 2000) (PAJA)	Throughout the scoping and EIA process	This Act gives effect to the constitutional right to administrative action that is lawful, reasonable and procedurally fair. It also gives effect to the right to written reasons for administrative action as contemplated in section 33 of the Constitution. The Act aims to promote an efficient administration and good governance and to create a culture of accountability, openness and transparency in the public administration or in the exercise of a public power or the performance of a public function by giving effect to the right to just administrative action. In terms of the Act, administrative action which materially and adversely affects the rights or legitimate expectations of any person must be procedurally fair. "Administrative action" as defined in section 1 of PAJA means any decision taken, or any failure to take a decision, by- (a) an organ of state, when (i) exercising a power in terms of the Constitution or a provincial constitution; or (ii) exercising a public power or performing a public function in terms of any legislation; or (b) a natural or juristic person, other than an organ of state, when exercising a public power or performing a public function in terms of an empowering provision, which adversely affects the rights of any person and which has a direct, external legal effect, excluding certain classes of executive, legislative and quasi-judicial functions set out in the act

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process);	**REFERENCE WHERE APPLIED** (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	**HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT** (e.g. In terms of the National Water Act: Water Use Licence has/has not been applied for).
		The public participation process will be undertaken in line with the NEMA requirements throughout the authorisation process to keep registered stakeholders notified of the process and any decisions taken by the competent authorities.
The Promotion of Access to Information Act, (Act No. 2 of 2000) (PAIA)	Throughout the scoping and EIA process	This Act gives effect to Section 32 of the Constitution by providing mechanisms to ensure access to certain information held by a public body as well as to information held by private bodies (in the latter case, as long as this information is required in order to exercise or protect any rights). The act allows for access to records, regardless of when such records came into existence. The Act specifically retains Sections 31 (1) and (2) of NEMA which also deal with access to information from a public or private body. While the Act confers specific rights of access to information, I&APs should not forego the normal public participation process and only try to obtain information through the PAIA provisions. Registered I&APs have specific rights (and responsibilities) in terms of being afforded an opportunity to "access" all the information to provide comments and to be informed of the outcome. The public participation process have been undertaken in line with the NEMA requirements throughout the authorisation process to keep registered I&APs notified of the process and any decisions taken by the competent authorities.
Noise standards	Throughout the construction and operation phases	There are a few South African Scientific Standards (SABS) relevant to noise from mines, industry and roads. They are: South African National Standard (SANS) 10103:2008. The measurement and rating of environmental noise with respect to annoyance and to speech communication • SANS 10210:2004. Calculating and predicting road traffic noise • SANS 10328:2008. Methods for environmental noise impact assessments • SANS 10357:2004. The calculation of sound propagation by the concave method • SANS 10181:2003. The measurement of noise emitted by road vehicles when stationary • SANS 10205:2003. 'The measurement of noise emitted by motor vehicles in motion' A noise specialist study was undertaken to assess the potential impact associated with the proposed Expansion Project.

6 Description of the Scope of the Proposed Overall Activity

This section presents a description of the proposed activities associated with the Expansion Project. The relevant listed activities in terms of NEMA, which are trigged by each of the proposed project activities have also been indicated and described. The position of the listed activities is provided in Figure 6-1.

6.1 Listed and specified activities

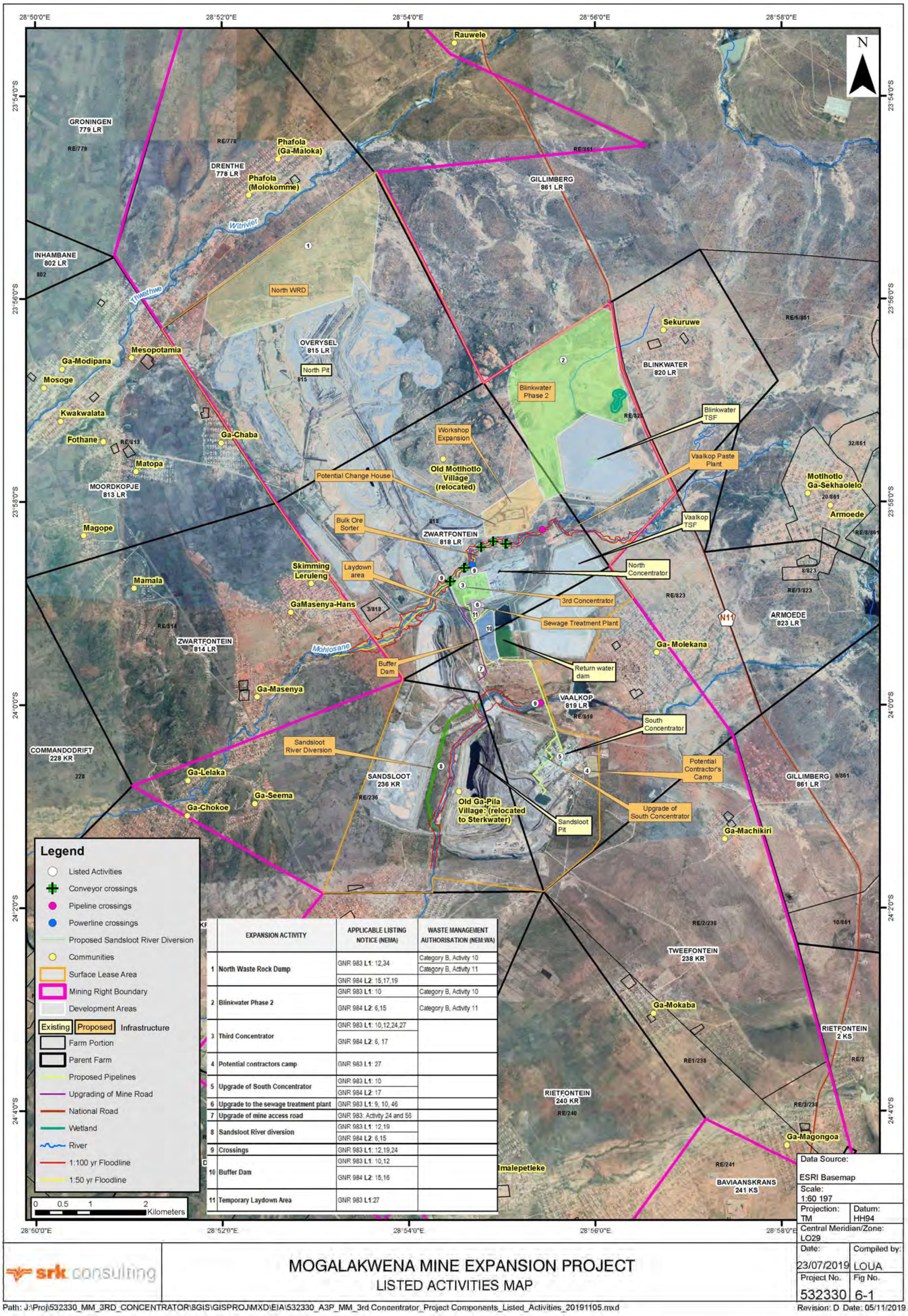
The listed activities associated with the proposed Expansion Project is provided in Table 6-1 and is shown in Figure 6-1 and Appendix 11.

Table 6-1: Listed Activities

NAME OF ACTIVITY (All activities including activities not listed) (e.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors.)	**AERIAL EXTENT OF THE ACTIVITY** Ha or m²	**LISTED ACTIVITY** Mark with an X where applicable or affected.	**APPLICABLE LISTING NOTICE** (GNR 544, GNR 545 or GNR 546)/NOT LISTED
Construction and operation of a M3C plant and associated infrastructure including crusher and bulk ore sorting facility[7]	Approximately 42 ha	X	GNR 983: Activity 10,12,24 and 27 GNR 984: Activity 6 and 17
Establishment of the North WRD, ore stockpiles and associated haul roads	Approximately 210 ha	X	GNR 983: Activity 12, 19, 24 and 34 GNR 984: Activity 15 and 17
Construction of a buffer dam to store mine-related process water. The proposed buffer dam will include a pipeline system connecting the buffer dam with the M3C, RWDs of the Vaalkop TSF and Dam 1160	Approximately 30 ha	X	GNR 983: Activity 10 and 12 GNR 984: Activity 15 and 16
Expansion of the NEMA approved, but not constructed, footprint of Blinkwater 2 TSF of the NEMA approved, to provide additional capacity to support the development of the M3C. A paste plant may also be constructed to the north of the Vaalkop TSF	Approximately 245 ha (Previously approved area 160 ha)	X	GNR 983: Activity 10 GNR 984: Activity 6 and 15
Upgrade of the existing MSC plant and associated infrastructure to assist with increasing the current crushing capacity of the MSC and will include a conveyor system (and associated maintenance road), crushing and screening operations	Approximately 3.5 ha	X	GNR 983: Activity 10 GNR 984: Activity 17
Upgrade of the existing STP at the contractor's camp and the North STP	Approximately 0.2 ha	X	GNR 983: Activity 9,10 and 46
Expansion of workshop area to accommodate anticipated increase in mining equipment and associated mining equipment assembly areas	Approximately 0.9 ha		
Establishment of a temporary lay-down area for contractors to support the construction phase to be located between the M3C and the buffer dam	Approximately 2 ha	X	GNR 983: Activity 27
Potential contractor's camp as a temporary accommodation facility to be used during the construction phase	Approximately 7 ha	X	GNR 983: Activity 27
Upgrade of mine access road Upgrade of the access road from the Bakenberg Road turnoff (going toward the MNC) to the M3C area to manage traffic congestion during the construction	Approximately 4 ha	X	GNR 983: Activity 24 and 56

[7] During the scoping phase the need for a bulk ore sorting facility was identified, to be located in close proximity to the third concentrator. The impacts associated with the ore sorting and stockpile facility have been assessed during the impact assessment phase

NAME OF ACTIVITY (All activities including activities not listed) (e.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors.)	**AERIAL EXTENT OF THE ACTIVITY** Ha or m²	**LISTED ACTIVITY** Mark with an X where applicable or affected.	**APPLICABLE LISTING NOTICE** (GNR 544, GNR 545 or GNR 546)/NOT LISTED
Realignment of approved Sandsloot (Pholotsi) River diversion and application for Water Use Licence	Approximately 15 ha	X	GNR 983: Activity 12 and 19
			GNR 984: Activity 6 and 15
Linear infrastructure Watercourse crossings and diversions associated with new activities Conveyor crossings over the Mohlosane River near the proposed M3C and Bulk Ore Sorting Facility	Approximately 0.65 ha	X	GNR 983: Activity 12, 19 and 24



	EXPANSION ACTIVITY	APPLICABLE LISTING NOTICE (NEMA)	WASTE MANAGEMENT AUTHORISATION (NEM:WA)
1	North Waste Rock Dump	GNR 983 L1: 12,34	Category B, Activity 10
			Category B, Activity 11
		GNR 984 L2: 15,17,19	
2	Blinkwater Phase 2	GNR 983 L1: 10	Category B, Activity 10
		GNR 984 L2: 6,15	Category B, Activity 11
3	Third Concentrator	GNR 983 L1: 10,12,24,27	
		GNR 984 L2: 6, 17	
4	Potential contractors camp	GNR 983 L1: 27	
5	Upgrade of South Concentrator	GNR 983 L1: 10	
		GNR 984 L2: 17	
6	Upgrade to the sewage treatment plant	GNR 983 L1: 9, 10, 46	
7	Upgrade of mine access road	GNR 983: Activity 24 and 56	
8	Sandsloot River diversion	GNR 983 L1: 12,19	
		GNR 984 L2: 6,15	
9	Crossings	GNR 983 L1: 12,19,24	
10	Buffer Dam	GNR 983 L1: 10,12	
		GNR 984 L2: 15,16	
11	Temporary Laydown Area	GNR 983 L1:27	

Figure 6-1: Listed activities map

6.2 Description of the activities to be undertaken

It is the intention of Mogalakwena Mine to expand its existing operations and add additional infrastructure to its operations to improve production capacity and therefore the EMPrs and associated environmental authorisations (EA) need to be amended. The proposed expansion will be located within Mogalakwena Mine's mining right and surface lease areas on the remaining extent of portions 0 of the farm Blinkwater 820 LR and Portions 0 of the farms Overysel 815 LR, Zwartfontein 818 LR, Vaalkop 819 LR and Sandsloot 236 KR. The proposed Expansion Project entails key infrastructure and activities and associated secondary infrastructure as described in Section 6 and shown in Figure 6-2. The proposed project components will be located within the mining right and surface lease areas of Mogalakwena Mine. A summary of the design criteria associated with the expansion of the Blinkwater 2 TSF, North WRD, Buffer Dam and the Groot Sandsloot River Diversion is provided in the section below and detailed engineering design reports associated with the proposed expansion project, where applicable, will be submitted to DWS as part of the WULA.

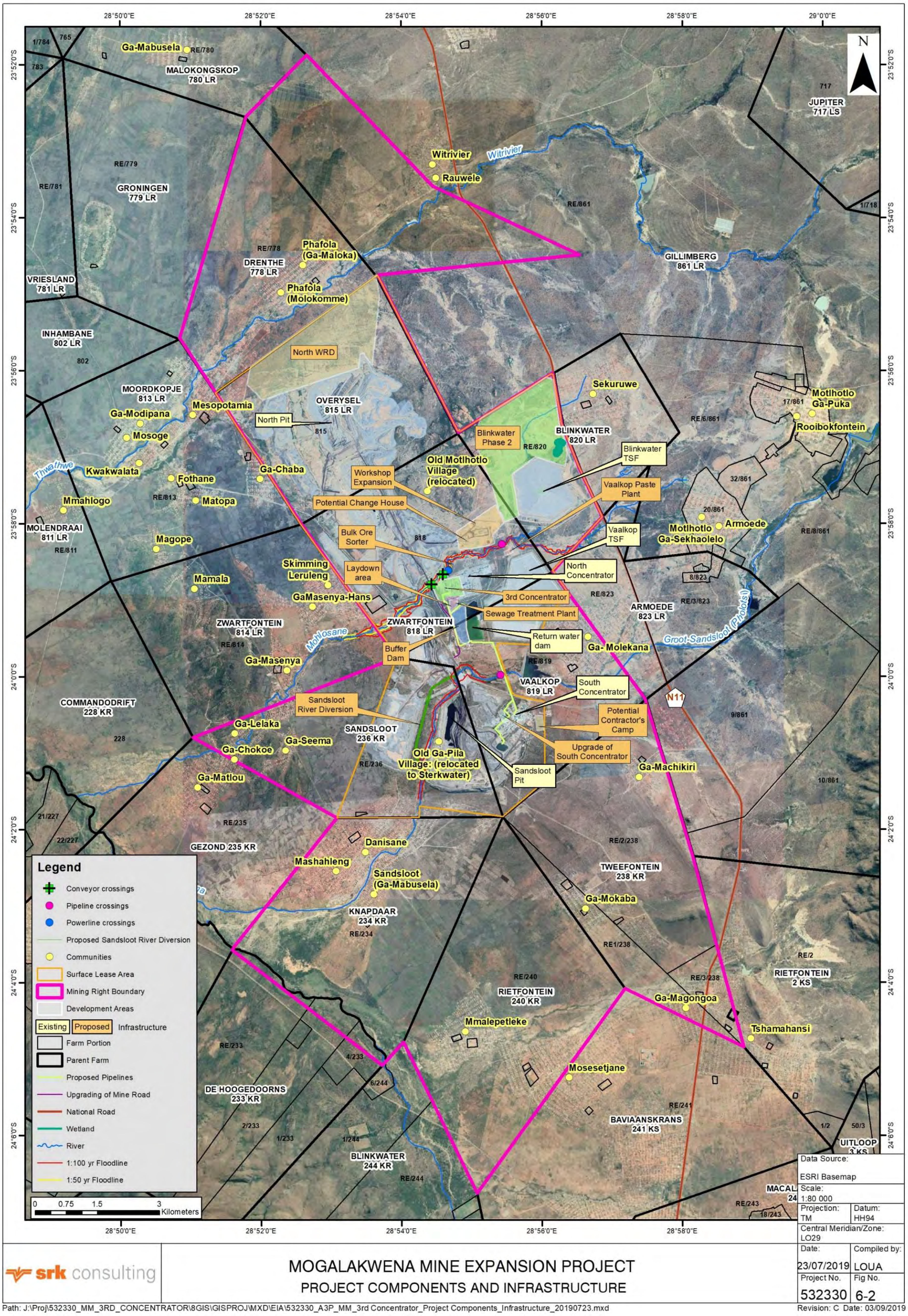


Figure 6-2: Project components and infrastructure

6.2.1 Key expansion project infrastructure

Mogalakwena Third Concentrator and Bulk Ore Sorting Facility

Third Concentrator

The proposed M3C is designed to treat a total of 15 Mtpa of Platreef ore and will operate 365 days a year, for 7 days a week and 24 hours a day. The plant will have a footprint of approximately 31 ha and will be located in a disturbed area, adjacent to the MNC. The plant will be fully automated, including a high level of instrumentation, automatic pump changeover stations and dedicated pipelines.

The process within the plant will consist of a four-stage crushing and screening circuit followed by a milling, flotation and solids-liquid separation processes to produce final concentrate and final tails streams. Depending on water efficiencies, a paste plant may be required in the future and will potentially be located in close proximity to the Vaalkop TSF to enable the continued deposition of tailings to the Vaalkop TSF.

The M3C will have the following associated infrastructure:

- Crushers;
- Storage stockpiles;
- Storage silos;
- Storage bins;
- Screening;
- Floatation;
- Final concentrate filtration;
- Final tails thickeners;
- Pipelines;
- Conveyor systems;
- River crossing; and
- Access road

In addition to the above, a high-grade ore stockpile will be constructed adjacent to the MNC high grade stockpile and the existing North Mine access road will be realigned to create space for the new primary crusher.

Due to the extent and position of the M3C, the existing Pollution Control Dam (PCD) associated with the MNC Plant will need to be relocated and a new PCD will be constructed as part of the establishment of the proposed M3C to accommodate run-off from the existing MNC and the M3C. The PCD will be approximately 200 000 m3.

The existing PCD associated with the MNC will remain in operation until the new PCD has been constructed and commissioned, which will collect and store dirty water runoff from the North and M3C.

Bulk Ore Sorting Facility

In addition to the proposed M3C, the requirement for a bulk ore sorting facility is required. The bulk ore sorting facility will be located north of the proposed M3C within the area where the proposed MNC De-Bottlenecking Plant was authorised. The purpose of the bulk ore sorting facility is to perform accurate grade control by classifying mined ore based on its composition. Lower grade ore or waste will be diverted to stockpiles from where it will be transported to existing low grade ore stockpiles or WRDs.

The four low grade ore stockpiles will be located north and north-west of the existing MNC stockpile and proposed new M3C. The design of the ore stockpile includes a platform on which the ore will be stockpiled will be made up of an engineered fill sloped towards the concrete lined channels. Channels have been designed around the new stockpiles, which will also act as a passageway, large enough to allow vehicles to travel around the stockpile areas. This ring road collects stormwater from the stockpile areas, discharges it into the main channel, before continuing to discharge into the PCD through silt traps. The dirty water channels were designed to convey dirty water runoff from the stockpile areas to the PCD, thereby preventing dirty water from entering and polluting the natural environment. All Channels have been designed as trapezoidal concrete lined channels. The channels were sized to accommodate a 1:50-year storm event.

The ore sorter consists of scanners that measure the grade of ore and distributes the ore to one of four stockpiles situated to the north of the M3C. Initially the rejected material will be diverted to a smaller stockpile and removed by front end loaders and trucks to the low grade ore stockpiles or the WRDs. Each of the larger three stockpiles will have an associated conveyor and service road crossing the Mohlosane River. The river crossings associated with the M3C include five conveyor crossings and associated service roads, two powerlines and one gantry carrying the tailings slurry and tailings return water pipelines. A haul road will also be required adjacent to the existing north mine access road for the transportation of material from the proposed bulk ore sorting facility.

The proposed layout of the M3C and the bulk ore sorting facility is provided in Figure 6-3.

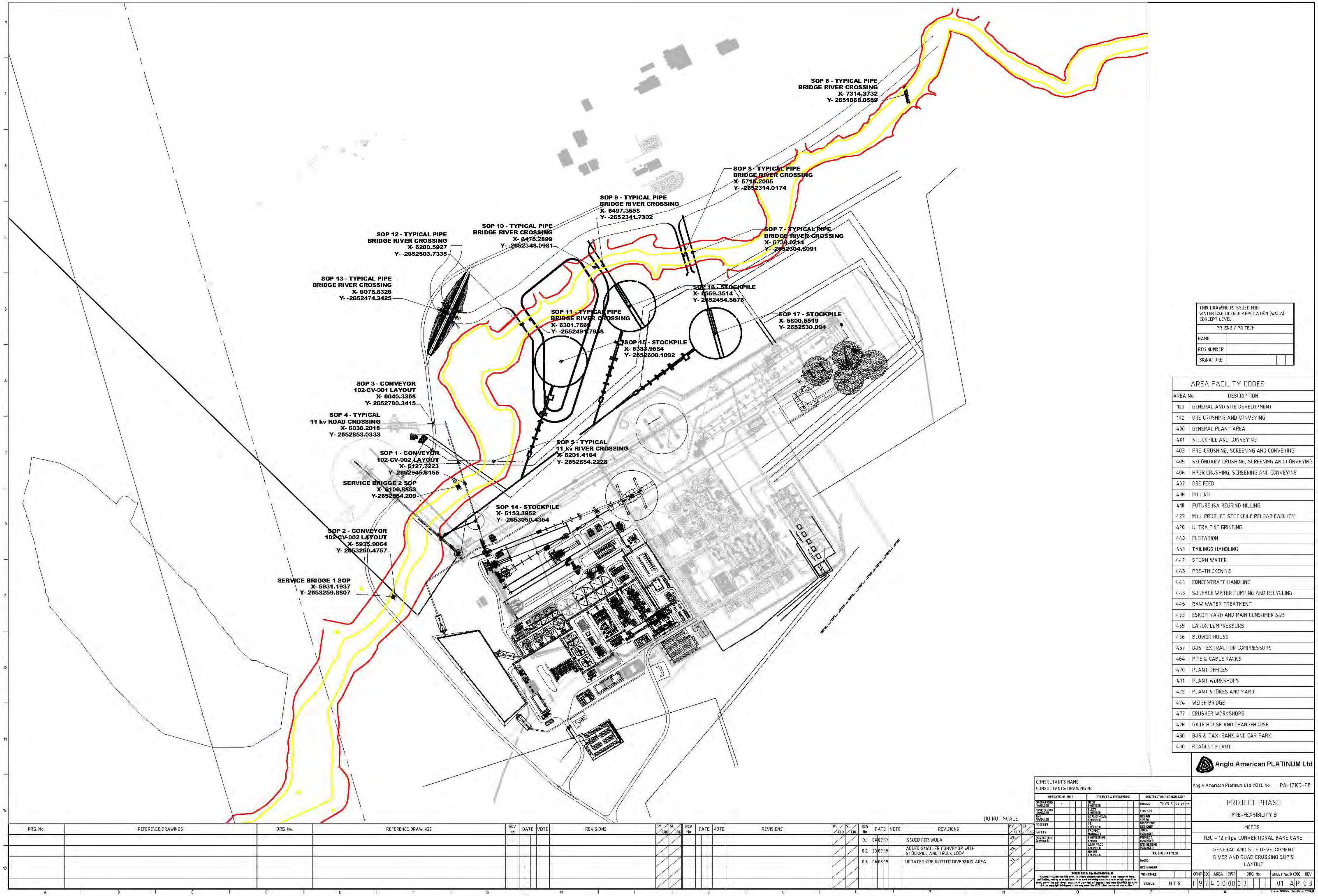


Figure 6-3: Proposed Layout of the M3C and Bulk Ore Sorter

Blinkwater 2 TSF expansion

The expansion of the Blinkwater 2 TSF, including associated additional water management infrastructure will provide additional tailings storage capacity to support the M3C. The Blinkwater 2 TSF is proposed to be located directly north of the existing Blinkwater 1 TSF. The TSF will have an approximate footprint (includes associated infrastructure) of 245 ha. Any pipelines required in respect of the Blinkwater 2 TSF expansion will follow existing pipe routes. As detailed in the Blinkwater 2 TSF Design Report, the proposed TSF have been designed making use of the design criteria summarised in Table 6-2. The proposed layout of the Blinkwater 2 TSF is provided in Figure 6-4.

Table 6-2: Design criteria for Blinkwater 2 TSF expansion

Item	Value/Description
Tailings produced	
M3C	15 mtpa
TSF's closure elevation	
Blinkwater 2 TSF	1,234 mamsl waste rock impoundment, 1,233 mamsl interface material and 1,232 mamsl tailings
Tailings parameters/characteristics	
Grading of target tailings	The tailings that will be produced by the M3C will be similar to that produced by the MNC
Specific gravity of solids	3.014
Slurry density (t/m^3)	1.45
Solids concentration (%)	46
Cohesion (kPa)	0
Friction angle (degrees)	33
In-situ dry density (t/m^3)	1.7
Permeability (m/s)	$4x10^{-8}$
Blinkwater 2 TSF geometry	
BW2 TSF tailings surface basin area	1,628,783 m^2
BW2 TSF total surface area (tailings and waste rock impoundment)	2,345,047 m^2
General	
BW2 TSF slope geometry	1(v) in 2.4 (h) overall slope
BW2 TSF's return water	Conveyed to the Buffer Dam
Construction method	Downstream rock impoundment similar to Blinkwater 1 TSF
Design factor safety	1.5

Blinkwater 2 TSF expansion barrier system

The proposed barrier system for Blinkwater 2 TSF aims to provide equivalent protection to that prescribed by a landfill engineered with a Class C barrier system. The alternative barrier design components aim to align with both the minimum requirements as well as the site-specific constraints.

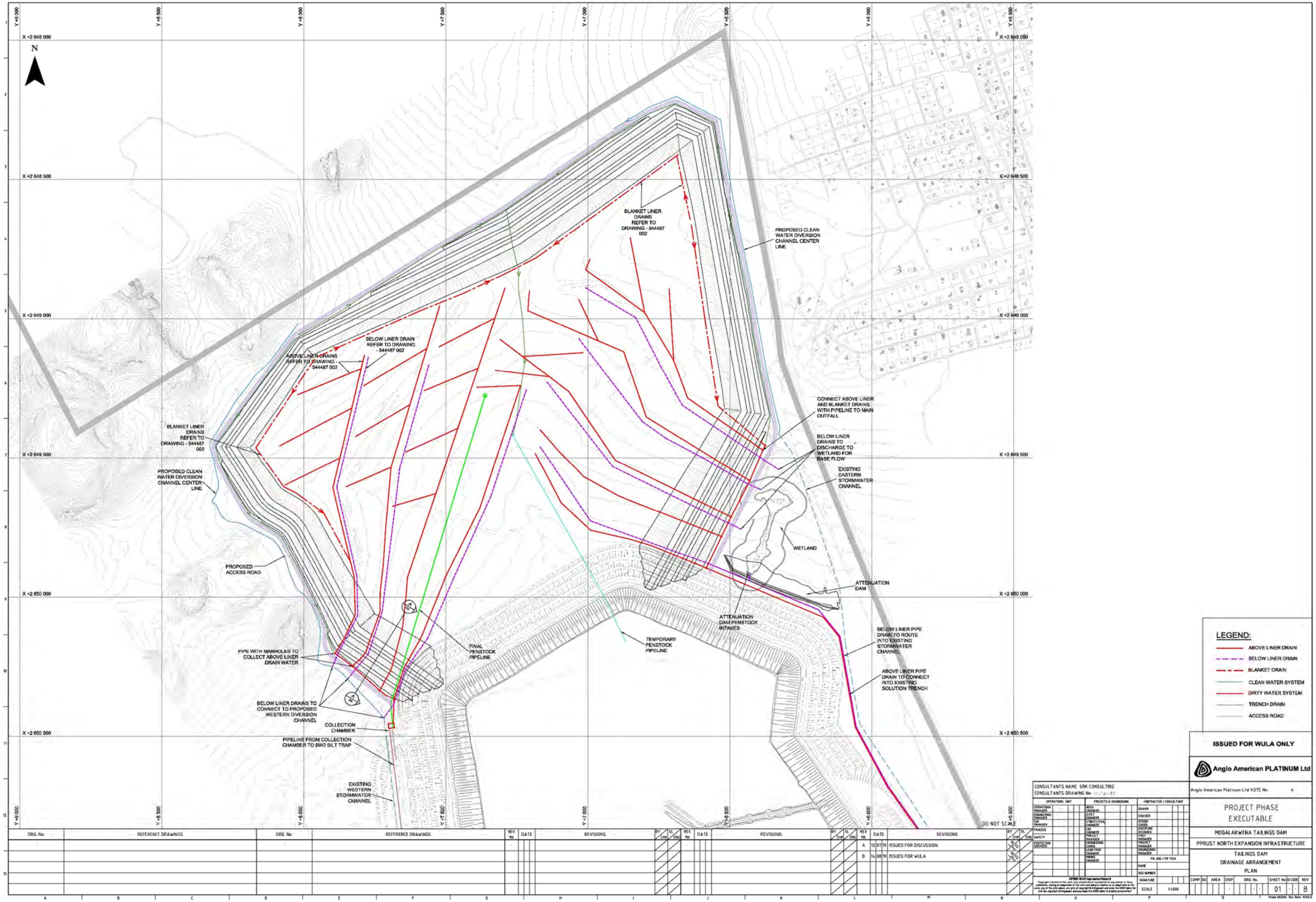


Figure 6-4: Proposed layout of the Blinkwater 2 expansion TSF

The TSF barrier system designs are based on the following design criteria/philosophy:

- Redundancy built into the over liner drainage system is to allow for unforeseen blockages;
- The HDPE geomembrane will be installed directly onto 200 mm - 300 mm layer of fine tailings or acceptable alternative, placed on a prepared surface. The fine tailings material is proposed as an alternative bedding layer due to the scarcity or minimal availability of clayey soils, free of gravel, on site;
- In the place of the minimum required 1,500 µm (1.5 mm) and 300 mm compacted clay barrier, a 2,000 µm (2 mm) thick HDPE geomembrane will be used to provide equivalent/better barrier protection than the minimum requirements;
- Double textured HDPE will be used to enhance stability; and,
- Bedding materials are required to have no particles > 2 mm according to SANS 1526.

Blinkwater 2 TSF expansion decant water

The decant water from the Blinkwater 2 TSF expansion will decant via pipelines to the proposed Buffer Dam, which has been sized to be able to contain the runoff from the expanded area.

North WRD and ore stockpile area

An area located north of the current North Open Pit area has been earmarked for the development of an additional WRD, North WRD, that will provide additional storage capacity for the placement of waste rock generated by the current mining operation. The new North WRD will include:

- Water management infrastructures to manage surface water runoff from the site;
- Haul roads to the proposed North WRD to be located between the North Open Pit and the proposed WRD; and
- Ore stockpiles to be placed in the area between the edge of the existing North open pit and the proposed WRD area.

The North WRD will cover an area of approximately 140 ha (210 ha inclusive of associated haul roads) and will also include water management infrastructures to manage surface water runoff from the site. The North WRD will be placed outside of the 1:100 year floodline of the Witrivier. The design specifications of the North WRD is provided in Table 6-3 and the North WRD, haul roads and ore stockpile area is shown in Figure 6-5.

Table 6-3: Design specifications of the proposed North WRD

Volume	21 000 000 m^3 (per year)
Slope Geometry	Total Height: 60 m
	Slope Angle: 29°
	Berm Width: 10 m
	Bench Face Angle: 37°
	Bench Height: 15 m

The results of the 2018 Waste Classification, indicate that the samples from both, ore stockpile and WRD fall within the category TC≤TCT1 AND LCT0 < LC<LCT1 and are classified as Type 3 waste requiring a Class C or Class C equivalent barrier system.

Based on the assessment of the waste rock material, the material is not considered a risk in terms of leachability of the listed metals and the conditions that would prevail if the waste rock is reused. This motivates the material to be defined as per Section 7(2)(e) of the Norms and Standards as Type 4 waste based on the scenarios provided and actual conditions found on site

A WUL is being applied for as part of the proposed expansion project which include the design of the proposed North WRD including water management for the North WRD ensure that all dirty water is contained within the WRD area. The following stormwater controls as shown in Figure 6-6 and Figure 6-7; are included in the design:

- Paddock system along the north, west and eastern extents of the proposed North WRD to prevent any surface water runoff from the WRD flowing into the Witrivier. The dirty water collected in the paddocks will evaporate;
- A clean water canal is envisaged along the north of the WRD to divert clean water into the Witrivier;
- Due to the possibility of precipitation infiltrating into the WRD and seeping into the ground water beneath the WRD, a series of drainage trenches are proposed beneath the WRD to divert infiltration to the dirty water disposal system and limit seepage into the ground water system; and
- The proposed drainage trenches will make use of gravity flow which will assist in providing a preferred path for the infiltrated precipitation to flow. The drainage trenches will act as a preferred drainage path and redirect the seepage to the dirty water disposal system.

The diversion trench proposed is a simple construction. The trench is excavated using an excavator. The material excavated is then used to construct a safety berm which will assist with containment of larger waste rock. The diversion trench will require routine maintenance..

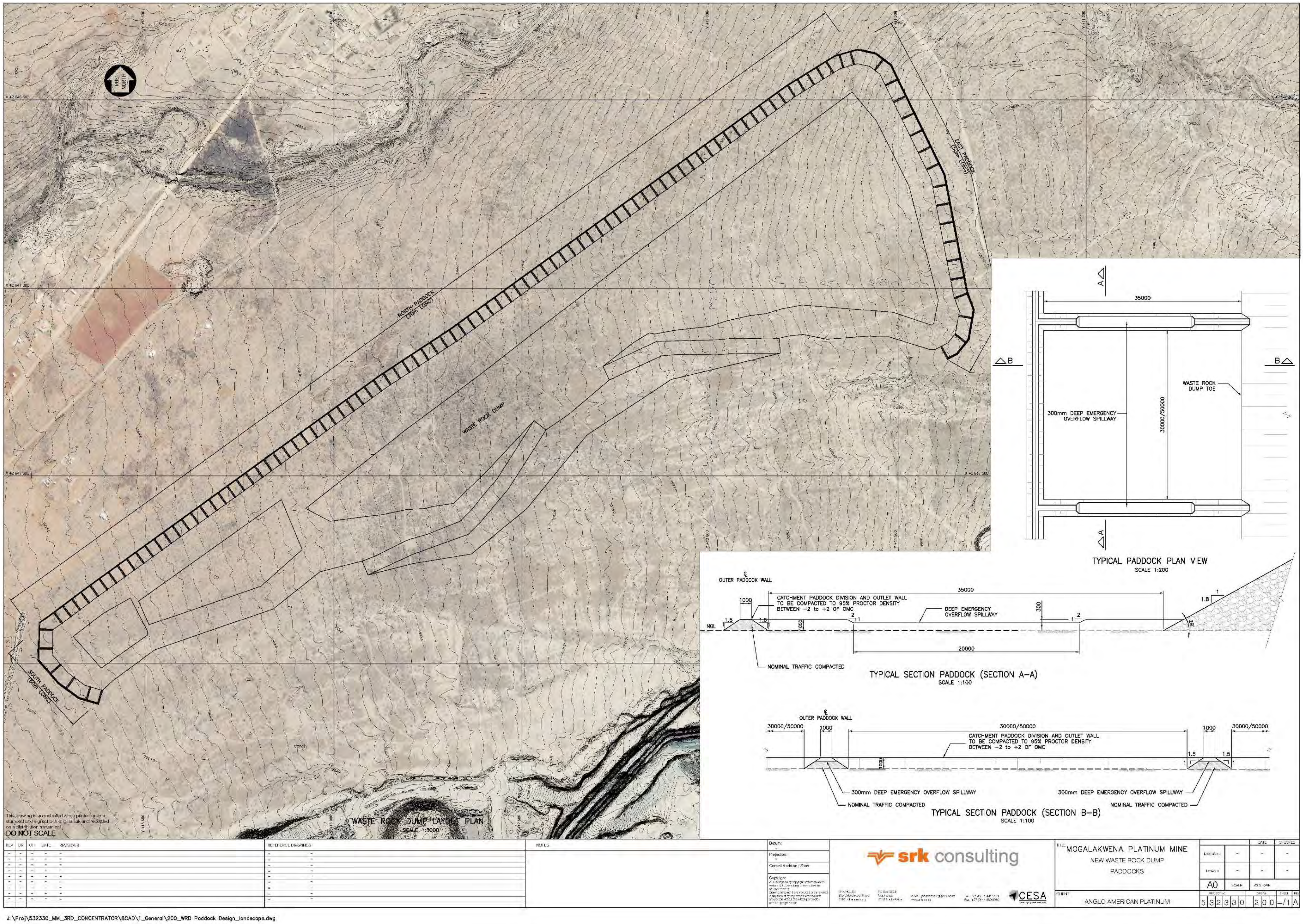


Figure 6-5: Proposed layout of the North WRD and Ore Stockpile Area

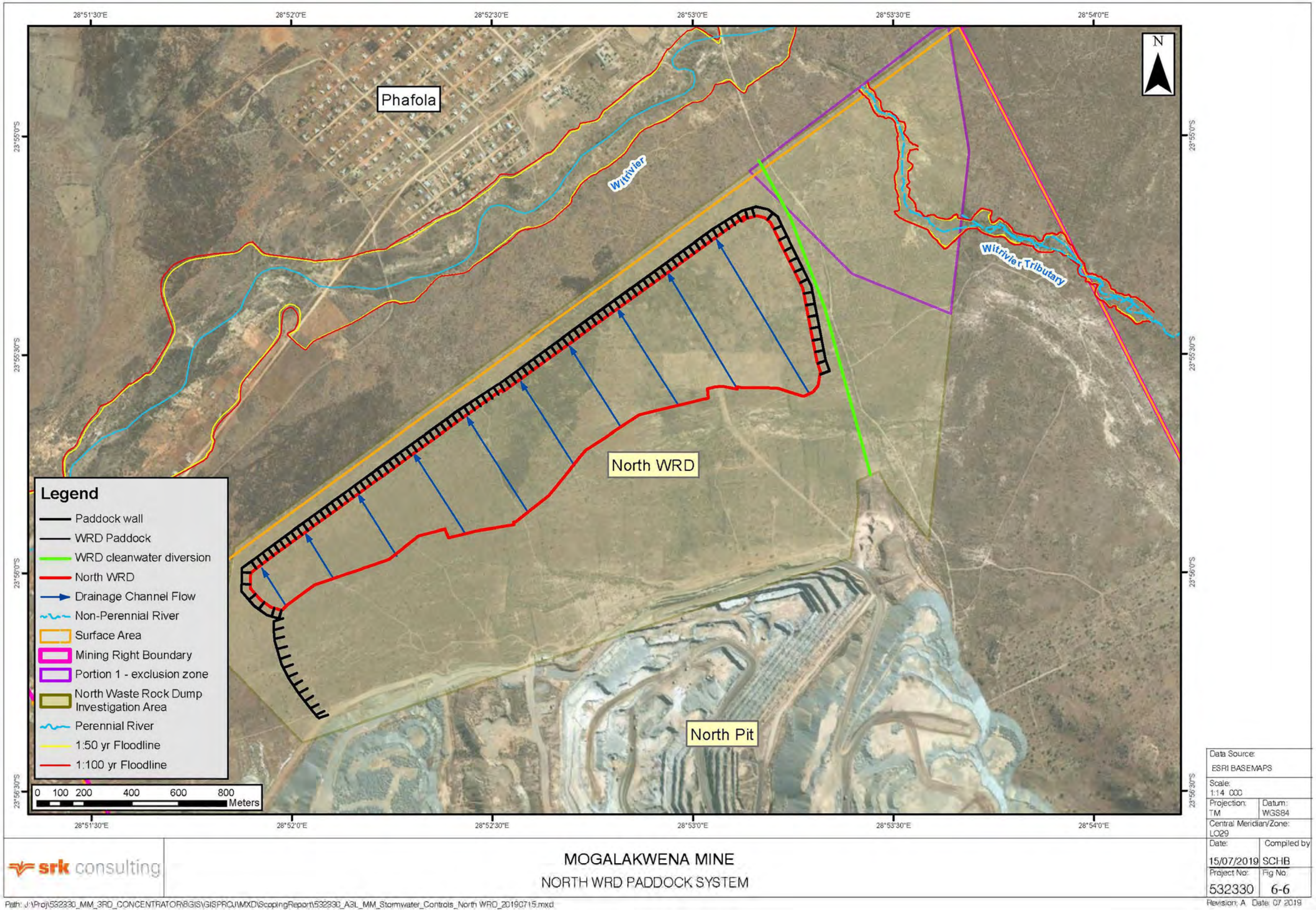


Figure 6-6: North Waste Rock Dump paddock system

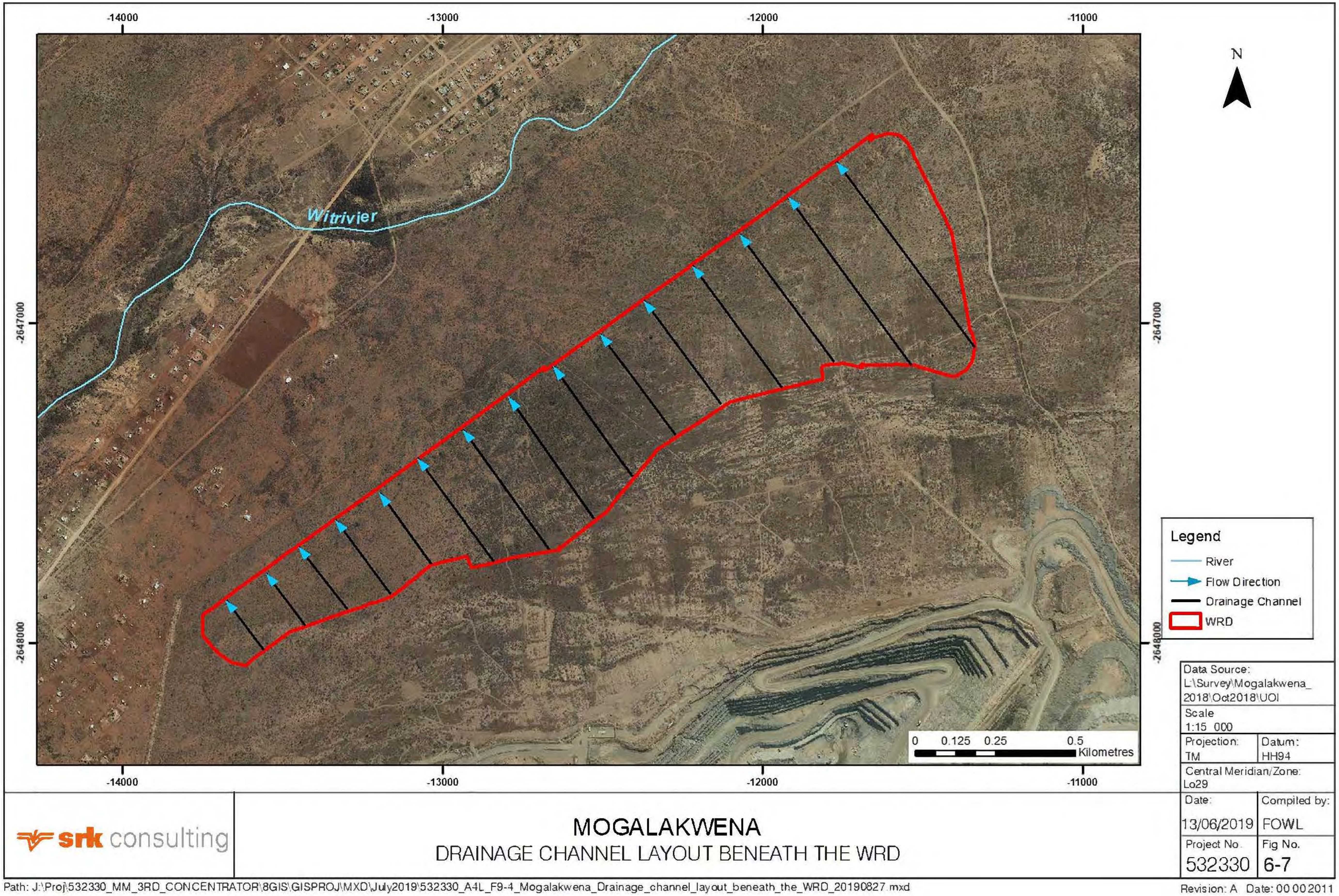


Figure 6-7: Drainage channel layout beneath the WRD

6.2.2 Support infrastructure

Buffer dam

An additional 1.5 Mm^3 water storage dam will be located west of the Vaalkop RWDs associated with the Vaalkop TSF. The purpose of the Buffer Dam will be to manage and where possible store water from various sources for utilisation in the dry season, due to the potential variable regional climate, which may result in an increase in magnitude and frequency of flood events during the wet season. The Buffer Dam will therefore assist in minimising the use of raw water and optimising water re-use across the mining operations, including the proposed M3C.

The Buffer Dam will receive and store water from the following sources:

- Pit water (combination of surface water runoff and groundwater ingress collected within the open pit areas).
- Treated sewage effluent from the Polokwane and Mokopane Sewage Treatment Plants, via an extension to the existing pipeline system. Currently, Mogalakwena Mine utilises Dam 1160 (an existing dirty water dam) for the storage of the treated sewage effluent. The storage of treated sewage effluent will be balanced between Dam 1160 and the new buffer dam;
- Return water from the Mogalakwena Mine TSF's including the proposed Blinkwater 2 TSF and;
- Runoff water collected within the plant and mining areas.

It is anticipated that the buffer dam will be a lined facility consisting of either one or two compartments and silt traps, with a pipeline system connecting the buffer dam with the M3C, RWDs of the Vaalkop TSF and Dam 1160. Other relevant design criteria associated with the proposed buffer dam is included in Table 6-4.

Table 6-4: Buffer dam design criteria

Description	Criteria
Dam type	Lined earth embankment
Dam Capacity	1 500 000 m^3
Liner design life	Approximately 20 years
Crest width	5m
Proposed Upstream Slope (V:H)	1:3 (as per slope stability assessment)
Proposed Downstream Slope (V:H)	1:3 (as per slope stability assessment)
Compartments	1
Maximum Wall Height (m)	7.8
Maximum Water Depth (m)	10.8
Freeboard	0.8m (min)
Spillway	Concrete
Proposed Liner System	Class C Barrier (as determined by the geochemical analysis)
Leakage Detection System	Yes (primary and secondary)

The construction of the buffer dam will eliminate the need for the new RWD that will be required for Blinkwater 2 TSF expansion (i.e. the buffer dam will be used as an additional RWD). Water would overflow from the existing RWD's into the buffer dam. The layout of the proposed buffer dam is shown in Figure 6-8.

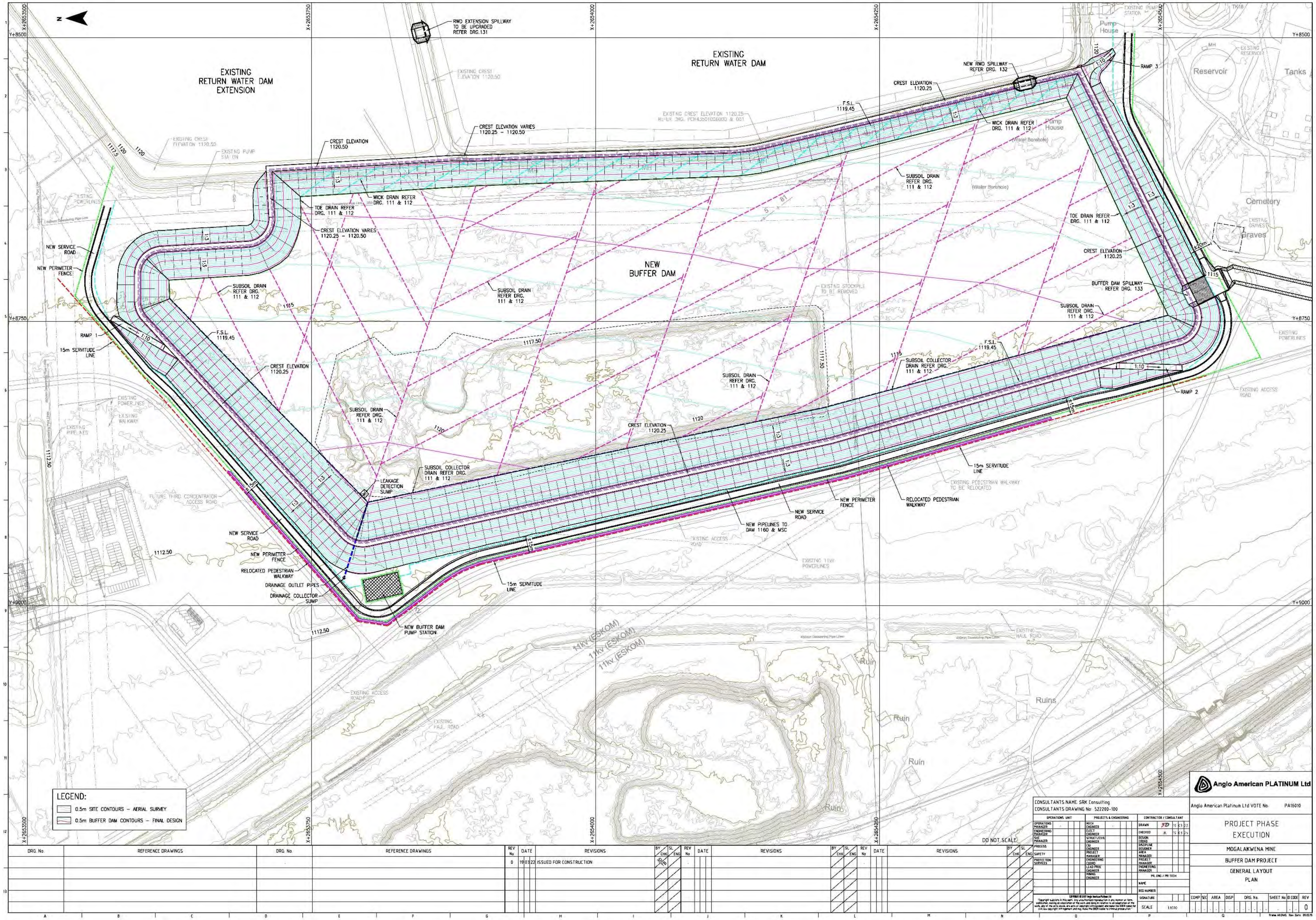


Figure 6-8: Proposed Buffer Dam Layout

Upgrade of the South Concentrator

The existing MSC Plant design has a capacity of 5.1 Mtpa. An upgrade to the MSC plant is proposed through the installation of debottlenecking plant to assist with increasing the current crushing capacity of the MSC and will include a conveyor system, crushing and screening operations. The MSC debottlenecking project will increase the throughput to 6 Mtpa.

The concentrator is constrained by the A & B Section primary autogenous mills since the very hard Platreef ore is not amenable to autogenous milling circuits. This is exacerbated by the low aspect ratio of the existing mills. The A & B-Section primary mill constraint is to be removed by the following plant modifications:

- Installation of a new crushing and screening circuit after existing primary gyratory crusher comprising secondary cone crusher (closed with a screen) followed by HPGR;
- Splitting the existing fine ore stockpile (FoS) withdrawal conveyor into two separate conveyors that will reclaim fine ore to the existing fine ore silo via the existing portion of the modified conveyor (to feed the in-circuit crushing section) and reclaim fine ore to the new crushing and screening circuit (supplementary feed) via a second withdrawal conveyor operating in the opposite direction;
- Converting the A & B-Section primary autogenous mills to ball mills. A second drive will be added to each of the ball mills to increase the installed power per mill, which will enable maximum power draw to be attained;
- The existing in-circuit crushing (ICC) section that was previously used to crush pebbles from the autogenous mills will be retained to prepare the mill feed to the C-Section primary ball mill. Grizzly undersize material will be transferred to the ICC section via the existing fine ore silo and conveyors systems;
- Upgrade of the existing final concentrate thickener drive and rake system and installation of a froth skimmer;
- Installation of an additional final tails thickener; and
- Upgrade of several slurry pumping systems within the plant.

Potential contractor's camp

A potential contractors camp is being investigated for the accommodation of mainly service contractors that will be involved with the construction of the project components associated with Mogalakwena Mine's Expansion Project. The proposed contractors camp is planned to be situated to the east of the existing MSC.

Upgrade of sewage treatment plant

The existing sewage treatment plant at MNC will be ungraded, to accommodate the additional staff required for the operation. Mogalakwena Mine plans to install an additional module adjacent to the existing package plant. The treated effluent will be reused in the process.

Contractor's laydown area

A new contractors' lay-down area will be required to support the construction projects associated with the proposed Expansion Project. The area under consideration is located between the M3C and the proposed buffer dam.

Expansion of workshop area

The existing workshop area at the main mining complex will need to be expanded to provide additional maintenance facilities for a larger mining fleet and associated support equipment. The workshop expansion will be located directly north of the existing workshop area located to the west of the Blinkwater 1 TSF.

Upgrade of mine access road

Upgrade of the access road from the Bakenberg Road turnoff (going toward the MNC) to the M3C area to manage traffic congestion. The road is anticipated to be approximately 2km in length and will have an area of disturbance of 4 ha. In addition to the above, upgrades to the two new intersections and associated access roads to the existing MNC and M3C will be required. The existing North Mine access road will also be realigned to create space for the new primary crusher.

The Groot Sandsloot (Pholotsi) river diversion

It is proposed that the Groot Sandsloot (Pholotsi) River be diverted to allow for the continued mining of the Sandsloot Pit towards the western and northern sides. The Groot Sandsloot (Pholotsi) River flows from north-east to south-west across the mine property, along the western side of the Groot Sandsloot open pit. The location of the Groot Sandsloot (Pholotsi) River in relation to the opencast pit and WRD is indicated in Figure 6-9. The diversion will be situated between a WRD to the west and the Sandsloot pit to the east. A minimum distance of 30 m will separate the WRD from the diversion to cater for the WRD water management infrastructure and a minimum distance of 50 m together with a flood protection and safety berm will separate the diversion from the Sandsloot pit. The river diversion will be approximately 2.8 km in length.

The conceptual design of the Groot Sandsloot (Pholotsi) River Diversion caters for the 1:100 year flood and will require the construction of a new culvert under the northern haul road, approximately 250 m north of the current culvert position in the northern or upper reaches of the diversion. The diversion side slopes have been designed in accordance with the type of material underlying the diversion, namely; in soft material a slope of 1:3 will be required and in rock only 1:2 slope will be necessary. Rip-rap will line areas of soft material to reduce erosion. Energy dissipators within the diversion will be constructed to manage flow velocities and discharge back into the natural river to the south of the pit through the existing haul road culvert.

An additional change house

An additional change house will be developed within the existing north mining area.

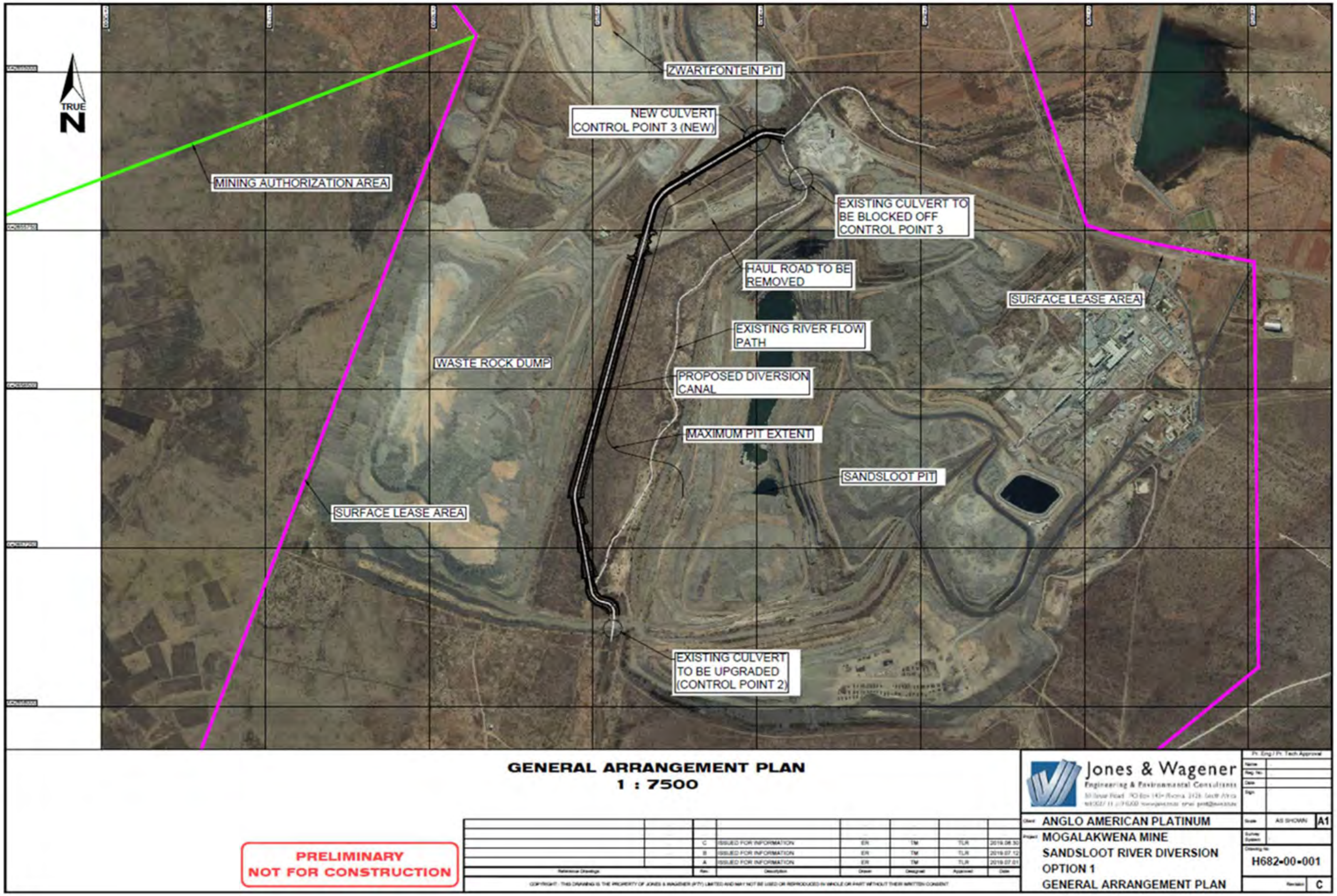


Figure 6-9: Proposed Groot Sandsloot (Pholotsi) River Diversion

7 Need and Desirability of the Proposed Activities

This section has been compiled in line with the Integrated Environmental Management Guideline on Need and Desirability (DEA, 2017). A summary of the key aspects has been included in the subsections below.

7.1 Mining benefits

The mineral extraction at Mogalakwena Mine is considered by AAP to be in the best interest of the public at large, by generating earning power both locally and internationally, in the absence of significant alternative employment opportunities in the area.

Platinum is sold both locally and overseas and therefore, the mine is an earner of foreign exchange for South Africa. In addition, the mine also has 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.

Mogalakwena Mine 's life of mine (LoM) extends well beyond 2080. The proposed Expansion Project will allow Mogalakwena Mine to continue with the mining activities for the LoM.

7.2 Environmental responsibility

Mogalakwena Mine has various EMPrs and EMPs approved under the previous Minerals Act and the MPRDA. The purpose of this document is to amend the existing approved EMPrs and EMPs to include the activities and infrastructure associated with the proposed Expansion Project and to develop one comprehensive document that will be in line with the legislated requirements of the NEMA. This document will contain management measures to avoid, minimise and reduce the potential negative impacts on the environment, as a result of the mining and processing operations at Mogalakwena Mine.

Mogalakwena Mine is also operating under two WULs (WUL No. 27059655 and 14/A61G/GICABJ/5053). Monitoring of water consumption is in place at Mogalakwena Mine with the intention to ensure the minimum amount of water is used by the respective mining related activities. Reduction targets are set and revised annually. Mogalakwena Mine also indicates that they review and revise the water management strategy on an on-going basis towards continual improvement.

The mine participates in relevant environmental forums. As part of the ongoing commitment to the area’s water management, Mogalakwena Mine is represented on the Polokwane / PPL Treated Effluent Monitoring Committee.

Mogalakwena Mine is also actively involved in the Waterberg Air Quality Management Forum.

Mogalakwena Mine indicates that it has an open-door policy for dealing with any complaint/issues received from the public and information is provided to the surrounding landowners if and when requested. In addition to this, the mine has a grievance register where members of the public and communities can lodge their complaints.

7.3 Socio-economic benefits

Mogalakwena Mine is considered to have a positive socio-economic benefit through employment of locals. Unskilled and semi-skilled labour is sourced mainly from the local communities and surrounding areas and recruitment is in conjunction with the local unemployment forum. Specialist and skilled labour are recruited outside the local boundaries when required due to skills scarcity. 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.

7.4 Employment and local procurement opportunities

At present, approximately 2 300 permanent employees and 2 000 contract employees are employed at Mogalakwena Mine. As far as possible, all labour requirements associated with the construction of the proposed Expansion Project will be prioritised for local temporary employment. External labour will only be sourced if skilled candidates are not available locally.

It is currently anticipated that approximately 1 500 temporary contract workers may be employed during the construction phase of the project (approximate duration of 18 months). In the current planning, the labour requirements for the operation of the new third concentrator (M3C) will be met by existing employees. Over the operational life of Mogalakwena Mine, additional permanent job opportunities may be created as the open pit mining operations are ramped up.

Procurement for the project will be done as per the prevailing Anglo American Platinum Inclusive Procurement policies. Meaningful participation of local businesses will be maximised as far as possible.

7.5 No-Go option

The socio-economic impacts of cessation or curtailing of operations at Mogalakwena Mine include the following 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.

Should the proposed Expansion Project not be implemented, Mogalakwena Mine will continue to operate at its current capacity and any additional local economic development opportunities as well as procurement of local goods and services to support the mine activities will not be realised. In addition to this, projected temporary employment opportunities during the construction phase will not be fulfilled.

If the proposed expansion project is not taken forward and the 'no-go' or status quo approach is adopted, then the Mogalakwena Mine will continue to operate at the current production rates. The MSC will eventually need to be decommissioned and without a replacement (i.e. the proposed M3C), the platinum concentrate volumes will reduce (economic loss) and there will be job losses at the mine.

8 Existing Surface Infrastructure and Activities Associated with Mogalakwena Mine

The current activities and infrastructure at Mogalakwena Mine is provided in this section and shown in Appendix 12 and Table 4-2. Infrastructure associated with the proposed Expansion Project has been italicised. This section must be read in conjunction with Table 4-2 in Section 4.

8.1 Open pit mining

Platinum group metals (PGMs) and various base metals are currently mined at Mogalakwena Mine via five open pits, namely the Sandsloot, Zwartfontein, South, Central and North Pits (See Figure 6-2). Zwartfontein Pit is situated on the farms Zwartfontein 818 LR, Vaalkop 819 LR and Sandsloot 236 KR whereas Sandsloot pit situated on the farm Sandsloot 236 KR. North, Central and South pits will in future become one pit on the farms Overysel 815 LR and Zwartfontein 818 LR.

Waste rock from each open pit is placed in close proximity to the open pit activities as described in Section 8.3.1 and shown in the infrastructure map in Appendix 12.

Open pits at Mogalakwena Mine will not be backfilled and all pits will remain as final voids.

8.2 Run of mine stockpiles

Run of mine (RoM) stockpiles have been developed to provide the plants a steady grade and rock type to be fed through the crusher. The RoM stockpiles will also serve as a strategic reserve should open pit operations be interrupted for a period of two to three weeks.

8.3 Mine residue deposits

Mine residue deposits at Mogalakwena Mine consists of WRDs, overburden stockpiles and TSFs. Details relating to the mine residue deposits at Mogalakwena Mine are provided in the sections below.

8.3.1 Waste rock dumps and overburden stockpiles

Various WRDs are located within the mine lease area which store waste rock from the open pit mining operations. The approved footprint and heights of these WRDs is included in Table 8-1.

Table 8-1: Waste Rock Dumps situated at Mogalakwena Mine

Name of WRD	Location	Farm name	Approved footprint (ha)	Approved Height (m)
RS3	West of the Sandsloot pit	Sandsloot 236 KR	195.64	60
W07	South of Sandsloot pit. W07 also extends onto Vaalkop 819LR	Sandsloot 236 KR and Vaalkop 819LR	84.32	60
W01	Northeast of South pit	Zwartfontein 818 LR	42.28	60
W02[8] (West Waste Rock Dump)	West of the North pit	Overysel 815 LR	153.47	60
W020[1] (East Waste Rock Dump)	East of the North pit	Overysel 815 LR	246.15	60
Waste Rock Dump	WRD situated to the east of the Sandsloot pit	Vaalkop 819LR	48.71	20
Witrivier[9] WRD (not developed)	Located on sections of the remaining extend and Portion 1 of the farm Witrivier 777 LR	Gillimberg 861 LR (Previously Witrivier 777 LR)	316	300
Western Bundwall Waste Rock Dump	Located to the western side of the central and south pits	Zwartfontein 818 LR	385 ha	60
Eastern Bundwall Waste Rock Dump	Located to the eastern side of the North, Central and South pits	Zwartfontein 818 LR and Overysel 815 LR	1027 ha	60

[8] W02 and W020 form part of the original East and West WRD footprint areas

[9] The Witrivier WRD was authorized in terms of NEMA in 2017 however it does not have a WUL. The Witrivier WRD has not been developed.

The development of a new WRD, is included in the Expansion Project and is proposed to be situated North of the North pit.

8.3.2 Tailings storage facilities

Mogalakwena Mine currently operates three TSFs within their mining area namely Vaalkop TSF Complex (Vaalkop and Vaalkop extension) and Blinkwater TSF.

Vaalkop Tailings Storage Facility Complex

Vaalkop TSF Complex consists of the original Vaalkop TSF No 1 and Vaalkop TSF No 2 which is an extension to the original Vaalkop TSF. Details relating to the Vaalkop TSF Complex are provided in Table 8-2.

Table 8-2: Summary of Vaalkop TSF Complex

TSF	Date of Construction	Dam design footprint area (ha)	Dam design height (m)	Dam Design Volume m^3
Vaalkop TSF1	1992	150 ha	1180 mamsl	53 258 368 m^3
Vaalkop TSF 2	2004	120 ha	1180 mamsl	38 713 013 m^3

Buttressing of the Vaalkop TSF 2 has been undertaken to accommodate additional tailings previously destined for the Blinkwater TSF, due to delays in the construction of the Blinkwater TSF. Buttressing of Vaalkop TSF 1 is planned for the last quarter of 2019.

Blinkwater Tailings Storage Facility

Blinkwater 1 TSF is currently operational and a summary of the design criteria is provided in Table 8-3.

Table 8-3: Summary of Blinkwater TSF

TSF	Date of Construction	Dam design footprint area (ha)	Dam design height mamsl (m)	Dam Design Volume m^3
Blinkwater TSF	2011	270 ha	1234 mamsl	112 472 651 m^3

The expansion of the NEMA approved Blinkwater 2 TSF is included in the proposed Expansion Project and a WULA for the expansion of the will be submitted for Blinkwater 2 TSF as part of the integrated environmental authorisation process.

8.3.3 Method of deposition

Tailings from the MNC are pumped via an existing pipeline to the Blinkwater TSF whilst the Vaalkop TSF Complex receives tailings from the MSC.

8.3.4 Return water dam

The Vaalkop TSF complex has two RWDs (original and extension). Pipelines carry dirty water from the Blinkwater TSF section to the Vaalkop RWD Extension and from Vaalkop TSF to the original RWD. Water from the original RWD travels via pipeline to the MSC and from the RWD Extension to the MNC. The RWD stores Vaalkop and Extension TSF supernatant water for re-use. Refer to Section 8.13 for a description of mine dirty water containment facilities.

As part of the proposed Expansion Project, Mogalakwena Mine is proposing the development of a buffer dam to store mine process water. The proposed buffer dam will include a pipeline system connecting the buffer dam with the M3C, RWDs of the Vaalkop TSF and Dam 1160.

8.4 Infill drilling/prospecting/exploration drilling

Prospecting and exploration drilling within the mining right area to undertake resource estimation is done on a continuous basis with infill drilling being conducted on areas within the mining right area. Where specific prospecting rights are held, continuous prospecting is conducted.

8.5 Crusher plants

Waste rock minimization at Mogalakwena Mine is being achieved by crushing the rock for reuse at the crusher plant located near W01 Waste Dump. The crusher plant has been established to crush waste rock to be used for the supply of road aggregate and construction material in the vicinity of Mogalakwena Mine.

Ore is transported by haul trucks to the gyratory crusher and by means of conveyors to the MNC and MSC, as well as within the plant. Crushing is achieved in three phases using a gyratory crusher in an open circuit, as well as screening and tertiary crushers. The conveyor feeds the primary mills from the crushed ore stockpiles. Primary crushers are situated within both the MNC and MSC.

As part of the proposed Expansion Project a primary crusher will installed within the proposed M3C.

8.6 Ore stockpiles

A number of ore stockpiles (including low grade ore) and pebble deposits are situated in various locations on the farms Overysel 815 LR, Vaalkop 819 LR, Zwartfontein 818 LR and Sandsloot 236 KR. Ore stockpiles are dynamic dumps feeding the concentrators as required.

Ore is transported by haul trucks to the gyratory crusher and by means of conveyors to the mineral processing plants, as well as within the plant.

There are ore stockpiles within the mining area that consist of low-low-grade material, high-low-grade material and oxidised ore. These stockpiles will be processed when there is a requirement for makeup tonnages in the concentrating circuits.

As part of the proposed Expansion Project a number of ore stockpiles will be placed in the area between the edge of the existing North open pit and the proposed NWRD area.

8.7 Topsoil and subsoil stockpiles

During the development of Mogalakwena Mine, topsoil and subsoils have been stockpiled and maintained on site to meet rehabilitation and closure requirements in line with a final closure plan.

As part of the proposed Expansion Project additional topsoil stockpile areas will be developed due the removal of topsoil prior to the commencement of construction activities.

8.8 Ore pebble stockpile

MMs MSC plant produces a secondary ore product (referred to as pebbles) as part of the ore processing process. The ore pebbles are very dense material rendering them unsuitable for processing at the MSC. The MNC plant at Mogalakwena Mine does however have the capacity and technology available to process the ore pebbles which cannot be processed at the MSC. For this reason Mogalakwena Mine has established an additional ore pebble stockpile in close proximity to the MNC area where the ore pebbles from MSC will be placed for further processing.

The additional ore pebble stockpile covers an area of approximately 3,000 m^2 (0.3 ha) between the existing crusher and MNC plant on the Remaining Extent of the farm Zwartfontein 818 LR. The ore pebble stockpile area has a storage capacity of 20,000 tons.

A PVC lined sump will be constructed down gradient of the proposed ore stockpile area to collect any runoff from site, which will be used as process water at the mine.

8.9 Concentrator Plants

There are two mineral processing plants at the mine, MNC and MSC. The MSC has the capacity to process 5.1 Mtpa. The MNC plant has a capacity of 9.6 Mtpa and in future an additional 4.8 Mtpa could be processed[10]. Therefore, the total future potential capacity of the MNC is a 15 Mtpa. The PGM's are extracted from the ore in the form of a concentrate at both MSC and MNC. The concentrate is transported to the AAP Polokwane Smelter for smelting to produce furnace matte. The matte then undergoes an acid converting process at the Waterval Smelter complex in Rustenburg.

As part of the proposed Expansion Project a new concentrator, the M3C will be constructed.

8.10 Tailings scavenger plant

MM has approval to construct an in-line Tailings Scavenger Plant (TSP) between their existing MNC and Blinkwater 1 TSF to extract residual platinum group metals (PGMs) from the wet tailings generated at the MNC, which is transported via an existing pipeline system, prior to the deposition of the tailings to the Blinkwater 1 TSF. The TSP and associated infrastructure (e.g. offices, parking area and workshop area) will cover an area of less than 1 ha on a section of the remaining extent of the farm Zwartfontein 818 LR within the mining lease area of Mogalakwena Mine.

8.11 Electricity supply

Electricity to the mine is supplied by Eskom via an electricity distribution network.

Electricity requirements associated with the proposed Expansion Project will be sourced via the ESKOM electricity supply. A new electrical overhead line is required for M3C. ESKOM has already received environmental authorisation for the overhead line..

8.12 Water supply

The section below provides and overview of the water supply to Mogalakwena Mine.

8.12.1 Potable water supply

Potable water is obtained from the Commandodrift, PPL and Blinkwater wellfields. The abstraction of groundwater at these wellfields has been authorised by DWS under Mogalakwena Mine's WUL (reference number 27059655). Additional boreholes situated on the mine site have been authorised for abstraction and potable water use under the new WUL (No. 14/A61G/GICABJ/5053). These boreholes are in addition to the wellfield boreholes that are authorised under the original WUL. The majority of the wellfield water is used for domestic purposes and only a small percentage is used in the process at MSC.

[10] Mogalakwena is installing a fine floatation plant within the footprint of the MNC to reduce ultrafine mineral losses to tailings

The three wellfields are as follows;

- PPL wellfield – 2.93 Ml/d at the farms Vaalkop 819 LR, Overysel 815 LR, Zwartfontein 818LR and Sandsloot 236 KR,
- Commandodrift wellfield 1.0 – 1.4 Ml/d at the farms Molendraai 811 LR, Moordkopje 813 LR and Commandodrift 228 KR,
- Blinkwater wellfield 1.8 Ml/day reducing to 1.0 Ml/day at the farms Blinkwater 244 KR and Rietfontein 240 KR.

All wellfield water is pumped to an existing 10 Ml concrete reservoir adjacent to the Vaalkop RWD.

Potable water requirements associated with the proposed Expansion Project will be sourced from existing potable water supply and additional water supply will not be required.

8.12.2 Process water supply

Process water is obtained from recycled sewage effluent from the on-site sewage treatment plants, as well as the Mokopane (up to 6 Mℓ/d is authorised) and Polokwane (up to 20 Mℓ/d is authorised) municipal sewage treatment plants, as well as pit dewatering and return water from the TSF's etc. The process water dam (Dam 1160), situated at MSC and the return water dams with associated pump and pipeline systems are established as part of the combined water system for the mine. The MSC makes use of a small percentage of potable water due to the older technology in use at that concentrator. MNC can operate using a poorer quality of water and uses less potable water than MSC. Both concentrators do, however, make extensive use of recycled water, which has been collected and stored on the mine premises, in preference to using clean/potable water where possible. The various facilities that store recycled water on the mine have been included in Table 8-4.

Process water requirements associated with the proposed Expansion Project will be sourced from existing water supply and additional water supply will not be required. In addition, the proposed Buffer Dam will assist with storing process water for re-use from various sources for utilisation. In addition, the existing sewage effluent pipeline from Mokopane and Polokwane municipal sewage treatment plants will be extended to take water to the Buffer Dam.

8.13 Pollution control dams, paddocks and evaporation dams

Details relating to the dirty water dams for the containment of dirty water across Mogalakwena Mine are provided in in Table 8-4.

Table 8-4: Process water dams at Mogalakwena Mine

Storage facility	Capacity	Description
Mining		
PCD NN	82 000 m^3	Stores stormwater runoff from the WRD at North pit. Water is pumped to RWD and reused in the process.
Effluent water storage tanks North, Central & Zwartfontein (ZFT)	548 m^3 each	Tanks store water from the open pits for use in dust suppression on haul and mine roads.
Landfill site dirty water dam	11,704 m^3	Captures and stores stormwater runoff from the landfill site. The water is used for soil rehabilitation.
North Concentrator		
Effluent water storage dam PCD-NC	56 730 m^3	Stores excess plant water and plant stormwater. Water is reused within the plant.
Effluent water storage tanks Zinc Dam Washbay	586 m^3	Stores wastewater from MNC for use as vehicle washing water.

RWD Extension	Combined capacity with RWD of 10,685 m^3	Stores Blinkwater 1 TSF supernatant water for reuse in the MNC processes.
South Concentrator		
Dam 1160	374 Ml (excludes a freeboard height of 2 meters/69 Ml)	Receives treated effluent from Polokwane and Mokopane Sewage works, water from the open pits and water from RWD. Supplies water to both concentrators for process use.
Effluent water storage tanks (Erichsen dams)	507 m^3	Receives water from pits to be used for dust suppression on haul roads.
Return Water Dams	Combined capacity with RWD Ext of 10,685 m^3	Stores Vaalkop and Extension TSF supernatant water for re-use in the MSC process.
SWS (Storm Water South)	13 740 m^3	Captures spillage and stormwater from the MSC which is returned to the process.
SP Dam	11 720 m^3	Captures spillage and stormwater from the MSC which is returned to the process.
OS-2 (Old) (no longer in use)	4,096 m^3	The OS dams hold water contaminated with hydrocarbons from the workshops until these can be skimmed off the surface of the water.
OS-2 new	17,500 m^3	

8.14 Water balance

The Mogalakwena Mine Expansion Project has been designed in a manner that does not require new water sources i.e. no additional water will be sourced from surface or groundwater resources in and around the mining area. Existing sources of water will be utilised together with increased site water storage (buffer dam) and recycling of process water. Existing sources of water include:

- Tailings return water (Vaalkop TSF 1 and 2, Blinkwater TSF 1);
- Captured dirty stormwater from various pollution control dams at the concentrators and within the mining area;
- Treated sewage effluent from the mine sewage treatment plants (South and North Concentrators and the Contractor's camp) as well as effluent from the Polokwane and Mokopane sewage treatment plants;
- Pit water (groundwater seepage, runoff and rainfall into the North, Central, South, Zwartfontein and Sandsloot pits); and
- Potable water wellfields (Blinkwater and PPL) which provide nominal volumes of water for processing at the South and North Concentrators.

The total water demand of approximately 66 Ml per day has been accounted for in the water sources listed above and will be managed by the mine to support the concentrator and mining requirements, as is depicted in the water balance presented in Appendix 13.

8.15 Bulk fuel storage facilities/fuel depot

MM has a bulk fuel storage depot, as well as a storage area for dangerous goods area for the storage of diesel, oils and lubricants. The areas consist of infrastructure detailed in the Table 8-5:

Table 8-5: Bulk fuel storage facility

Name	Quantity	Capacity/Volume
Diesel storage tanks	4	58 m^3
	8	70 m^3
	5	14 m^3
	1	790 m^3
OCH tank (10 W Oil)	1	26 m^3

OEC tank (15W40 motor oil)	1	26 m^3
Tellus 46 oil	1	10 m^3
ODT 30 oil	1	10 m^3
Storage of dangerous goods	area	860 m^3

In addition to the above the following infrastructure is also included in these areas:

- Transfer pumps;
- Wash and service bays;
- Bulk loading and offloading areas;
- An interceptor separator for the recovery of oil;
- Service bay areas; and
- Store areas.

8.16 Explosives storage facilities

The explosive depot is situated on top of the existing WRD No. 2, and is utilised for the storage of more than 80m^3 of explosives in the explosives magazine section, as well as ANPP and Emulsion storage and handling sections.

8.17 Pipelines

MM has an extensive potable, tailings, excess water, sewage, treated sewage effluent and mine contact water reticulation network. This reticulation network allows for the distribution of water (clean and dirty) for use in various areas and for specific mine infrastructure requirements.

8.17.1 Pit dewatering pipelines

A number of dewatering boreholes have been approved for dewatering but currently pit dewatering pipelines have been installed to transfer water from the open pits for storage and reuse.

> *As part of the proposed Expansion Project, additional reticulation will be required associated with the Blinkwater TSF expansion, M3C, buffer dam and temporary contractors' accommodation.*

8.18 Roads

The Mogalakwena Mine can be accessed via a district road from the N11. Transport on the mine is by means of private mine roads, including haul roads, service roads and access ways linking existing infrastructure.

A section of the D4380 Road west of Ga- Masenya village passing between the village and the school has been realigned as close as possible to the western boundaries of the farm Zwartfontein 818 LR, to allow for the expansion of mining activities.

> *As part of the proposed Expansion Project, upgrade of existing roads will be undertaken. These include the rerouting of a section of the internal mine access road and new access roads to the M3C.*

8.19 Polluted water treatment

There is no treatment of polluted water on the mine for water pollution control purposes. All available water on the mine is re-used. The only treatment of water is aimed at making the water suitable for-use as process make-up water and includes the following:

- The use of settling ponds for water pumped from the pit;
- Clarification of water containing slimes in the cloudy water storage and distribution system;
- All sewage effluent is treated at the existing and planned sewage treatment plants to an acceptable quality for the intended use.

8.20 Disturbance of water courses

A section of the Groot Sandsloot (Pholotsi) River within the Mogalakwena Mine mining area has previously been diverted to accommodate mining development and infrastructure. The upper reaches of the Mohlosane drainage line has been diverted around the Blinkwater TSF. Clean stormwater runoff is captured in the diversion and flows into the Mohlosane River. In addition to the diversions there are also numerous pipelines, road, conveyors and powerline river crossings within the mining area.

The Groot Sandsloot (Pholotsi) River diversion design and route is being amended through the proposed Expansion Project to allow for the further development of the pit.

8.21 Non-mineral waste

MM operates under operational procedures for the handling, storage and disposal of hazardous waste and non-hazardous waste (Reference number MS-SHE-ENV-PRO-0010 and MS-MIN-ENV-PRO-0011 respectively). The objective of the procedures is to:

Hazardous Waste:

- Ensure that all hazardous waste is handled correctly;
- Ensure temporarily stored hazardous waste is held/stored correctly until disposal;
- Ensure that all hazardous waste at Mogalakwena and both Concentrators, is disposed of correctly by the relevant contractor at a registered hazardous materials landfill site; and
- Report any deviations or incidents of wrong handling, holding and disposal of hazardous waste to the Environmental Department.

Non-Hazardous Waste:

- Correct handling, holding and separation of waste;
- Correct storage and labelling of waste containers;
- Recycling of waste;
- Final disposal of non-hazardous waste;
- Correct reporting of Non-Hazardous Waste on the SHE, Enablon and SAWIS databases;
- General awareness with regards to non-hazardous waste.

8.21.1 South Concentrator

Landfill site

MM operates its own general and small waste disposal site located at the MSC on the farm Vaalkop 819 LR. This waste disposal site was constructed in 1992 as part of the original infrastructure required for the mine. Only small items of non-hazardous waste may be mixed with domestic waste at this site.

8.21.2 North Mining

A non-hazardous waste and domestic waste disposal/landfill site, sorting facility and treatment of contaminated waste has been developed at the North mining complex on the farm Zwartfontein 818 LR. The waste site comprises landfill cells, a salvage yard, a bioremediation site, dirty water dam, a sorting area and a temporary hazardous storage facility. In addition, this site houses recycling machinery in a laydown area and hazardous waste is sorted in a demarcated area on the site.

Although paper, plastic, wood and metals are sorted for recycling at the various sections of the mine, additional sorting will be carried out at the North mining waste site.

Landfill site

The landfill contains cells at which the remains of the general waste, after sorting, is disposed. The trenches of the landfill are located in the northern side of the site. In total, twelve cells have been constructed at the landfill.

General Waste

The general waste that will be taken to the waste site comprise of sorted and unsorted waste. Some sorting is done at source, but unsorted waste is sorted at the waste site. The recyclable materials are stored at the waste site prior to being transported away under contract. The unrecyclable general waste is buried at the landfill on a cell by cell basis according to an engineering design.

Industrial Waste

Industrial waste that cannot be salvaged or returned to suppliers for recycling is temporarily stored in a designated area within the waste disposal site before it is removed from site by a sub-contractor to a municipal landfill site.

All scrap metal is separated from the other general waste at the waste disposal site and this is sold to scrap metal dealers. Used oil is returned to suppliers for recycling or to sub-contractors. Industrial waste that cannot be salvaged or returned to suppliers for recycling is sorted at designated salvage areas at both the North and South Concentrators before being removed off-site by the Waste Contractor. All metal, conveyor belts, electrical cable and redundant equipment are sold for scrap. Used oil is returned to suppliers for recycling by the Waste Contractor.

Hazardous Waste

Hazardous waste is sorted at designated salvage areas at both the North and South Concentrators before being taken to a registered facility, for further recycling or disposal to a hazardous waste landfill. Hazardous waste is temporarily stored at a designated area within the waste disposal site before being dispatched to a licensed hazardous waste disposal site.

The mine temporarily stores hazardous waste and salvageable items which contains hazardous substances in containers in a demarcated enclosed area on the site (less than 10 tonnes per day). The hazardous waste comprises of fluorescent tubes, laboratory effluent and soil contaminated with fuel or chemicals, and totals a maximum of 150 cubic metres per annum. Hazardous waste is taken to a licenced hazardous waste disposal site if it cannot be treated/remediated.

The temporary storage of hazardous waste is located at the southern side of the salvage yard and is bordered by the Dirty Water Dam (DWD).

Dirty water dam

Water from the site is directed to the DWD for containment. The collected water from the DWD can be used to keep bioremediated waste wet or for dust suppression at the site. The dam incudes a pump station which is used to pump out the water from the dam when necessary or if the dam is flooded. The water is pumped into a truck and then sprayed for dust suppression. When flooded, the water discharges into the existing PCD located adjacent to the workshop complex across the tributary of Mohlosane River in the south western side of the site.

Salvage yard

A salvage yard is located in the north western side of the waste site, right at the end of the road that enters the site. The size of the salvage yard is approximately 1.6ha. Waste metal and machine parts are stored here on a temporary basis.

Soil remediation

The North mining waste site also includes a substantial area for soil remediation as well as a stormwater dam to collect dirty water runoff generated on the waste site. The purpose of this site is to remediate soils that have been polluted with hydrocarbons elsewhere on the mining footprint area. The treated contaminated soil will be used to cover waste at the landfill and for rehabilitation purposes at the TSFs and WRDs after it has been classified as suitable for the purpose.

Stockpiling

A designated area is located in the southern side of the Bioremediation site, immediately west of the waste cells and is used for the stockpiling of sand. The sand stockpile is used for emergency coverage of hazardous waste. The stockpile generated from the digging of the dumping trench is located in the eastern side of the trenches. Those stockpiles are used as stormwater berm and reused as covering of waste materials.

Scrap Metal

Scrap metals is sorted at the salvage yard. The recoverable metals are re-used by the mine and the non-recoverable metal is transported by contractors for recycling, sale or disposal. Scrap metals are therefore not disposed of at the waste site.

Waste disposal

The non-recoverable and unrecyclable scrapped and general waste is disposed of at the landfill. Hazardous material is removed on a weekly basis for disposal to a registered site. The operation is working hand in hand with Interwaste to find reuse/recycling solutions for all waste types. Anglo American Platinum has a strategy of getting to Zero Waste to Landfill by 2020.

Waste sorting area

Waste is sorted at a waste sorting area located on the eastern side of the temporary storage of hazardous waste area.

Waste Tyres Storage Facility

Waste tyres are recycled and stored at a designated area on WRD W07 within the Mogalakwena Mine mining area. This includes HME tyres, LDV and truck tyres.

MM has the following existing waste authorisations:

- Potgietersrust Platinum Limited, Control and Management of General Communal and General Small Waste Disposal Sites, 16/2/7/A600/C27Z3
- Waste Management Licence; Mokopane Platinum Mine, Waste Tyre Storage Facility Licence No 12/4/10 – A/4/W2, Limpopo Department of Environmental Affairs and Tourism - 09/05/2012.
- Waste Management Licence variation; Mokopane Platinum Mine, Waste Tyre Storage Facility Licence No 12/4/10/8-A/2/W1-A2, Limpopo Department of Economic Development, Environment & Tourism - 23/09/2015.
- Landfill site (bioremediation site) on Zwartfontein 818 LR (Ref: 12/9/11/L621/5) - 30/09/2014.

8.22 Sewage treatment plants

MM has three sewage treatment plants – one at MSC, one at MNC and another at the old Contractors Camp.

The MSC sewage works, which services both Sandsloot and Zwartfontein operations, is located down gradient of the South Concentrator. The works is designed for a specified population of 1 000 people with a maximum capacity of 120 m^3/day.

The MNC sewage works for the Northern operations is positioned to the south of the concentrator complex and is designed for 1 210 people. The plant is capable of treating 200 m^3/day,

The treatment process at each of these works incorporates a mechanical screen at the inlet, aeration and chlorination. Sewage flows into 150 mm diameter pipes and is collected in a manhole before flowing into a 200 mm diameter pipe to the treatment works. The treated effluent from MSC is pumped into the process water circuit and any overflow from the MNC is pumped to the Return Water Dam. Sludge from the sewage works gets dried and taken to the landfill site.

As part of the proposed Expansion Project, the existing north sewage works will be upgraded to accommodate the additional staff required for the M3C. Mogalakwena Mine is considering the installation of additional modules of the same treatment capacity to the existing package plant.

8.23 Conveyors

Conveyors are operated and utilised within the mining area at the concentrators to transport ore for processing.

Additional conveyors will be required as part of the proposed Expansion Project. These conveyors will be associated with the M3C and the Bulk Ore Sorting Plant.

8.24 Workshops, administration and other buildings

The mine complex and concentrator complexes include infrastructure such as change houses, stores, offices, boardrooms, workshops, training centres, clinic, security offices, fuel/lube bays, green/conservation areas, dispatch and other supporting buildings, and clean and dirty water segregation systems.

As part of the proposed Expansion Project an additional change house and expansion to the existing workshop is proposed.

8.25 Contractors camp

A contractor's camp, not currently in use, has been developed on the mine property with the potential to house 4 000 temporary construction workers. However, the camp will not be used in future as mining activities is taking place in close proximity.

A new contractors camp may be required as part of the proposed Expansion Project. and if required will be sited east of the South Concentrator.

8.26 Stormwater management

Stormwater runoff in contaminated areas within Mogalakwena Mine is contained and fed into the dirty water system, while stormwater from clean areas is diverted and is allowed to enter the natural environment in accordance with GN704.

As part of the proposed Expansion Project, stormwater requirements for new infrastructure have been included in the design for these facilities/infrastructures.

8.27 Helicopter landing area

A helipad is situated to the east of the North Mining Area.

8.28 Storage of dangerous goods

MM has authorisation for the storage of hazardous goods on the farm Zwartfontein 818 LR

- A permanent facility to store dangerous good in 6X 46 000L Horizontal Tanks;
- A temporary facility with a 5-year life with 6 X 14 000L vertical tanks for lubricants;
- 2 X 750 000L horizontal tanks for diesel; and
- 1 X 23 000L underground tank for petrol.

9 Period for which the Environmental Authorisation is Required

It is envisaged that the construction of the infrastructure associated with the proposed Expansion Project will take approximately 2 to 3 years, with the expected operational, closure and post-closure timeframes associated with these projects being in line with Mogalakwena Mine's current Mining Right up to 2040. It is however, estimated that adequate reserves remain for the LoM extending beyond 2080.

10 Project Timeline

The construction of the infrastructure associated with the expansion is expected to take approximately 30 months including 9 months of early works construction. Early works construction will commence in by mid 2020 and the main construction in the second quarter of 2021. Construction of M3C will continue until the final quarter of 2022. Construction will take place during daylight hours (i.e. 06h00 to 18h00) from Monday to Saturday, with the possibility of certain activities taking place on 24 hours per day, 7 days per week basis.

The operational phase will commence after construction of the project infrastructure has been completed and will continue in line with current LoM as detailed in Section 9.

Mogalakwena Mine is operated 365 days per year, 24 hours per day.

11 Motivation for the Preferred Development Footprint

The section below describes the development footprint alternatives which have been considered for the activities and infrastructure associated with the Expansion Project. These include the following:

- Property and location;
- Type of activity;
- Design or layout; and
- Technology to be used

Alternatives with regards to location, infrastructure and transportation were considered for the previous authorised EMPrs for Mogalakwena Mine. The key infrastructure associated with the proposed Expansion Project, including the construction of a third new concentrator, the North WRD and expansion of the approved second compartment of the existing Blinkwater TSF, will all be expansions to existing facilities limiting alternative sites.

11.1 Property alternatives

The location of the proposed Expansion Project components is constrained to the location of the existing infrastructure, as well as the mineral resource. The proposed Expansion Project will be located within Mogalakwena Mine's existing mining right area on the following farms:

- Portion 0 of the farm Overysel 815 LR;

- Portion 0 of the farm Zwartfontein 818 LR;
- Portion 0 remainder of the farm Blinkwater 820 LR;
- Portion 0 of the farm Sandsloot 236 KR; and
- Portion 0 of the farm Vaalkop 819 LR.

As such, no property alternatives were deemed viable.

11.2 Activity type alternative

The location of the proposed project is constrained to the location of the mineral resource, and proven reserve. As an existing mine, with existing infrastructure that supports the mining operation, mining and ore processing are the only activities relevant to this assessment. As such, no activity alternatives were viable to be considered for this project.

11.3 Design/layout alternative

The location of the proposed Expansion Project is constrained to the location of the mineral resource, and proven reserve. As such, no layout alternatives were viable to be considered for this project.

The engineering team has concentrated the required surface infrastructure for the Expansion Project within and around the existing infrastructure and current mineable orebodies. The land surface area of these properties is already transformed in large parts by the historical mining activities. The footprint area for the proposed Blinkwater 2 TSF expansion and the North WRD is situated mostly on land undisturbed by mining although it has been altered by community use, i.e. grazing and wood collection.

11.4 Technology alternatives

Technological alternatives aimed at optimising sub processes within the new concentrator have been considered for the proposed Expansion Project. Apart from the sub processes optimisation, the existing technologies utilised by Mogalakwena Mine remain as the main mining and processing technologies to support the expansion activities. However, as part of operations, Mogalakwena Mine are continuously assessing technology alternatives, which will be applied if they are found to be viable.

11.5 Operational alternatives

Operational alternatives were not considered for the proposed Expansion Project. The proposed Expansion Project will be operated in line with and concurrent to the existing Mogalakwena Mine operational activities.

11.6 No-Go alternative

The expansion project will increase the annual concentrator capacity which will require and increase in the annual open pit mining rate. As the sources of ore remains the existing open pits within the Mogalakwena Mine Mining Right, no alternatives were applicable.

Should the proposed Expansion Project not be implemented, Mogalakwena Mine will continue to operate at its current capacity and any additional local economic development opportunities as well as procurement of local goods and services to support the mine activities will not be realised. In addition to this, projected temporary employment opportunities during the construction phase will not be fulfilled.

If the proposed expansion project is not taken forward and the 'no-go' or status quo approach is adopted, then the Mogalakwena Mine will continue to operate at the current production rates. The MSC will eventually need to be decommissioned and without a replacement (i.e. the proposed M3C), the platinum concentrate volumes will reduce (economic loss) and there will be job losses at the mine.

If the proposed Expansion Project does not go ahead, the additional surface infrastructure needed for mining and processing will not be constructed and the potential negative impacts of the mining and related activities will not occur.

12 Mining of Future Ore Resources

It is very difficult to predict what advances in technology are likely to take place in future. Similarly, it is almost impossible to predict what economic conditions may be in force at that time. Experience has shown that technology has allowed mining companies to exploit deeper and lower grade deposits than was possible even twenty years ago.

Part of a mining company's responsibilities includes the stewardship of a resource, extracting economic value now without precluding future generations from further developing that resource.

There are reasonable indications that the deposit at Mogalakwena Mine extends much deeper than the economic limits of the open pit. Thus, there is a strong likelihood that either the open pit will extend deeper than currently planned or that an underground mine may be developed to exploit those resources in future. In both instances, the current open pits would be used to provide access to the deeper ore resources.

13 Details of the Public Participation Process

13.1 Objectives of public participation

The objectives of public participation for the various phases of the environmental authorisation process are presented in the sections below.

13.1.1 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.

13.1.2 During scoping phase

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 terms of reference (ToR) for the specialist studies, and to contribute relevant local and traditional knowledge to the environmental assessment.

13.1.3 During impact assessment phase

The objectives of public participation, during the EIA phase, are to verify that registered I&APs issues have been considered in the environmental assessment and to comment on the findings of the environmental assessment, including the potential negative and positive impacts and the proposed management measures.

13.1.4 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.

Public participation throughout the integrated environmental authorisation process is shown in Figure 13-1.

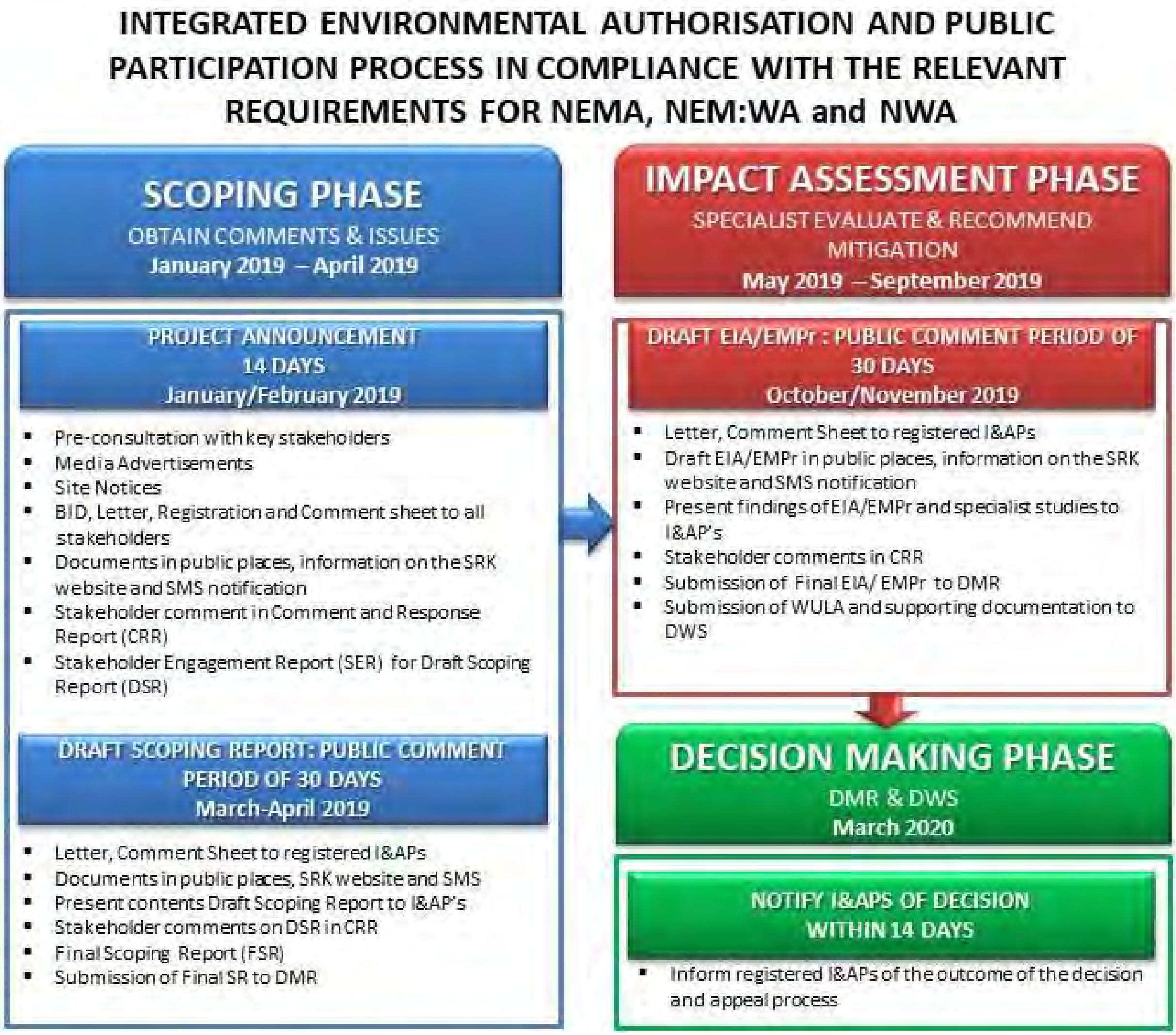


Figure 13-1: Public participation throughout the integrated environmental authorisation process

13.2 Stakeholder identification

The NEMA EIA Regulations (GN R 982 amended) require identification of and consultation with communities and interested and affected parties (I&APs). In terms of Section 24 0 (2) of NEMA, specific State Departments were identified and recognised as commenting authorities on aspects of the proposed Expansion Project. Representatives from these departments are included in the stakeholder database.

I&APs identified in previous environmental authorisations processes, together with lists of stakeholders with whom Mogalakwena Mine has regular contact and networking and referral formed the basis for the development of the stakeholder database.

The stakeholder database will be reviewed and updated after each round of engagement during the environmental authorisation process. Box 1 below provides more information regarding the distinction between I&APs and registered I&APs.

A register of I&AP in terms of Section 42 of the EIA Regulations (GN R 982 of 2014) was compiled. This regulation requires that the register contain full contact details of registered I&APs and be submitted to the competent authority. In order to maintain privacy of I&APs contact details, the register of I&APs in this report will not contain contact details but will be kept on record.

Box 1. Distinction between I&AP's and Registered I&APs

The NEMA Regulations (GN 982 amended) distinguishes between I&AP's and registered I&APs.

I&AP's, as stated in Section 24(4)(d) of the NEMA include: (a) any person, group of persons or organisation interested in or affected by an activity; and (b) any organ of state that may have jurisdiction over any aspect of the activity.

In terms of the Regulations "***registered interested and affected parties"*** means:

An interested and affected party whose name is recorded in the register opened for that application.

For that purpose, an EAP managing an application must open and maintain a register which contains the names, contact details and addresses of:

- All persons who have submitted written comments or attended meetings with the applicant or EAP;
- All persons who have requested the applicant or EAP managing the application, in writing, for their names to be placed on the register; and
- All organs of state which have jurisdiction in respect of the activity to which the application relates.

13.2.1 Identification of landowners

The identification of landowners in the project area is an important part of the public participation process. SRK conducted a deeds search to identify landowners adjacent to and in the immediate surroundings of the proposed Expansion Project. In Table 13-1, farms in bold are the locations for the proposed infrastructure placement associated with the Expansion project.

Table 13-1: Landowners located in close proximity to the proposed Expansion Project

Farm Name	Farm Portions	Owner	MM Area
Knapdaar 234 KR	Portion 0	National Government of the RSA	Mining
Blinkwater 820 LR	**Portion 0 – Remaining Extent**	**National Government of the RSA***	**Mining and surface (Mapela lease)**
Armoede 823 LR	Portion 0, Remaining Extent	Rustenburg Platinum Mines Ltd	Surface (Owner)
Tweefontein 238 KR	Portion 1	National Government of the RSA	Mining
Tweefontein 238 KR	Portion 2 Remaining Extent	National Government of the RSA	Mining
Tweefontein 238 KR	Portion 3	National Government of the RSA	Mining
Rietfontein 240 KR	Portion 0	National Government of the RSA	Mining
Sandsloot 236 KR	**Portion 0**	**National Government of the RSA***	**Mining and surface (Mapela and Mokopane leases)**
Drenthe 778 LR	Portion 0	National Government of the RSA	Mining
Overysel 815 LR	**Portion 0**	**National Government of the RSA***	**Mining and surface (Mapela lease) -**
Zwartfontein 818 LR	**Portion 0**	**National Government of the RSA***	**Mining and surface (Mapela lease)**
Vaalkop 819 LR	**Portion 0**	**National Government of the RSA***	**Mining and surface (Mapela lease)**
Gillimberg 861 LR (Previously Witrivier 777 LR)	Portion 0 Remaining Extent	National Government of the RSA	Mining

MM currently operates three wellfields (PPL, Blinkwater and Commandodrift wellfields) to obtain potable water to be used on the mine. The PPL wellfield abstraction boreholes fall within the mining lease area of Mogalakwena Mine (Table 13-2).

Table 13-2: Locality of the PPL, Blinkwater and Commandodrift wellfields

Property	Wellfield	Owner
Vaalkop 819 LR	PPL	National Government of the Republic of South Africa
Overysel 815 LR	PPL	
Zwartfontein 818 LR	PPL	
Sandsloot 236 KR	PPL	
Blinkwater 820 LR	Blinkwater	
Rietfontein 240 KR	Blinkwater	
Molendraai 811 LR	Commandodrift	
Moordkopje 813 LR	Commandodrift	
Commandodrift 228 KR	Commandodrift	

13.2.2 Identification of District and Local Municipalities

The project area falls within the jurisdiction of the Waterberg District Municipality and the Mogalakwena Municipal Area Local Municipality in the Limpopo Province. Details of the relevant municipalities and respective ward councillors are provided in Table 13-3.

Table 13-3: District and Local Municipalities

Municipality	Contact Person	Designation	Office number
Mogalakwena Local Municipality	Mr Kenneth Malluleke	Municipal Manager	015 491 6604
Mogalakwena Local Municipality	Ms Solane Ntshane	Town planning officer	015 491 9699
Mogalakwena Local Municipality	Cllr MJ Mampane	Ward Councillor (Ward 13)	015 491 9600
Mogalakwena Local Municipality	Cllr L.E Laka	Ward Councillor (Ward 14)	015 491 9600
Mogalakwena Local Municipality	Cllr ME Seema	Ward Councillor (Ward 17)	015 491 9685
Mogalakwena Local Municipality	Cllr MS Letwaba	Ward Councillor (Ward 18)	015 491 9685
Mogalakwena Local Municipality	Cllr MA Ratema	Ward Councillor (Ward 19)	015 491 9600
Mogalakwena Local Municipality	Cllr M.T Mogale	Ward Councillor (Ward 20)	015 491 9600
Waterberg District Municipality	Mr Morris Maluleka	Municipal Manager	014 718 3321
Waterberg District Municipality	Mr Peter Makondo	Acting Executive Manager of the environmental department	014 718 3341

13.2.3 Identification of relevant government departments

The relevant authority applicable to the environmental authorisation process for the proposed Expansion Project is the DMR and contact details are provided in Table 13-4. A meeting was held with the DMR on 19 November 2018 to discuss and confirm the process and way forward for the proposed Expansion Project.

The relevant authority applicable to the water use licence application and amendment process is the DWS. A pre-application meeting was held with the DWS in Polokwane on 11 November 2018 and the contact details of the case officer responsible for the Mogalakwena WUL are included in Table 13-4. The attendance registers and minutes of the meetings with the DMR and DWS are provided in Appendix 14

Table 13-4: Relevant Government Departments

Department	Contact Person	Office number
DMR (Amendment of the Mogalakwena Mine EMPrs) - Polokwane Office	Mr Thivhulawi Kolani	015 230 3600
DWS (Amendment to the WUL, consolidation of the two existing WULs and new WULA)	Mr Love Hlekane	015 284 6700

A site visit with DWS was held on the 31 May 2019 as part of the WULA process, the attendance register provided in Appendix 14.

Other commenting authorities consulted with during this process include LEDET, Department of Agriculture, Rural Development and Land Reform, SAHRA, Mogalakwena Local Municipality and the Waterberg District Municipality. Proof of communication with these authorities has been included in Appendix 15.

13.3 Introductory meetings with key stakeholders

The proposed activities and infrastructure associated with the proposed Expansion Project footprint falls within the Mapela TA area of jurisdiction and immediately adjacent to the Mokopane TA area of jurisdiction.

An introductory meeting with the Mapela and Mokopane TAs in the project area was held on 10 December 2018.

The purpose of the meeting was threefold:

- To consult with the owners of the properties where the proposed activities are planned to take place and may be affected by the proposed Expansion Project;
- To introduce the team to representatives of the TAs; and
- To announce the project and give the TAs an opportunity to comment and present their concerns.

13.3.1 Announcement

The project was announced to the public between **21 January and 6 February 2019**. I&APs were notified of the opportunity to comment on the proposed Expansion Project and to register as an I&AP via various engagement methods (see Appendix 15 for copies and proof of all notification materials). Table 13-5 presents a summary of the activities undertaken as part of the announcement phase.

Table 13-5: Summary of announcement methods and dates

Stakeholder group	Announcement activity/materials
Mapela TA	Introductory meeting with the Mapela TA
	Follow up meeting with the Mapela TA
	Hand delivery of notification letters, BIDs and registration and comment forms (in English and S the Mapela TA.
	Placement of notices at the Mapela TA Offices and 14 community village Kgoros
	Placement of 275 copies of the BID and comment sheet (200 Sepedi copies and 75 English co Mapela TA offices
	Placement of comment boxes at the Mapela TA offices for people who do not have access to e facilities
	Meeting with the Mapela Tribal Council Headman/Woman
	Meeting with the Mapela Task Team
Mokopane TA	Introductory meeting with the Mokopane TA
	Hand delivery of notification letters, BIDs and registration and comment forms (in English and S the Mokopane TA.
	Meeting with the Mokopane TA Leadership forum to present the project to the leadership forum
	Placement of notices at the Mokopane TA Offices and 7 community village Kgoros
	Placement of comment boxes at the Mokopane TA offices for people who do not have access fax facilities
	Meeting with the Mokopane Task Team
	Follow-up meeting with Mokopane Task Team
Focus groups	Meeting with the Bohwa Bja Rena Communal Property Trust
Public	137 emails including letters, BIDs and comment sheets (English and Sepedi) to various stakeh notifying them about the project
	Placement of four English and four Sepedi site notices at strategic points around the Mogalak site (Mogalakwena Mine entrance, Mogalakwena Mine social performance office, Blinkwat at Vaalkop dam)
	Placement of 175 copies of the BID and comment sheet at the Mogalakwena Mine social pe office (150 Sepedi and 25 English copies)

Stakeholder group	Announcement activity/materials	Date of announcement / distribution of materials
	Placement of comment boxes at the Mogalakwena Mine social performance office for people who do not have access to e-mail or fax facilities	22 January 2019
	Placement of the BID and registration and comment form in English and Sepedi on SRK's website (www.srk.co.za/en/za-mogalakwena-mine-expansion-project)	22 January 2019
	Advertisements in English and Sepedi in The Bosvelder and The Polokwane Observer	25 January 2019
	Radio Announcement on the Mokopane Community radio station	30 January 2019
Mogalakwena Local Municipality	Consultation Meeting with Mogalakwena Municipality	19 February and 4 March 2019

13.3.2 Opportunities to comment

I&APs were encouraged to submit their written comments to SRKs stakeholder engagement office using the contact details provided in the stakeholder letters, BIDs and comment sheets. I&APs could also fill in comment forms at one of the public places (Mapela Traditional Council Office, Mokopane Traditional Council Office and Mogalakwena Mine Social Performance Office), contact the SRK stakeholder engagement team via telephone, email or fax to submit comments and to discuss any issues of concern.

13.4 Availability of the draft scoping report for public comment

The Draft Scoping Report (DSR) was made available for public comment from 19 March 2019 to 18 April 2019 The availability of the DSR and details relating to the public engagement meetings was announced as follows and detailed in Table 13-6:

- Distribution of a letters to I&APs as well as to Kgoshi Hans Masebe Langa and Kgoshi Vaaltyn Kekana, accompanied by a registration and comment form (in English and Sepedi), inviting them to comment on the DSR and to register as an I&AP;
- E-mail notifications to the DWS, LEDET, Department of Agriculture, Rural Development and Land Reform, Mogalakwena Local Municipality, Waterberg District Municipality and SAHRA;
- Notification to I&APs via site notices, SMS, email and letters;
- Posting the DSR, announcement letter and comment form on the SRK website (www.srk.co.za/en/za-mogalakwena-mine-expansion-project); and at the following public places:
    - Mapela Traditional Council Office;
    - Mokopane Traditional Council Office;
    - Mogalakwena Mine Social Performance Office;
    - MNC Office;
    - North Mining Offices; and
    - Bohwa Bja Rena Trust Office

13.5 Scoping open house meetings

Five stakeholder engagement meetings were held from **26 to 30 March 2019** to present the content of the DSR to I&APs and provide stakeholders with an opportunity to comment. The meetings were held in Sepedi and English . A Non-Technical Summary (NTS) presenting the content of the DSR in simplified, non-technical language, (English and Sepedi) was distributed to meeting attendees. In addition to the NTS, posters in English and Sepedi, were used to present the information to the stakeholders.

Stakeholder engagement documentation used at the scoping stakeholder engagement meetings is presented in Appendix 15 and includes the following:

- Non-technical summary in English and Sepedi;
- Posters in English and Sepedi;
- Comment sheets; and
- Advertisements.

Refer to Table 13-6 for a summary of stakeholder engagement as part of the proposed Expansion Project and Table 13-7 or details of the scoping phase stakeholder engagement meetings.

Table 13-6: Summary of stakeholder engagement

Stakeholder engagement activity/opportunity to comment	Stakeholder engagement type	Date of engagement	Project phase
Authorities			
• Department of Mineral Resources, Polokwane	Meeting	19 November 2018	Pre-application
• Department of Water and Sanitation, Polokwane	Meeting	19 November 2018	
• Department of Water and Sanitation, Polokwane	Site Visit	31 May 2019	EIA Phase/WULA Phase 2
Mapela			
• Meeting with the Mapela TA	Meeting	10 December 2018	Pre-announcement and announcement phase
• Follow up meeting with the Mapela TA	Meeting	17 January 2019	
• Hand delivery of notification letters, BIDs and registration and comment forms (in English and Sepedi) to the Mapela TA.	Distribution of materials	22 January 2019	
• Placement of notices at the Mapela TA Offices and 14 community village Kgoros	Distribution of materials	22 January 2019	
• Placement of 275 copies of the BID and comment sheet (200 Sepedi copies and 75 English copies) at the Mapela TA offices	Distribution of materials	22 January 2019	
• Placement of comment boxes at the Mapela TA offices for people who do not have access to e-mail or fax facilities	Distribution of materials	22 January 2019	
• Meeting with the Mapela Tribal Council Headmen/Women	Meeting	5 February 2019	
• Meeting with the Mapela Task Team	Meeting	6 February 2019	
• Announcement of the availability of the Draft Scoping Report and invitation to Scoping Phase meetings to Mapela TA and TT and placement of notices and letters to invite community members	Distribution of materials	19 March – 22 March 2019	Scoping Phase
• Open house meeting with the Mapela TA at the 5-in-1 Sports complex	Open house meeting	26 March 2019	
• Open house meeting with the Mapela Task Team at the 5-in-1 Sports complex	Open house meeting	26 March 2019	
• Open house meeting with the Mapela community at the 5-in-1 Sports complex	Open house meeting	28 March 2019	
• Follow up meeting with the Mapela Traditional Council	Meeting	25 June 2019	EIA Phase
• Follow up meeting with the Mapela Traditional Council	Meeting	16 July 2019	

Stakeholder engagement activity/opportunity to comment	Stakeholder engagement type	Date of engagement	Project phase
• Preliminary EIA feedback meeting with Mapela TA, Headmen and Headwomen	Meeting	11 September 2019	
• Preliminary EIA feedback meeting with Mapela Task Team,	Meeting	11 September 2019	
• Meeting with the Mapela TA, Headmen and Headwomen	Meeting	22 October 2019	
• Open house meeting with Mapela community and Mapela Task Team	Meeting	23 October 2019	
Mokopane			
• Meeting with the Mokopane TA	Meeting	10 December 2018	Pre-announcement and announcement phase
• Hand delivery of notification letters, BIDs and registration and comment forms (in English and Sepedi) to the Mokopane TA.	Distribution of materials	28 January 2019	
• Meeting with the Mokopane TA Leadership forum to present the project to the leadership forum	Meeting	28 January 2019	
• Placement of notices at the Mokopane TA Offices and 7 community village Kgoros	Distribution of materials	30 January 2019	
• Placement of comment boxes at the Mokopane TA offices for people who do not have access to e-mail or fax facilities	Distribution of materials	30 January 2019	
• Meeting with the Mokopane Task Team	Meeting	5 February 2019	
• Follow-up meeting with Mokopane Task Team	Meeting	19 February 2019	
• Announcement of the availability of the Draft Scoping Report and invitation to Scoping Phase meetings to Mokopane TA, Leadership Forum and TT and placement of notices and letters to invite community members	Distribution of materials	19 March – 22 March 2019	Scoping Phase
• Open house meeting with the Mokopane TA at the 5-in-1 Sports complex	Open house meeting	27 March 2019	
• Open house meeting with the Mokopane Task Team at the 5-in-1 Sports complex	Open house meeting	27 March 2019	
• Open house meeting with the Mokopane community at the 5-in-1 Sports complex	Open house meeting	29 March 2019	
• Site visit with representatives from the Mokopane Task Team in response to request to visit the mine	Site visit	28 June 2019	EIA Phase

Stakeholder engagement activity/opportunity to comment	Stakeholder engagement type	Date of engagement	Project phase
• Preliminary EIA feedback meeting with Mokopane TA and Leadership Forum	Meeting	12 September 2019	
• Preliminary EIA feedback meeting with Mokopane Task Team,	Meeting	12 September 2019	
• Open house meeting with Mokopane community, TA and Task Team	Meeting	24 October 2019	
Focus groups			
• Meeting with the Bohwa Bja Rena Communal Property Trust	Meeting	5 February 2019	Pre-announcement and announcement phase
• Open house meeting with the Bohwa Bja Rena Communal Property Trust	Open house meeting	27 March 2019	Scoping Phase
• Announcement of the availability of the Draft Scoping Report and invitation to Scoping Phase meetings to Bohwa Bja Rena Communal Property Trust and placement of notices and letters to invite community members	Distribution of materials	19 March – 22 March 2019	
• Preliminary EIA feedback meeting with Bohwa Bja Rena Communal Property Trust	Meeting	13September 2019	EIA Phase
• Meeting with Bohwa Bja Rena community	Open house meeting	23 October 2019	
Public			
• 137 emails including letters, BIDs and comment sheets (English and Sepedi) to various stakeholder groups notifying them about the project.	Distribution of materials	28 January 2019	Announcement phase
• Placement of three English and three Sepedi site notices at strategic points around the Mogalakwena Mine site (Mogalakwena Mine entrance, Mogalakwena Mine social performance office, Blinkwater TSF and at Vaalkop dam)	Distribution of materials	22 January 2019	
• Placement of 250 copies of the BID and comment sheet at the Mogalakwena Mine social performance office (150 Sepedi and 100 English copies)	Distribution of materials	22 January 2019	
• Placement of comment boxes at the Mogalakwena Mine social performance office for people who do not have access to e-mail or fax facilities	Distribution of materials	22 January 2019	
• Placement of Background Information Document (BID), and registration and comment form in English and Sepedi on SRK's	Distribution of materials	22 January 2019	

Stakeholder engagement activity/opportunity to comment	Stakeholder engagement type	Date of engagement	Project phase
website (www.srk.co.za/en/za-mogalakwena-mine-expansion-project)			
• Advertisements in English and Sepedi in The Bosvelder and The Polokwane Observer	Announcement	24 January 2019	
• Radio Announcement on the Mokopane Community radio station	Announcement	30 January 2019	
• 199 emails including letters and comment sheets (English and Sepedi) to the I&AP database notifying them about the availability of the Draft Scoping Report and scoping open house meetings. • Approximately 508 SMSs to the I&APs who do not have email addresses	Announcement	19 March 2019	Scoping Phase
• Radio Announcement on the Mokopane Community radio station	Announcement	26 and 27 March 2019	Scoping Phase
• Open day – open house meeting	Open house meeting	30 March 2019	
• 285 emails including letters (English) to the registered I&APs on database notifying them about the availability of the draft EIA/EMPr report • Approximately 738 SMSs to the registered I&APs who do not have email addresses	Announcement	4 October 2019	EIA Phase
Mogalakwena Municipality			
Consultation Meeting with Mogalakwena Municipality	Meeting	19 February 2019 and 4 March 2019	Announcement phase

Table 13-7: Scoping stakeholder engagement meeting details

Meeting details	Venue	Approximate number of attendees	Documents Distributed	Key comments, issues, questions and suggestions raised by I&APs
Mapela Traditional Authority and Headmen/Headwomen	Mapela TA Offices	Approximately 40	• No Documents distributed	• The Mapela Traditional Authority was invited to the meeting but did not attend. • The Headmen/Headwomen accused SRK/Anglo of not following procedure by arranging meetings directly with the community and not through the Headmen/Headwomen. • SRK was accused of not caring about the community but of only trying to meet timeframes regulated by government. • SRK should be more flexible and provide more time to address us with a specific allocated/limited time. • The presentation given by SRK should be a one that consists of issues collected from the village • The Headmen/Headwomen stated that they have not agreed with the expansion, yet SRK presentation makes it look like the project is commencing without their concerns being addressed. • Community members affected by the Sandsloot (Pholotsi) river diversion should be relocated. • The Mapela Headmen/Headwomen adjourned the meeting before SRK could finish the presentation and closed the meeting with the following: o Demanded that SRK holds a meeting in each of the 42 villages since the Headmen have already informed the communities that SRK is coming. o Fined SRK R84,000 (R2,000 x 42 villages), o Cancelled the meeting scheduled with the Mapela Communities on (28 March 2019)[11] Requested that attendance registers signed by the Mapela Headmen/Headwomen are returned
Mapela Task Team	5-in-1 Sports Complex	Approximately 50	• 30 English and 12 Sepedi Comment forms	• Community boreholes are dry and polluted and the project could make the situation worse. • Flow of the Sandsloot (Pholotsi) river stopped due to mine activities and quality is impacted by livestock and human activities.

[11] The SRK/Anglo team decided to continue with the meeting as planned

Meeting details	Venue	Approximate number of attendees	Documents Distributed	Key comments, issues, questions and suggestions raised by I&APs
			• 35 English NTS and 6 Sepedi NTS	• Existing dust, noise and heritage impacts – these may increase due to the expansion project • Employment need to go to locals, but external contractors bring their own employees. • Blasting at the mine leads to cracked windows and houses e.g. the houses are falling apart in Mothlotlo and this was reported to Anglo in November 2018 - no action has been taken since. • The mine must provide locals with skills so that they can be ready for jobs at the mine. • The Task Team request: o a copy of the blasting report compiled by the mine including a list of houses already fixed. o copy of the report reflecting people employed/trained and skills developed from the local community is also required by the Task Team. • The Mogalakwena Mine Human Resource Department to provide a candidate list for their training academy. • The graves at Mothlotlo need to be fenced off. • Lack of communication and feedback from Mogalakwena Mine is a problem • Procurement opportunities and documentation
Mokopane Traditional Authority and Leadership Forum	5-in-1 Sports Complex	Approximately 25	• 15 English and 15 Sepedi Comment Forms • 15 English and 15 Sepedi NTS	• Anglo seems to want to drive a wedge between the community and the Traditional Authority by excluding the community from the process. • SRK and Anglo must go directly to the villages in order to ensure proper information transfer especially those with livestock affected by the water quality and quantity at Sandsloot (Pholotsi) River e.g. Masenya, Machikiri, Malepetleke etc. • The Sandsloot (Pholotsi) river is dry due to mine activities • MM to provide feedback regarding water quantity and quality issues in the Sandsloot (Pholotsi) river • Communication with communities to go through Kgoros – so Kgoros can mobilise the community • Written undertaking requested for the next round of meetings to take place in the villages, meeting with affected villages at a central point

Meeting details	Venue	Approximate number of attendees	Documents Distributed	Key comments, issues, questions and suggestions raised by I&APs
				• The mine must put in writing which new machinery they will use so SMME's can prepare themselves • Site visit to inspect areas of new infrastructure and specifically the Sandsloot (Pholotsi) river section to be diverted – site visit should take place before end of DSR comment period which is **18 April 2019** • Local companies must benefit from procurement at the mine and external contractors must not be used. • Anglo and SRK negatively affecting local culture by creating conflict between the TA and the youth in the community. • Transport company from Mokopane must be used to transport community members to the meeting to be held on Friday. • Complained about the procurement process at Anglo not providing community members with enough time to bid for tenders. Notices to bid for tenders arrive in communities close to the closing date. • Local community members and companies must be included in the skills programme to ensure they benefit from employment and procurement opportunities
Mokopane Task Team	5-in-1 Sports Complex	Approximately 30	• 20 English and 14 Sepedi Comment Forms • 23 English and 15 Sepedi NTS	• The Mokopane Task Team members requested a site visit to the mine to view the potential impact of the Sandsloot (Pholotsi) River to the surrounding community[12]. • The Sandsloot (Pholotsi) River has dried up due to the activities of the mine and the mine has also polluted the river in the water. • Anglo must provide a percentage of local people to be employed by the project, including procurement opportunities for local companies. • Anglo/SRK must meet communities directly at the villages through the Kgoros/Traditional Councils and the date of the meetings must be communicated to the Task Team. • Water quality data for entire Mogalakwena Mine should be provided to the Task Team • How will the Mine ensure that all 1 500 temporary jobs associated with the expansion project go to the community?

[12] The site visit was undertaken on 28 June 2019

Meeting details	Venue	Approximate number of attendees	Documents Distributed	Key comments, issues, questions and suggestions raised by I&APs
				• Cracked houses not being fixed • Provide list of the 25 people who were trained by the mine • Graves at Mothlotlo not fenced
Bohwa Bja Rena Communal Property Trust	5-in-1 Sports Complex	Approximately 10	• 8 English and 1 Sepedi Comment Forms • 8 English and 1 Sepedi NTS	• A large number of people depend on government grants but Anglo does not support with jobs and procurement opportunities. • The proposed infrastructure expansion will have an impact but the community does not benefit from the mine. Blasting and noise from the dump trucks are major issues
Mapela Community	5-in-1 Sports Complex	Approximately 320	• 68 English and 140 Sepedi comment forms • 230 English and 105 Sepedi NTS	• Anglo must address issues related to cracked houses caused by blasting. • Fixing of cracked houses must be continuous, since mining is continuous. • Dust from the WRD and the TSF is also a major issue for surrounding communities, what is being done about this? • Provide business opportunities to small business in Mapela • 95% of employment and procurement opportunities must be directed to Mapela community members. • 70% of employment and procurement opportunities must be directed to Mapela community members. • Specialists must work with local community members to ensure skills transfer. • Buses that transport community members to meetings should be sourced from Mapela. • Anglo/SRK must visit each village and conduct meetings. • Dust buckets in the community are not monitored. Community members must be included in the dust monitoring process. • Complained about being provided a summary Technical Report and not the full Scoping Report. • Community not aware of the employment and procurement opportunities at the mine. • Provide community members with skills so that they can be ready to benefit from the employment and procurement opportunities to be brought by the project.

Meeting details	Venue	Approximate number of attendees	Documents Distributed	Key comments, issues, questions and suggestions raised by I&APs
				• Mokopane community is favoured over Mapela when it comes to employment and procurement at the mine • Anglo still has to pay some community members for royalties. • The old Mothlotlo area needs to be reflected on the map. • Adopt the Royal Bafokeng model so that community members can benefit from the mine. • Supply chain does not have a programme to upskill the people of Mapela • Community members have qualifications but does not have the means to submit CV's to the mine • Health impacts on communities from dust generated from the mine, will a health impact assessment be done? • Plot 234 Mashaleng village is not included on the map – Knapdaar • Please note that students are crossing the Sandsloot (Pholotsi) river, cattle drink from the river and locals use the water from the river for washing, planting and building • Noise from blasting affecting the community – Ga Chaba
Mokopane Community	5-in-1 Sports Complex	Approx. 280	• 28 English and 14 Sepedi Comment forms • 200 English and 100 Sepedi NTS	• SRK allowed to present the information, however, the Mokopane Task Team requested that no registers will be signed and no comments/issues/concerns will be submitted until Anglo/SRK visit all the Mokopane villages. .
General Open Day (Saturday)	5-in-1 Sports Complex	0	• 0	• No one attended the open day. This could be due to stakeholder fatigue or lack of transport to the venue.

13.6 Availability of the draft environmental impact assessment report and environmental management programme for public comment

The draft EIA/EMPr was made available for public comment from **4 October 2019 to 4 November 2019**. The availability of the Draft EIA/EMPr and details relating to the public engagement meetings were announced as follows:

- Distribution of a letters to registered I&APs to notify I&APs of the availability of the Draft EIA/EMPr and inviting registered I&APs to comment on the Draft EIA/EMPr;
- Posting the draft EIA/EMPr on the SRK website (www.srk.co.za/en/za-mogalakwena-mine-expansion-project); and at the following public places:
  - Mapela Traditional Council Office;
  - Mokopane Traditional Council Office;
  - Mogalakwena Mine Social Performance Office;
  - MNC Office;
  - North Mining Offices; and
  - Bohwa Bja Rena Trust Office
- E-mail notifications to the DWS, LEDET, Department of Agriculture, Rural Development and Land Reform, Mogalakwena Local Municipality, Waterberg District Municipality and SAHRA;

13.7 EIA public meetings

Various stakeholder engagement meetings were held from **11 September – 13 September 2019** with the following structures to provide preliminary feedback on the Draft EIA/EMPr:

- Mapela Traditional Council and Headmen and Headwoman;
- Mokopane Traditional Council and Leadership Forum;
- Mapela Task Team;
- Mokopane Task Team; and
- Bohwa Bja Rena Communal Property Trust.

EIA meetings were held from **22 October to 24 October 2019** to engage with SRK Consulting and the project team on the content of the Draft EIA/EMPr report where I&APs were given an opportunity to raise further issues or concerns regarding the proposed project.

Refer to Table 13-8 for details of the EIA phase stakeholder engagement meetings.

Table 13-8: EIA stakeholder engagement meeting details

Meeting details	Venue	Approximate number of attendees	Documents Distributed	Key comments, issues, questions and suggestions raised by I&APs
Mapela Traditional Authority and Headmen/Headwomen	Mapela TA Offices	Approximately 30	• No Documents distributed	• SRK was not allowed to present the findings of the Draft EIA, until the fine imposed during the Scoping Phase have been paid. • The meeting participants requested a site visit to the mine to see where the proposed infrastructure will be placed, before SRK can present the findings of the Draft EIA. • The MTC indicated that SRK is not allowed to continue with the planned Mapela community meeting, and should the meeting continue the intention is to double the fine (Refer to Table 13-7). *A formal letter, summarising the stakeholder engagement undertaken with the Mapela Traditional Council (MTC) during the public participation process was submitted to the MTC, requesting a follow up meeting to present the Draft EIA findings to them prior to the planned EIA public meetings. A copy of the letter is provided in* Appendix 15*.*
Mapela Community and Task Team	5-in-1 Sports Complex	Approximately 600	• Approximately 600 (English and Sepedi) NTSs and Comment forms	Project benefits • Project benefits only focus on employment opportunities without consideration to vulnerable community members such as children, elderly, disabled. • How are these other groups going to benefit from the mine's expansion? • What is the purpose of the labour desk given community members cannot gain meaningful employment through this platform. Skills development for the local communities: • When is Anglo going to train the local youth to ensure that they are ready for the upcoming employment opportunities? • Anglo is aware that there are no skills available in local communities and should indicated how they are going to address this issue to ensure that local communities and local businesses have an opportunity to benefit. • Request for a Mapela Community Skills training centre Heritage issues • Heritage sites within the existing mining footprint must be protected and made accessible to the next of kin. Payment of lease agreements:

Meeting details	Venue	Approximate number of attendees	Documents Distributed	Key comments, issues, questions and suggestions raised by I&APs
				○ The mine should inform the communities regarding the existing surface lease agreements as well as details relating to the lease payments and signatories ○ Engage both the Mapela TA factions to ensure all the members of the community attend the meetings. Sandsloot River diversion - Loss of livelihoods and cultural resources • Community use the Groot Sandsloot (Pholotsi) River for fishing in order to support their families since they are not employed. Some community members also use the river for religious and traditional healing purposes. • The previous river diversion resulted in reduced flow which affected the amount of fish in the river. It is perceived that the proposed diversion will exacerbate the situation.
Mokopane Community Task Team and TA[13]	5-in-1 Sports Complex	Approximately 700	• Approximately 700 (English and Sepedi) NTSs and Comment forms	<u>River diversion, heritage resources and loss of medicinal plants:</u> • Communities use the plants along the Groot Sandsloot (Pholotsi) River for medicinal purposes. Diverting the river might have an impact on the availability of these plants. How does the mine plan to protect these plants from contamination and eradication in the area. • How will the mine protect heritage resources? • Some community members also use the river for religious and traditional healing purposes. With the river not flowing as it used to due to the diversions, communities do not have access to places of cultural significance. <u>House and grave relocations:</u> • Previously the mine has not managed relocations well and the process was flawed. Should there be future relocation, how will the process be improved. • The affected next of kin should financially supported to ensure that they are able to perform the required cultural ceremonies.

[13] The Mokopane TA was provided feedback during September as part of the preliminary EIA feedback to all structures and were invited to the EIA meetings.

Meeting details	Venue	Approximate number of attendees	Documents Distributed	Key comments, issues, questions and suggestions raised by I&APs
				Internal community leadership issues: • Allegations of not engaging with correct Mokopane leadership. Skills development for the local communities: • When is Anglo going to train the local youth to ensure that they are ready for the upcoming employment opportunities? • Anglo is aware that there are no skills available in local communities and should indicated how they are going to address this issue to ensure that local communities and local businesses have an opportunity to benefit. • Request for a Mokopane Community Skills training centre • The mine's qualification requirements for local employment includes Maths and Science, however these requirements are not applicable to recruitment from other areas. Legacy issues • Existing environmental management measures appear to be ineffective, how will the proposed management measures for the expansion project be implemented by the mine to manage the potential impacts more effectively. • There is dissatisfaction that Mapela communities are prioritised for benefits from the mine above the Mokopane communities, while the impacts from the mine are experienced by both. Priority is given to Mapela and not Mokopane although mining started at Sandsloot in the Mokopane community.

13.8 Comment and response report

All comments raised by I&APs throughout the process were recorded and have been included in the Comment and Response Report (CRR) in Appendix 15. Key project concerns raised to date relate to:

- Stakeholder engagement process;
- Water resources quality and quantity;
- Regulatory compliance;
- Environmental authorisation process;
- Heritage;
- Diversion of the Sandsloot (Pholotsi) River;
- Air Quality;
- Noise;
- Biodiversity;
- Health and safety;
- Socio-economic;
- Monitoring of environmental impacts;
- Cattle grazing at the Sandsloot (Pholotsi) River;
- Skills, employment and recruitment;
- Project benefits for the communities; and
- Closure.

Several legacy issues were raised during the scoping phase of the project and a comprehensive list of comments has been provided to Mogalakwena Mine and recorded in the CRR. These include issues relating to the following:

- Development of communities;
- Lease agreements;
- Mining and surface rights;
- Allocation of projects;
- Benefits to communities;
- Compensation;
- Procurement;
- Community relocation;
- Employment opportunities and processes;
- Traffic impacts;
- Water resources quality and quantity;
- Engagement with municipality;
- Safety;
- Protection of heritage sites;
- Level of consultation with communities;
- Blasting and cracked houses;
- Farming impacts;
- Water supply;
- Landownership;
- Air quality;
- Noise
- Resettlement;
- Access to land; and

- Communication and feedback.

13.9 Formal responses to comments raised during the announcement and scoping phase

Formal response to comments raised during the announcement and scoping phases were submitted to the following structures and stakeholders:

- Mapela Traditional Council;
- Mapela Task Team;
- Mokopane Traditional Council;
- Mokopane Task Team; and
- Bohwa Bja Rena Communal Property Trust.

13.10 Summary of previous stakeholder engagement processes

Comments raised during stakeholder engagement processes associated with previous environmental authorisations processes (see Figure 1-2), include:

- The visual impact of the mine specifically with reference to the WRDs;
- Dust nuisances and concerns regarding dust generated from tailings dams;
- Lack of communication between the mine and the surrounding communities with the general perception that the mine only engages with the communities when new environmental permitting processes need to be conducted;
- Loss of agricultural and grazing land due to the construction of WRDs and tailings dams;
- A lack in the understanding of the mine's water management plan as well as the mine's water demands for the future. In addition to this, concerns were raised on the impact of the mine's activities on the surface water and groundwater quality and quantity;
- Communities expressed concerns on the preservation of their cultural heritage and relocation of graves; and
- Comments associated with a lack in employment opportunities provided from the mine specifically in the project area where unemployment rates are high.

A summary of the historical comments from the various EMPr processes conducted for Mogalakwena Mine has been included in Appendix 15.

14 Environmental and Social Attributes

This section describes the biophysical and socio-economic conditions of the Mogalakwena Mine. Specialist studies comprising fieldwork investigations and laboratory analysis were undertaken between January 2019 to June 2019. Refer to Appendix 16 for the relevant specialist studies.

14.1 Climate and meteorology

The information presented in this section is extracted from the specialist Air Quality and Hydrological studies undertaken by SRK in 2019.

14.1.1 Regional climate

The regional climate is typically hot summers and cool, dry winters. The mean minimum monthly temperature is 13.0°C and the maximum mean monthly temperature is 26.3 °C. The rainy season is from October to April. Most of the rainfall results from thunderstorms, and rainfall events of short duration mostly in the afternoon and early evenings.

14.1.2 Rainfall and evaporation

Rainfall data was obtained from Weather Station W0633482 located approximately 15 km southwest of the mine (1903-2000), as well from the on-site weather stations. Together, the stations have a 115-year record. The mean annual precipitation for weather station W0633482 and Site Rainfall is 620 mm, as reflected in Table 14-1.

During the rainy season a maximum of 8 to 12 rain days per month is typically expected, whilst in the dry season a maximum of one rainy day may be expected per month. Most rain (85 %) falls in the six month period between November and April. Only 8 % of the rainfall occurs between May and September. The rainfall is mainly in the form of thunderstorms. Hail, which is often associated with thunderstorms, does occur during the hot summer months.

The Evaporation data is presented in Table 14-1. The average annual A-pan evaporation is 2 301 mm which indicates that evaporation exceeds the Mean Annual Precipitation (MAP) of 620 mm.

The mean annual S-pan evaporation at Mogalakwena Mine is 1 755 mm as obtained the Water Resources Manuals, 2012.

Table 14-1: Rainfall and evaporation data

Month	Rainfall (mm) WB 633482 (1903 to 2000) and Site Rainfall (2000 - Present)			Evaporation (mm)	
	Average	Maximum	Minimum	A-pan	S-pan
September	12.8	94.0	0	200.4	161.3
October	45.1	194.2	0	233.8	192.3
November	92.8	349.0	0	225.4	184.5
December	119.1	302.0	6.6	235.1	193.5
January	119.2	444.6	0	233.3	191.8
February	88.7	351.4	0	202.1	163.0
March	75.0	307.0	0	193.8	155.3
April	36.0	188.7	0	157.3	121.4
May	14.6	174.5	0	135.6	101.3
June	5.4	71.7	0	113.5	80.7
July	5.2	86.6	0	121.4	88.1
August	6.2	56.7	0	158.4	122.4
TOTAL	**620**			**2 210.1**	**1 755.6**

14.1.3 Site temperature

Temperature data for the area was sourced from a variety of sources including three PM_{10} monitors located within the Mogalakwena Mine mining area. Based on these sources the average maximum temperature for the area range from 28.8 °C to 39.4°C and average minimum range from 8.2 °C to 11°C.

14.1.4 Wind speed and direction

The wind roses for all hours, daytime and night-time for the modelled Lakes Environmental data for the period January 2016 to December 2018 indicate that the prevailing wind directions throughout the data period are predominantly from the east-northeast with lower occurrences from the northeast, east and east-southeast. Daytime winds (06:00-18:00) prevail from the northwest, with lower occurrences of winds from the northerly and easterly quadrants. Winds blowing during the earlier parts of the night

(18:00-00:00) and latter parts of the night (00:00-06:00) are similar, with the prevailing winds being from the east-northeast.

The average wind speed for the period from January 2016 to December 2018 is 3.46 m/s with calm conditions occurring 5.09% of the time. During the day (06:00-18:00), the average wind speed is 2.98 m/s with calm conditions occurring 8.54% of the time. The average wind speed during the early night is 3.71 m/s and increases to 4.13 m/s during the latter part of the night.

The seasonal wind roses are similar to the all hour's wind rose, except during winter where winds from the south easterly quadrant are prevalent. The frequency of winds from the east increases during autumn albeit at lower wind speeds. The highest average wind speeds of 3.87m/s occurs during spring with calm conditions occurring 3.57 % of the time. The lowest average wind speeds occur during autumn with an average wind speed of 3.07 m/s and calm conditions occur 6.78% of the time. The wind speeds during summer and winter are 3.65 and 3.27 m/s respectively.

14.2 Geology

The information presented in this section of the report is extracted from the specialist Geohydrology study undertaken by Itasca in 2019.

14.2.1 Regional geology

The Mogalakwena Mine is situated in the Northern Limb of the Bushveld Igneous Complex. The Platreef orebody lies at the base of the Main Zone of the Bushveld Complex and is overlain by gabbronorites which are in turn overlain by Upper Zone ferrogabbros. It is a 100 m thick tabular body that strikes north-south, dips 45^{o} to the west and reaches a depth of at least 2,000 m.

14.2.2 Local geology

The Platreef pyroxenite shows a transgressive relationship with the floor rocks such that its base lies at progressively higher levels in the stratigraphical succession. The floor rocks of Sandsloot and Zwartfontein pit belong to the Transvaal Super group (Malmani dolomites), while to the north the floor rocks are Archean Hout River Geniss with intrusive Utrecht granites making up the hills in the Mine area. The hanging wall rocks for all pits are comprised of norite, gabbro and gabbronorite (Refer to Figure 14-1).

At the Sandsloot and Zwartfontein Pits, the interactions between the Platreef and Malmani dolomites has resulted in the formation of calc-silicates and parapyroxenites in the footwall whereas further to the north, granofels and gneiss footwall is exposed in the North and Central pits.

The fault geometry of the Platreef is pre-Bushveld and is dominated by steeply dipping set of North - South faults with a secondary set of East North East and East South East striking faults with dips of 50^{o}-70^{o} to the south.

The locations of geologic structures such as faults and dykes are shown on Figure 14-1. The faults are designated as the Drenthe, NM, Pit, Centre Pit, and Mohlosane Faults. Because their spatial extents are smaller than the areal extent of the country-rock block model, these faults are considered to be localised to the Mine area.

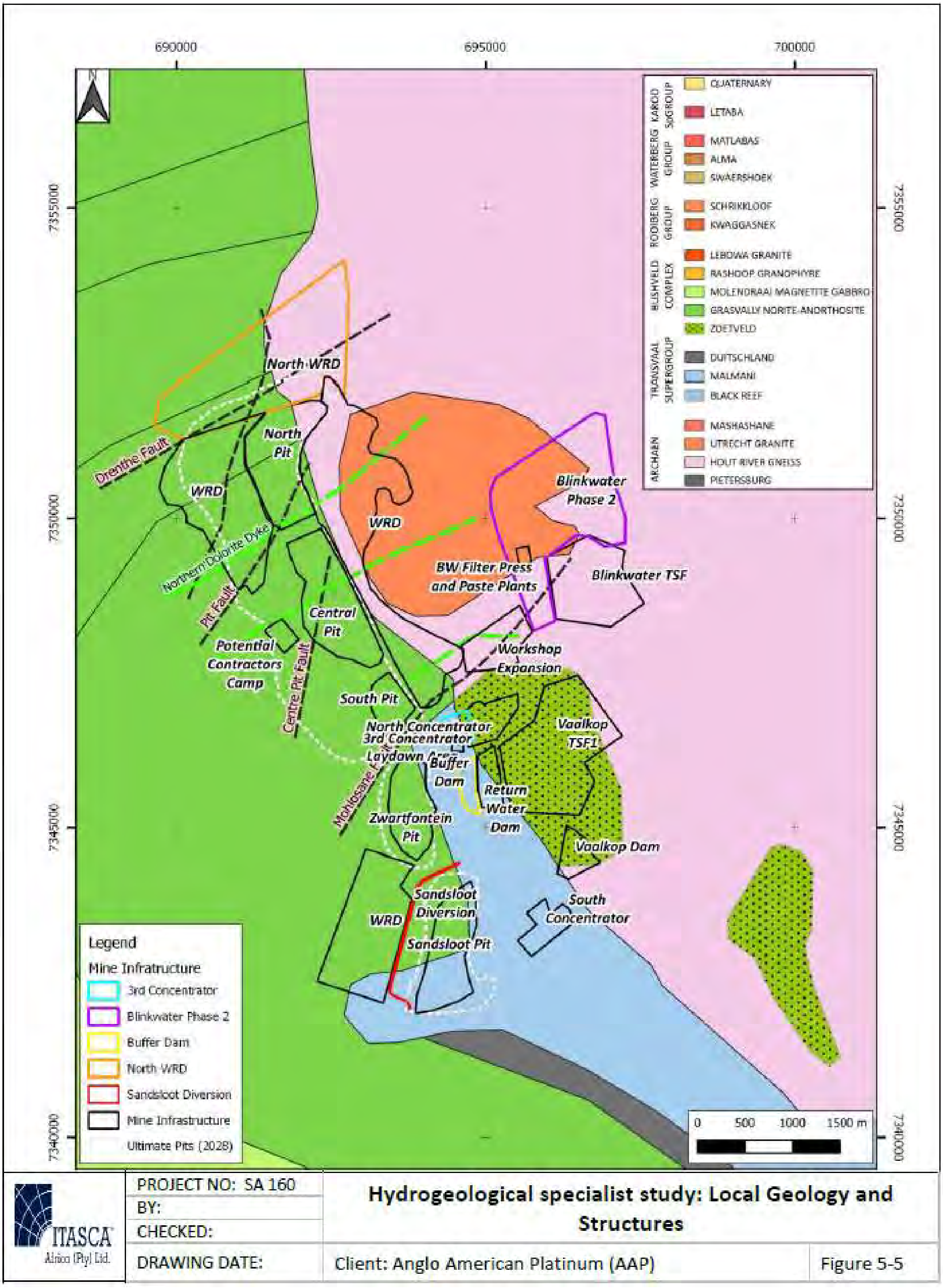


Figure 14-1: Local geology and structures

14.2.3 Topography and drainage

The Limpopo Province can be split into several topographic zones. In the east is the flat to gently undulating Lowveld plain, at an altitude of 300 to 600 metres above mean sea level (mamsl), bounded in the west by the Northern Drakensberg escarpment and Soutpansberg, with steep slopes and peaks up to the 2 000 mamsl.

Topographic elevations within the project area vary from 1,750 mamsl in the east to 1,000 mamsl in the west. The natural topography has been locally altered by mining activity (tailings and return water dams, pits, rivers diversion, rocks dumps, buildings, etc.). Drainage follows topography and migrates downstream from east to west.

The mine is located in the quaternary catchment A61G of the Mogalakwena River in the Limpopo Water Management Area (WMA). The Groot Sandsloot River runs through the mining area separating the North and South Concentrators as well as the other pits (to the north of the river) from the Sandsloot Pit (to the south). Both surface water and shallow groundwater are drained by the Mohlosane, Groot Sandsloot Rivers, and Witrivier which flow to the south-west into the Mogalakwena River which flows to the north-northwest into the Limpopo River.

The proposed Blinkwater 2 TSF extension will overlie the upper reaches of the Mohlosane stream bed, which is non-perennial. Recharge to the wetlands is from runoff and shallow flow from the hills to the northwest and north east forming the topographic relief.

Land use in the surrounding area is dominated by rural informal residential development and small-scale agricultural plots under dryland cropping. The area is also used for grazing of livestock and wood harvesting.

14.3 Soils, land use and land capability

The information presented in this section is extracted from the specialist Soils, Land Use and Land Capability study undertaken by Earth Science Solutions in 2019.

14.3.1 Soils characterisation

The soils encountered can be broadly categorised into three major groupings, with a number of dominant and sub dominant forms that characterise the area. The major soil forms are closely associated with the lithologies (geology) from which the soils are derived (in-situ formation), the topography and general geomorphology of the site, the effects of slope and attitude of the land forms and the pedogenetic processes involved affecting the soil pedogenisis and ultimately the soil forms classified and mapped.

The flat to undulating topography has resulted in the in-situ formation of soils, with some downslope transportation and accumulation of colluvial derived material in the valley bottoms and lower slope positions. The pedogenetic processes are symptomatic of the geomorphology of the site and the lithological units from which they are derived.

The climate also has an influence on the soil forming processes and outcomes, with the negative hydrological balance for the area (evaporation > rainfall) resulting in the development of evaporites within the soil profile where the accumulation of iron rich soil water (lower lying areas and valley bottoms) is able to precipitate and form nodules of ferrous oxide that become cemented over time into layers or “banks” of laterite (ouklip/hard pan ferricrete).

These processes result in the formation of layers of hard plinthite that form inhibiting layers or barriers to the vertical infiltration of water down the profile, a situation that over time results in further accumulations of relic ferric oxide. The soil water accumulates close to surface within the profile due to the low permeability’s across the hard plinthite and moves laterally along the horizon to issue at surface within the streams and waterways as springs and seep zones. These waters contribute to the “base-flow” of the rivers and are an important contributor to the wetlands and more sensitive and important ecological and biodiversity balance of the area.

The following major soil groupings are considered of importance:

- The deeper and sandier loams are considered of the better potential materials and are distinguished by the better than average depth of relatively free draining soil to a depth of greater than 750mm. This group is recognisable by the lack of signs of any wetness within the top 500mm, and the land capability is rated as moderate intensity grazing and/or arable depending on the production potential. The permeability of these materials is rated as good, while the more sandy texture of this soil group renders them more easily worked, and of a lower sensitivity (Deep >500mm). These soils are generally, but not always lower in clay than the associated wet based soils and more structured colluvial derived materials, have a distinctly weaker structure and are better drained (better permeability). These higher potential soils are limited in the study area.
- The shallower sandy loams are more common, average rooting depths of between 200mm and 600mm occurring downslope of the very shallow and areas of outcrop (sheet outcrop) downslope of the more hilly to mountainous terrain common to the granite country rocks.
- In contrast, the shallower and more strongly structured materials are considered to be more sensitive and will require greater management if disturbed. This group of shallower and more sensitive soils (< 500mm) are associated almost exclusively with the sub outcropping of the PGM host rock, the igneous intrusive geology (dunite and peroxinites) producing soils that are high in swelling clays. These soils returned moderate to shallow (400mm to 600mm) rooting depths, soil texture with a fine to medium grain size, strong block (pedocutanic) to prismacutanic structure, good water holding characteristics and moderate to poor soil permeability. This group of soils constitute the larger portion of the soils in the study area, the steeper slopes constituting the erosive environment (soil loss) while the valley bottoms (receiving environment) comprise the majority of the colluvial soils.
- The fourth group of soils comprise those that are associated with the hydromorphic soil forms and profiles where wetness is noted at the base of the soil profile. This group of soils have a set of distinctive characteristics and nature that are separated out due to their inherently much more difficult management characteristics and the legal implications for impacting/disturbing these zones. These soils are characterised by relatively much higher clay contents (often of a swelling nature), poor intake rates, poor drainage, generally poor liberation of soil water and a restricted depth (inhibiting barrier within the top 500mm of the soil profile).
- Where wetness is evident within the top 500mm they are considered to be wetland soils in terms of the wetland delineation guidelines. These soils are easily recognised by the mottled red and yellow colours on low chroma background colours (grey soils). These soils are regarded as highly sensitive zones that will require authorisation/permission if they are to be impacted. The legal implications (licensing) will need to be considered if these soils are to be considered within the development.

These conditions and associated sensitivities should be noted in terms of the overall bio-diversity balance if the sustainability equation is to be managed and mitigation engineered. Transition zone and their associated shallow wet based soils are an important contributor to the ecological cycle, while the shallow sandy loams are sensitive to erosion.

Figure 14-2 provides an overview of the dominant soil types in the Mogalakwena Mine Expansion Project area.

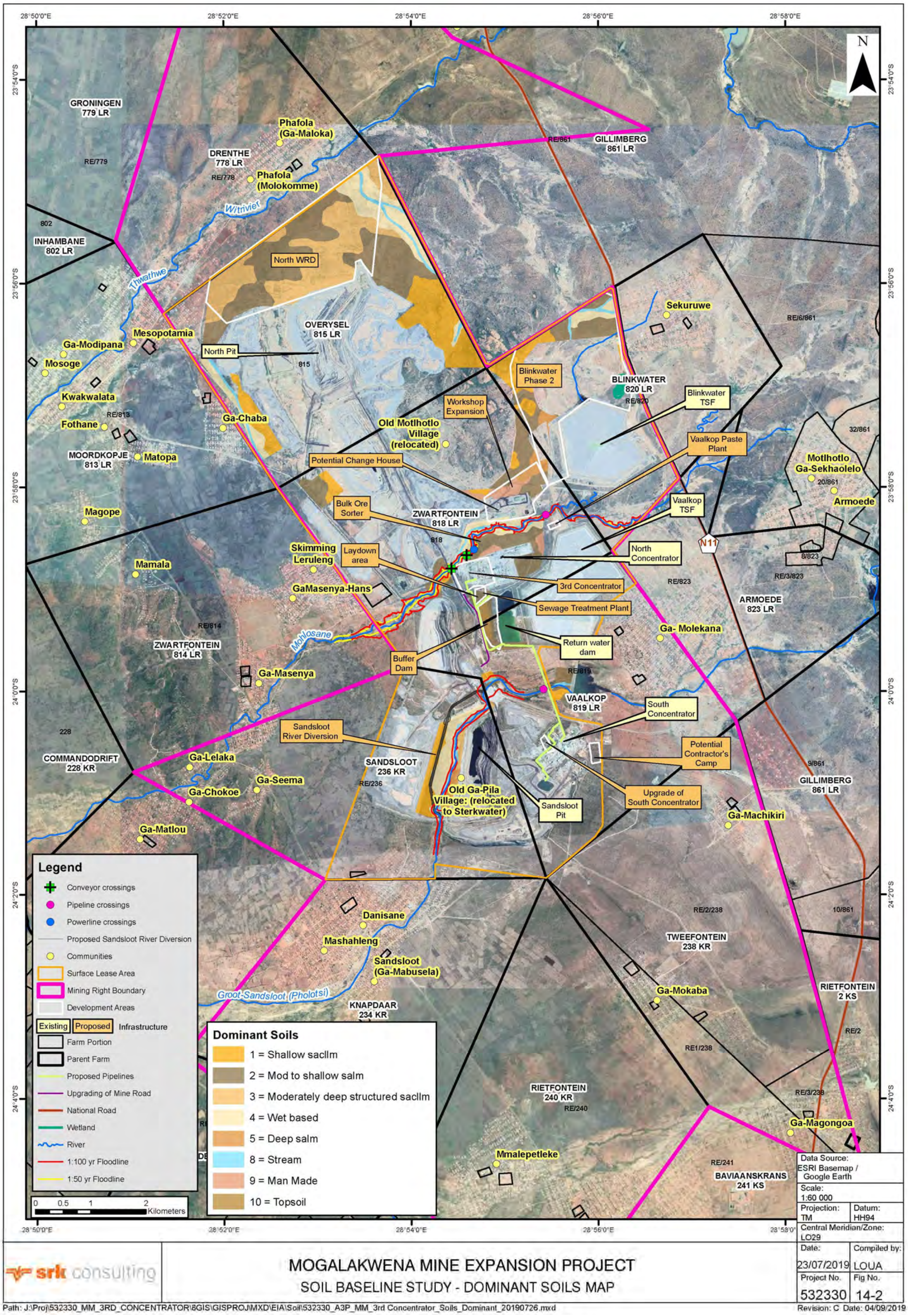


Figure 14-2: Dominant Soils Map

14.3.2 Soil chemical characteristics

The results of the laboratory analysis returned a variety of materials that range from very well sorted sandy loams with lower than average nutrient stores and moderate clay percentages (<18% - B2/1) to soils with a moderately stratified to strong blocky structure, sandy loam to clay loam texture and varying degrees of available nutrients.

In general, the pH ranges from acid at 5.2 to neutral and slightly alkaline at 6.25, a base status ranging from 11me% to over 30me% [Eutrophic (slight leaching status) to Dystrophic (moderate leaching status)], and nutrient levels reflecting generally high levels of calcium and sodium, but deficiencies in the levels of magnesium, potassium, phosphorous, copper, aluminium and zinc, with very low stores of organic carbon matter.

The more structured (moderate blocky to prismacutanic) and associated sandy and silty clay loams returned values that are indicative of the more iron rich materials and more basic lithologies that have contributed to the soils mapped. They are inherently low in potassium reserves and returned lower levels of zinc and phosphorous.

The growth potential on soils with these nutrient characteristics is at best moderate to poor and additions of nutrient and organics (compost) will be necessary if vegetative cover is to be propagated on these soils. They are at best moderate or poor grazing lands, with a poor arable land capability rating.

14.3.3 Soil physical characteristics

The majority of the soils mapped exhibit apedal to moderate blocky structure, moderate to good clay content and a dystrophic leaching status.

The texture comprises sandy clay loam to sandy loams for the most part, with more silty loams and clay loams associated with the colluvial and alluvial derived materials associated with the lower slope and bottom land stream and non-perennial waterways.

The semi-arid to arid climate (negative water balance) combined with the geochemistry of the host rock geology are conducive to the formation of evaporites, with the development of calcrete and ferruginous layers within the vadose zone. The accumulation of concentrations of iron and manganese rich fluids in solution will result in the precipitation of the salts and metals when exposed to high evaporation (negative water balance), while lithologies rich in calcium and magnesium will result in the formation of calcium carbonate layers once the soil waters is lost due to evaporation. These processes result in the development of a restrictive or inhibiting layer/zone within the profile over time, a factor that is important in a climate where water at surface is scares, a factor important to the ecology and biodiversity of this area.

The negative water balance is evidenced by the generally low rainfall of between 550mm/yr and 650mm/yr, and the high evaporation that exceeds 1,350mm/yr on average. These are the driving mechanisms behind the ouklip/hard pan ferricrete/laterites and in places calcretes mapped.

14.3.4 Soil erosion and compaction

Erodibility is defined as the vulnerability or susceptibility of a soil to erosion. It is a function of both the physical characteristics of a particular soil as well as the treatment of the soil. The majority of the soils mapped can be classified as having a moderate to high erodibility index in terms of their organic carbon content and clay content, while the steepness of many of the slopes add to the erosion index.

The concerns around erosion and inter alia compaction, are directly related to the disturbance of the protective vegetation cover and topsoil that will be disturbed during any construction and operational phases of the development. Once disturbed, the effects and actions of wind and water are increased.

14.3.5 Land capability and land use

The area to be disturbed by the proposed expansion and new developments will impact the surface environment, with the footprint of impact being planned over a range of land capability classes. This is especially true of the areas being considered for the expansion to the mining areas, the River Diversion (Groot Sandsloot River), the Blinkwater 2 TSF and North WRD, where until now only subsistence grazing has been the impact, while the expansion to the South Concentrator Debottlenecking Plant, the Buffer Dam, Paste Plant, reinstatement of the contractors camp, the laydown area for the contractors, expansion of the Workshops, Mine Access Road addition of another Change House and the upgrading of the Sewage Works will be undertaken on an already disturbed mining footprint.

These include significant areas of low potential grazing land and smaller but more sensitive sites that comprise soil with signs of wetness at their base (Refer to Figure 14-3).

- **Arable land:** There are no arable lands associated with this area.
- **Grazing Land:** The classification of grazing land covers the shallower and transitional zone soils that are well drained. These soils are generally darker in colour, and although not always free draining to a depth of 750mm, they are capable of sustaining palatable plant species, especially since only the subsoil's (at a depth of >500mm) are periodically wetted. The majority of the study area classifies as low intensity grazing land or wilderness status.
- **Wilderness / Conservation Land:** The shallow rocky areas and soils with a structure stronger than strong blocky are characteristically poorly rooted and support at best very low intensity grazing, or more realistically are of a wilderness character and rating.
- **Wetland (Areas with wetland status soils):** Wetland areas in this document (soils and land capability) are defined in terms of the wetland delineation guidelines, which use both soil characteristics, the topography as well as floral and faunal criteria to define the domain limits.

These zones (wetlands) are dominated by hydromorphic soils (wet based) that sometimes show signs of structure (stratification etc), and have plant life (vegetation) that is associated with seasonal wetting or permanent wetting of the soil profile.

A significant but relatively small proportion of the study area classifies as having wet based soils. These should not be mistaken as wetlands in terms of the delineation document, but should be highlighted as potential zones of sensitivity that will need to be accounted for and managed as part of the construction phase and at rehabilitation.

These zones are considered very important, highly sensitive and vulnerable due to their ability to contain and hold water for periods through the summers and into the dry winter seasons. As far as possible the proposed infrastructure has been placed to avoid these sensitive areas and where avoidance is not possible to minimise the footprint occupied.

The baseline study indicates that the proposed development will impact some sites with sensitive to moderately sensitive soil forms, albeit that the land capability is for the most part considered to be of a poor grazing to wilderness land capability rating. Refer to Figure 14-3.

The infrastructure being proposed could, if not well managed, have a moderate to high negative impact on the surface conditions.

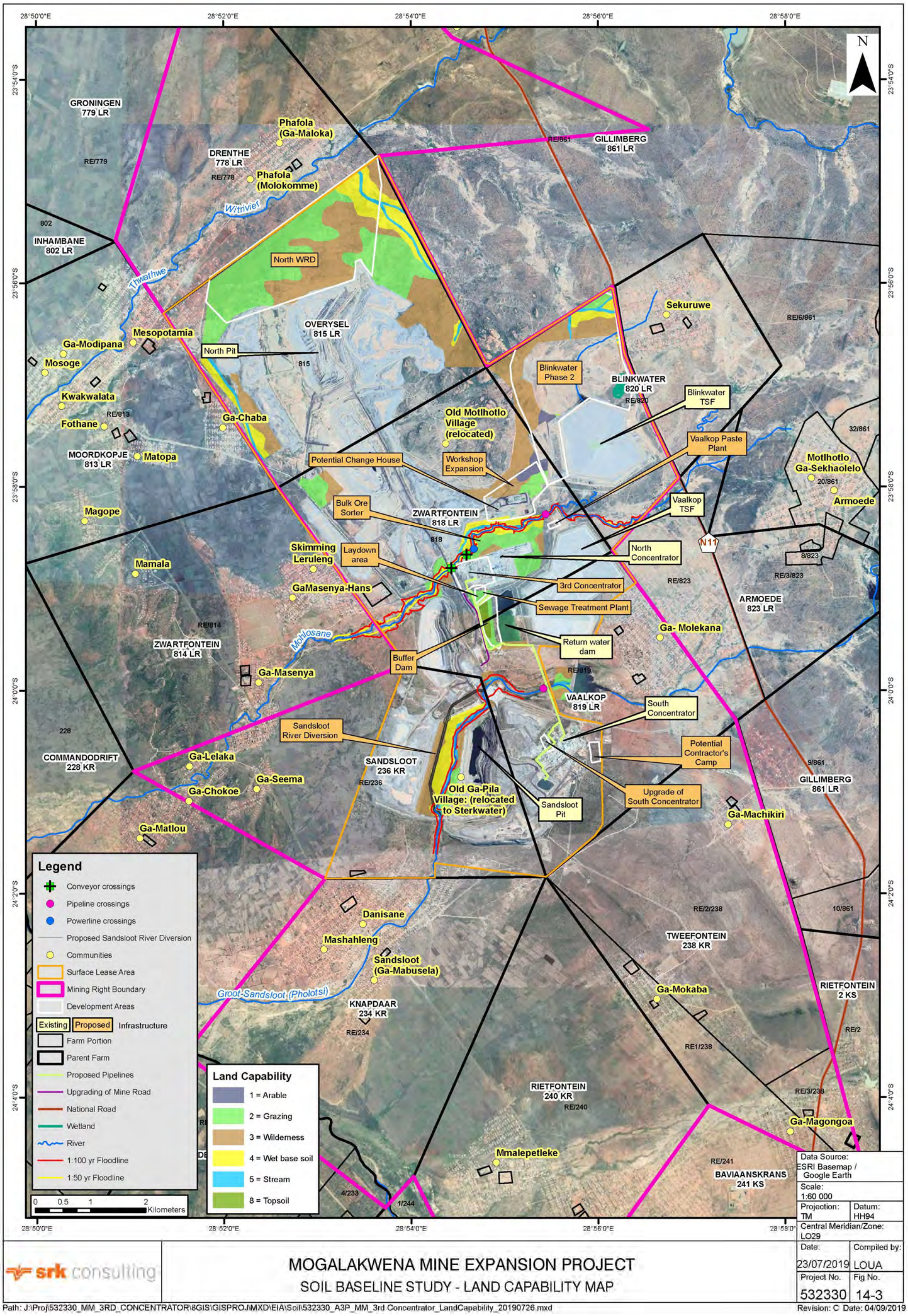


Figure 14-3: Land capability map

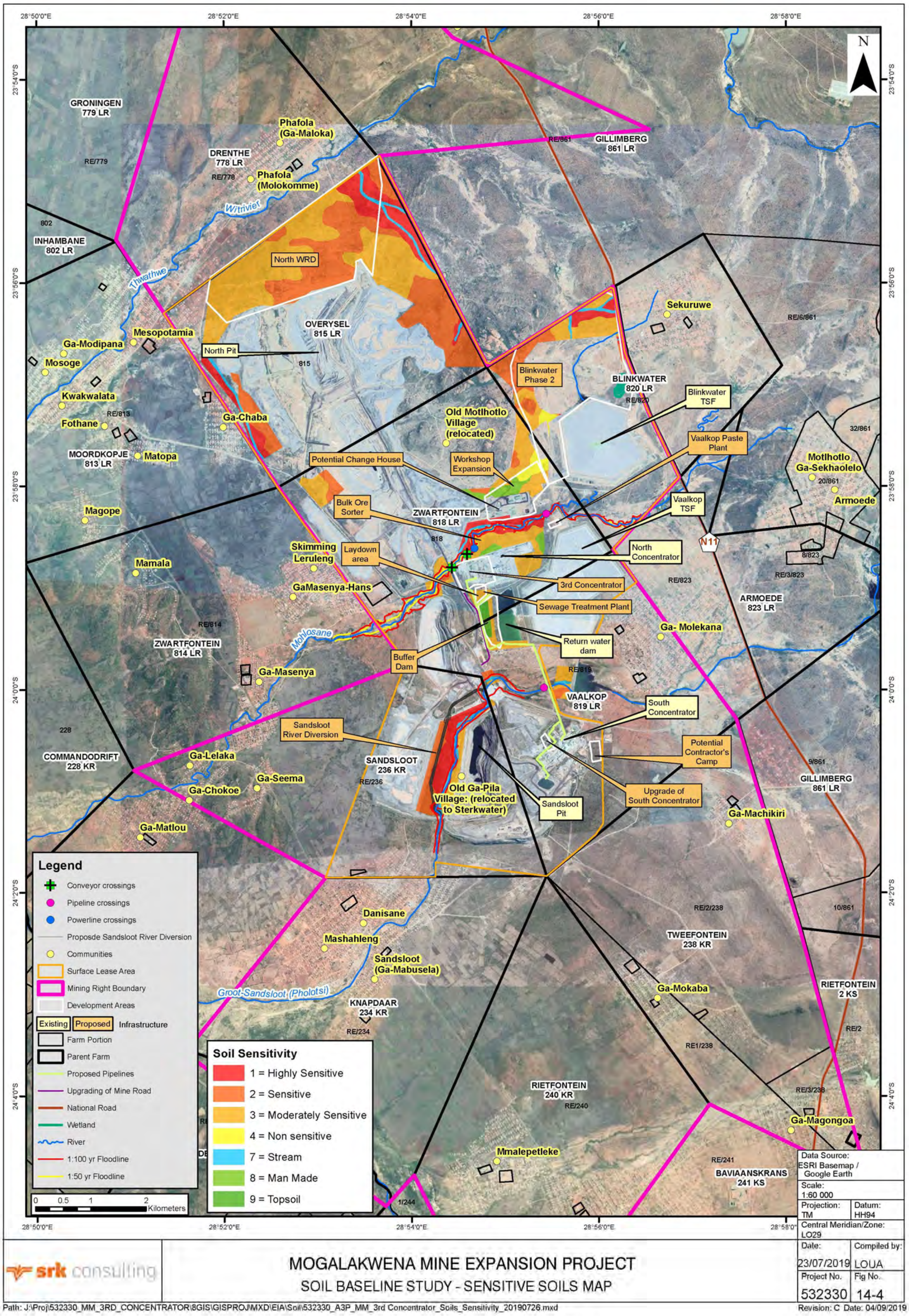


Figure 14-4: Soil sensitivity map

14.4 Biodiversity

The information presented in this section is extracted from the specialist Biodiversity undertaken by BioAssets in 2019.

This section provides a summary of the biodiversity of the area including a description of the areas where the proposed infrastructure and activities associate with the proposed Expansion Project will take place.

The general habitat in the area falls within the Savanna Biome and the vegetation unit at Mogalakwena Mine is represented by Makhado Sweet Bushveld (SVcb 20) (Mucina and Rutherford 2006). The Makhado Sweet Bushveld is found in the Limpopo Province where it is present on the plains between the Soutpansberg (to the north) and the Waterberg (to the west). The vegetation is known for the short and shrubby bushveld with a poorly developed grass layer on the slightly too moderately undulating plains. The area is known for its rich minerals and the geology consists of gneisses and migmatites (Hout River Gneiss) with some intrusions of potassium-deficient gneisses (Goudplaats Gneiss) and sand- and mudstones of the Matlabas Subgroup. In general, the soils are deep greyish sands, eutrophic plinthic catenas, red-yellow apedal freely drained soils with a high base status and clayey soils in low-lying areas. The climate associated with the vegetation unit is summer rainfall with very dry winters, a mean annual precipitation about 350-550 mm where the altitude ranges between 850-1 200 m (Mucina and Rutherford, 2006).

Please refer to Table 14-2 and Table 14-3 for a summary of the biodiversity features associated with the key and supporting infrastructure.

A description of the surface water features in the study are is provide in Table 14-4 and specific site references is provided in Figure 14-5.

Table 14-2: Key infrastructure biodiversity features

Third Concentrator	Blinkwater 2 TSF Expansion	North WRD
Habitat		
• The proposed M3C area is severely modified as it forms part of the industrial activities within the concentrator plant • Small patches of vegetation remain and is associated with small "islands" between hauling roads, parking areas and the larger MNC • The small area to the west where some vegetation occurs is on a site where spoils dumping was done previously and the emerging vegetation is dominated by grasses, some forbs and a few small shrubs • The new development will have no major impact on the terrestrial vegetation, but some impacts related to the river can occur. This will mainly be changes to flows (e.g. storm water runoff) and siltation during rain events • The instream and riparian habitat of the Mohlosane River near the M3C has been modified. When looking at the impacts downstream, it is clear that the system is modified and the habitat assessment on the site indicate a Class D/E (40% for the Instream Habitat Integrity Score) with the changes in flow, stream habitat integrity and erosion the main negative impacts	• The larger site consists of a disturbed savanna plain with varied impacts (roads, sand mining, wood harvesting, grazing and trampling) • In general, the low ground cover consists of mostly pioneer plant species. The tar road in the west and an existing tailings facility borders the proposed footprint for the expansion project with numerous tracks, exposed and bare areas with small patches of bush encroachment and weeds, grazing, trampling, wood harvesting and sand mining reflecting the anthropogenic impacts at the site • The general flow regime of the Mohlosane River is severely modified by the construction of the Blinkwater TSF (blocking some flow from tributaries) and the catchment to the east of the mining complex where numerous small impoundment modified the system • The current erosion, sand mining and wood harvesting are the main contributors to the degradation of the habitat. The trampling and heavy grazing load contribute to the change in the vegetation cover and degradation of the diversity of the woody species • The development will decrease the buffer around the granite outcrops and will therefore impact negatively on the already limited migration options for animals and birds in the area. As noted in 2015 (Terblanche, 2015) the site on the plains was of little conservation value as a migration corridor. As is the case with this study, Terblanche (2015) was of the opinion that the granite hills are of particular conservation importance for the site and the region, including as a migration corridor in the larger area	• The areas where the rock dumping is taking place is severely modified and changes to the habitat where the proposed expansion will take place will be high • The impact relates to loss of habitat, flow of surface and subsurface water to the Wit River and habitat for biota. This area is currently the connection to the granite outcrops and the larger habitat to the West and North
Biodiversity – fauna and flora		
• The natural vegetation is severely modified as a large section of the site falls within the concentrator footprint. The development will have no impact on the natural vegetation of the area, as the modified area don't represent the plant community of the area • The species noted were *Sclerocarya birrea*, *Gymnosporia buxifolia*, *Dichrostachys cinerea*, *Vachellia xanthophloea*, *V. tortilis* subsp. *heteracantha*, *Ziziphus mucronata*, *Peltophorum africanum*, *Grewia flava*, *G. monticola*, *Ozoroa paniculosa*, *Euclea crispa* and *Bolusanthus speciosus* • With regard to the protected tree species, numerous *Sclerocarya birrea* were observed and it will need a permit from the Department of Agriculture, Forestry and Fisheries (DAFF) for cutting or trimming of the trees	• At the Blinkwater TSF, the indigenous tree species diversity is good, but the numbers of some species are very low (result of over exploitation). Low shrubs dominate and the species that dominate are *Dichrostachys cinerea* and *Vachellia tortilis* subsp. *Heteracantha*. Other species have been listed in the Biodiversity Specialist Report (Appendix 16) • The grass layer is poorly developed over most of the site area (historic and current land use practices) and the dominant species are well adapted to degraded and modified veld conditions (e.g. *Eragrostis gummiflua*, *Chloris virgata*, *Urochloa mossambicensis* and *Melinis repens*) • On the rocky ridges (granite hills) to the northwest there is a high diversity of indigenous trees and shrubs which are present on the slopes and at the summit which include *Cussonia natalensis*, *Euphorbia ingens*, *Mundulea sericea*, *Elephantorrhiza burkei*, *Annona senegalensis*, *Ficus glumosa*, *F. tettensis*, *F. ingens*, *Elephantorrhiza burkei*, *Vangueria parvifolia*, *Burkea africana*, *Englerophytum magalismontanum, Nuxia congesta* and *Ormocarpum trichocarpum* • The pioneer species such as *Vachellia tortilis* and *Dichrostachys cinerea* dominate with the others present in much lower than expected numbers. This is a clear indication that the historic and current land-use practices had a negative on the natural vegetation diversity and the development will have a low impact on the vegetation unit in the region.	• Currently the natural vegetation at the proposed north WRD site is moderately modified on a local and moderately low on a regional level • There are areas where cultivation, heavy grazing and wood harvesting resulted in a vegetation community modified with pioneer species dominating, including encroachment of *Vachellia permixta, V. tortilis* and *Dichrostachys cinereal* • The other woody species present include *Sclerocarya birrea*, *Combretum imberbe, Boscia albitrunca* (permit needed from DAFF for cutting), *Vachellia rehmanniana, V. nilotica, Ziziphus mucronata, Ormocarpum trichocarpum, Grewia monticola, G. flavescens, Commiphora pyracanthoides, Dodonaea viscosa var. angustifolia, Gymnosporia buxifolia, Carissa macrocarpa, Combretum molle, C, zeyheri, C. apiculatum, Euclea crispa, E. divinorum, Searsia pyroides, Senegalia caffra, S. mellifera subsp. detinens, Ehretia rigida, Peltophorum africanum, Flueggea virosa, Terminalia prunioides, Olea europaea subsp. africana and Strychnos spinosa* • Some of the prominent succulents included *Aloe marlothii*, *A. greatheadii* and *Euphorbia tirucalli* while the alien invasive noted include *Senna didymobotrya*, *Ricinus communis*, *Datura stramonium*, *Schinus molle*, *Jacaranda mimosifolia*, *Morus nigra, Melia azedarach* and *Agave sisalana.*
• At this site, the enclosed security fence and high levels of activity deter any animals to establish permanently in the area. One will however expect some to pass through on occasions, but there was no activity or tracks noted during the specialist survey.	• The numerous activities (including sand mining, wood harvesting, hunting with dogs and setting of snares) will deter any larger animals to reside on site • The only presence of any larger mammals present were spoor of a *Raphicerus campestris*. • Very little signs of rodents were seen, and a few tracks were observed in areas with denser vegetation clumps • A concern is the encroachment of the granite outcrops. As was noted in earlier reports (e.g. Terblanche, 2015; Vlok, 2015) this habitat is considered as prime biodiversity hot spots that act as refugia for migrating animals and birds and for various plant species. The current activities around these areas are of concern as it will have a negative impact in the long-term. The removal of vegetation, hunting and sand mining are some of the impacts, but the fact that the existing rock dumps and future proposed rock dump and Blinkwater TSF will isolate this area will result in a loss of its functionality over time	• During the survey at the north WRD, it was noted that there was a low diversity and presence of biota. The only noticeable signs were of rodents, *Lepus capensis* and *Galerella sanguinea*. This is related to the increased activities in the area which include the mining (rock dump), settlements encroaching nearer to the mine boundary, hunting with dogs and the setting of snares • The development will have an impact on the remaining wild animals in the area, but it will be a low impact on a regional level

Third Concentrator	Blinkwater 2 TSF Expansion	North WRD
Riparian delineation and mapping of drainage lines		
• A riparian survey was conducted for the Mohlosane River north of the site, as the proposed activities will impede in this area. The historic drainage line south of the site is modified and no clear riparian zone is found and no mapping can be done due to the fact that the area is disturbed • A separate survey was conducted to finalise the riparian delineation for the affected area of the Mohlosane River upstream and downstream of the affected area		• Impacts to water resources will be high with regard to runoff, siltation, pollution and erosion from the new facility, especially during the initial construction phase • The potential for seepage from the rock dump is high if not well managed and this will have a negative impact on the surface and groundwater resources. It is recommended that a proper monitoring programme must be implemented prior to construction in order to get reliable baseline data for the river. This must include monitoring point upstream of the N11
Wetlands		
• No known wetlands in the vicinity of the M3C	• The current impacts to the wetland associated with the Blinkwater TSF are related to loss of connectivity to a water supply from the small catchment to the east of the N11 and the water from the northwest (granite outcrops) • The impacts are the road and berm northwest of the wetland that cut off surface and subsurface flow from the catchment and the N11 and pipeline to the northeast restricting flows into the wetland • The vegetation is in a fair condition and during the survey there was some water in a small section (excavated/dammed area) of the wetland • Under the current conditions it is clear that the wetland is degrading (loss of water) and this can be related to the changes in the flow regime, the recent droughts, abstraction and diversion of water from the area • The expansion of the Blinkwater TSF will have a moderate to high impact on the wetland, as it will impede on the already modified flows from the northwest	• No known wetlands in the vicinity of the North WRD

Table 14-3: Supporting infrastructure biodiversity features

South Concentrator Upgrade	Buffer Dam	Contractors' Camp	Contractors laydown	Workshop Expansion	Sandsloot River Diversion
Habitat					
• The area between the rock dump and MSC is severely modified. Any new development will have a limited impact on the already severely modified habitat of the area.	• The condition of the Buffer dam habitat varies from modified to fair • In some areas the current developments have transformed the area • The habitat can be considered to be assisting some biodiversity as there were signs of *Lepus capensis* and *Galerella sanguinea* (some scat and tracks). • If the larger development is taken into consideration, these small islands have very limited capacity to carry sustainable populations of mammals and are mostly migration corridors (e.g. link to open areas to the east) or part of a larger territory where sufficient open areas are present for the populations to thrive	• The area within the Contractors' Camp is modified as it was previously extensively utilised for temporary accommodation and although some structures were removed after the major construction on the mine was completed • The site shows no severe impacts to the habitat, apart from the levelling of the terrain • Some impacts on habitat can be expected with the proposed upgrade as some clearing of the vegetation and bringing in of material for construction will take place, but this will be of low significance. • Impacts related to water and water resources will be of higher significance and will be related to storm water runoff, potential pollution (oils, fuels from vehicles, food materials and other household refuse) that will impact on the water draining to the Wit River (two historic drainage channels north and west of the compound draining to the west)	• The habitat at the contractor's laydown area is modified, from historic and current activities • In the northern section the current laydown facility dominates the changes, and this has resulted in severe changes and impact to the environment • To the south, the changes is to the vegetation mostly and some smaller impacts related to infrastructure (roads and buildings) • The development will expose more open soils and create hard surfaces that will result in increased runoff and therefore a decrease in localised infiltration of water	• The expansion of the workshop and additional change house area is in the core activity zone of the mine's activities and the habitat is severely modified • Very little of the original habitat features remain. The development has further diverted the flow of the Klein Sandsloot/Mohlosane River and two of its smaller tributaries • The expansion of the workshop area will have some negative impacts related to water runoff and possible siltation of the river to the south	• The habitat associated with the area where the Sandsloot river diversion is planned, is modified and the current activities have a large impact on the system as a whole • The mining pit to the east and rock dump to west both impact on the system and with the larger industrial complex to the north the drainage system is isolated from its catchment • The southern section of the study area has been modified by the clay material washed from the rock dump resulting in a thick layer of material deposited onto the original soils • The mining activity to the east resulted in the earlier diversion of the river. As a result, the straight channel (artificial channel created) with limited roughness caused increased flow velocities bring about the higher erosion of the channel bed and stream banks. • To the north of the study area, the material washed from the west is not as much as to the south. The natural habitat is more intact, but the impacts from historic activities (agricultural) is clearly visible. This includes cultivated areas and infrastructure (buildings, cattle facilities and storage facilities) with some evidence of roads, wood harvesting, grazing and trampling present. • The proposed development will have a significant impact on the remaining habitat
Biodiversity (fauna and flora)					
• The natural vegetation on the site is severely modified as this area is surrounded by various large operations • The trees include *Clerodendrum glabrum, Vachellia xanthophloea, V. robusta, Senegalia nigrescens, Dichrostachys cinerea, Sclerocarya birrea, Grewia flava, Bolusanthus speciosus* and *Euclea divinorum*. Some of the exotics include *Senna didymobotrya* and *Schinus molle*. A permit for the cutting of the *Sclerocarya birrea* must be obtained from the Department of Agriculture, Forestry and Fisheries (DAFF) • The proposed development of the new plant will have little impact of the natural vegetation associated with the area	• The vegetation in general is heavily modified and although the diversity of species is fair to good, the numbers of the climax species are generally low • In some areas the pioneer species *(Dichrostachys cinerea and Vachellia tortilis*) are high and form dense stands, related to historic and current clearing of the natural vegetation • Species in this area include *Dichrostachys cinerea, Vachellia tortilis subsp. heteracantha, V. xanthophloea, Ziziphus mucronata, Sclerocarya birrea, Combretum hereroense, C. apiculatum, C. imberbe, Gymnosporia buxifolia, Grewia flava, G. flavescens, Searsia pyroides, S. lancea, Clerodendrum glabrum var. glabrum, Peltophorum africanum, Senegalia mellifera subsp. detinens, Euclea divinorum, Bolusanthus speciosus, Kirkia wilmsii* and *Euphorbia tirucalli*.	• The natural vegetation in the area of the potential contractors camp is severely modified with *Ziziphus mucronata* and *Dichrostachys cinerea* dominating the woody species • Other species include *Ormocarpum trichocarpum, Ehretia rigida, Gymnosporia buxifolia, Vachellia tortilis subsp. heteracantha, V. rehmanniana, V. permixta, V. xanthophloea, Sclerocarya birrea* (permit needed from DAFF for cutting), *Grewia flava, G. monticola, G. flavescens, Gossypium herbaceum, Commiphora schimperi, Combretum imberbe* (permit needed from DAFF for cutting*), Peltophorum africanum* and *Albizia anthelmintica*. The only succulent noted in the area was *Aloe greatheadii*. • A number of alien invasive are present and include *Melia azedarach, Senna didymobotrya, Schinus molle* and a number of *Opuntia spp*	• The natural vegetation at the contractors laydown area is modified by current and historical activities and the larger trees are mostly absent, indicating removal (e.g. construction material, fire wood, clearing for cultivation or clearing to lower fire risks) • The trees and shrubs are mostly small (<2.5m) and the pioneers dominate • Species include *Dichrostachys cinerea* and *Vachellia tortilis subsp. heteracantha* the two pioneers that are dominating the vegetation and the low numbers of *Sclerocarya birrea* (permit needed from DAFF for cutting/trimming), *Bolusanthus speciosus, Kirkia wilmsii, Senegalia mellifera subsp. detinens, Gymnosporia buxifolia, Euclea divinorum, Peltophorum africanum, Searsia leptodictya, Grewia flavescens* and *Ziziphus mucronata.* • The development will have an impact of the plant community, but it is very limited	• No discernible patches of natural vegetation that can be considered to represent the vegetation unit of the area • This large area is in the heart of the mining complex and its operations and the vegetation is totally lost • With the high vehicle and machinery activity and intensive developments at the workshop area expansion, no animal activity was noted. The further development of this area will have an impact on any possible animal activity, but it will have a negligible impact on the diversity of animals on a regional scale	• The vegetation in this section of the Groot Sandsloot River diversion, is modified as a result historic and current activities • In the southern section, the inflow of the clay material from the rock dump resulted in *Grewia vernicosa* dominating the vegetation composition • In the northern section where the clay material are only found in a narrow band near the rock dump, the *Grewia vernicosa* are present in that area, but where the natural habitat (soils) is present, the encroachment is dominated by *Dichrostachys cinerea* and *Vachellia tortilis* subsp. *heteracantha*. • Other trees present include *Ficus glumosa*, F. *tettensis, Ziziphus mucronata, Flueggea virosa, Grewia flava, G. flavescens, Olea europaea subsp. africana, Euclea crispa, E. undulata, Combretum hereroense, C. petrophilum, C. molle, C. imberbe, Ehretia rigida subsp. nervifolia*, *Vachellia permixta, Gymnosporia buxifolia, Searsia lancea, S. leptodictya, Ozoroa paniculosa, Commiphora pyracanthoides, Bolusanthus speciosus, Sclerocarya birrea, Kirkia wilmsii, Pappea capensis, Elephantorrhiza burkei, Diospyros lycioides var. guerkei and Clerodendrum glabrum var. glabrum.* • The development will result in the loss of the natural vegetation

South Concentrator Upgrade	Buffer Dam	Contractors' Camp	Contractors laydown	Workshop Expansion	Sandsloot River Diversion
		• There were no signs of any wild animals during the survey at the contractor's camp area in the area and this can be related to the high incidence of activities and the isolated nature from larger open areas	• A few protected trees will be removed if the site is totally cleared, but it is recommended that the few larger trees (all species) higher than 3m as left intact and that all *Sclerocarya birrea* (irrespective of size are left). This will give some cover and habitat for the birds remaining in the area • No visual observation were made of any animals during the survey, only old scat of *Lepus capensis* was noted in two places • From the survey it is clear that the isolation of this site and the surrounding activities lower the number of animals using the area for foraging or as living space. The development will have a negligible impact on the biota in the area, but it will be very low on a regional scale		• During the survey at the Sandloot river diversion, no sufficient water was present in the channel that allowed for the fish and macro-invertebrate survey to be completed. On the day of the site visit, no sightings of any wild mammals were made, only tracks of *Hyaena brunnea* and scat of *Lepus capensis* and *Galerella sanguinea* were observed.
Riparian delineation and mapping of drainage lines					
• There no known drainage lines on the site (confirmed during the field survey) • Currently, the excavated area act as a water trap of runoff from the surrounding landscape that can assist in water penetration (recharge of groundwater)	• There is no indication on historic maps that there are any drainage lines on the site and the two small channels present are associated with the water draining from the new infrastructure	• There no known drainage lines on the site (confirmed during the field survey)	• The historic drainage channel was diverted with the construction of the impoundment to the east • Historically no clear riparian zone (with specialist riparian trees) would have been present, as it is an ephemeral system with water only present during rain events • During the survey, no clear stream was observed and storm water management must divert water to the west to deliver the water to the Mohlosane River	• There no known drainage lines on the site (confirmed during the field survey)	• The riparian vegetation to a large extent is severely modified • In sections the typical riparian species are absent, while in other areas there is a dense growth related to the runoff and/or seepage from the mining activity and rock dump • The mining activities increase the surface flow of water to the river area increasing the water in the area and as a result some denser patches of terrestrial trees were observed • Some of the species in the "riparian zone" is *Combretum imberbe* (associated with wetter areas – permit needed from DAFF for cutting and pruning) and *Ziziphus mucronata, Vachellia tortilis subsp. heteracantha, Olea europaea subsp. africana* and *Bolusanthus speciosus*. In general, the riparian zone is modified with the northern section of the stream channel eroded. • The erosion is as a result of the increased flow velocity of the point where the river was bridged. The upstream width historically was wider channel, but at the road crossing, the narrower culvert increase the flow velocity, resulting in the erosion downstream of the road crossing. Apart from the erosion of the stream channel, the river banks were eroded as well • The riparian zone in these ephemeral streams are extremely sensitive to the increased flows and when one see removal of vegetation, the impact of the water increase the erosion potential of the river banks

Table 14-4: Surface water features in the study area

Witriver (Thwathwe River)	Groot Sandsloot	Mohlosane River (Klein Sandsloot)	Mogalakwena River
Habitat assessment			
• The site at Wit 1 is a tributary of the Wit River. It is near a settlement where erosion, solid waste disposal and over grazing is having a severe negative impact on the environment. In addition, the area is not serviced by a local authority and therefore almost all households use pit latrines on the properties • Site Wit 4 is considered to be in the main channel of the Wit River and is just below an impoundment with extensive settlement to the north and south of the area. Apart from over grazing, trampling and wood harvesting contributing to erosion, the water runoff from the settlements contribute to the loss of soil at an increased rate. The alien vegetation infestation present is at a low density under the current climatic conditions (low rainfall at the start of the wet season) • Site Wit 3 is situated on a large tributary network north of the main channel of the river just above a large impoundment. The area was part of a larger commercial farm and is now extensively used for grazing by the land users. As was the case at the other sites, the natural vegetation is modified due to overgrazing and trampling resulting in accelerated erosion into the stream. The cultivated fields to the north are poorly managed and increased surface runoff contribute to the erosion in the larger catchment. The settlements to the west have no formal services and organic pollution (sewage, solid waste from households) contribute to potential negative impacts on the surface and ground water. • Site Wit 2 is at the confluence of the tributary system (associated with Wit 3) and the main stem of the Wit River. There was a cumulative impact from upstream and an increase in sedimentation and solid waste both in the channel and the surrounding areas. The sediments are mainly from the catchment of the tributary, as the impoundments in the main channel of the Wit River will act as sediment traps • Site Wit 1 is at the crossing of the N11 over the river and here the cumulative impacts can be assessed. It is clear that on the site, wood harvesting and dumping of solid waste is a problem. The numerous impoundments in the main channel are restricting surface flows in low rain events and this is a concern with regard to the instream habitat. The lack of infrastructure in the settlements near the river contribute to the organic pollution (sewage and waste disposal) into the stream channel. Erosion at the site is as a result of over grazing, trampling by cattle and removal of the natural vegetation (wood harvesting) • The site adjacent to the mine (Wit 5) is modified with the large settlement to the west and the mining activities to the east. This site is recommended for future monitoring to evaluate the possible impacts and changes to the water quality as the mine activities expand. The exposed river banks increase the influx of sediments into the channel and this is having a negative impact on the streambed morphology (e.g. terrestrial encroachment into the channel) • The site just below the mining activities (Wit 6) is in the settlement with numerous negative impacts present – development into the riparian zone, dumping, removal and harvesting of vegetation, trampling and erosion. The riparian zone is modified and unstable resulting in	• The assessment of the first site (GS 4) was done on a tributary of the system flowing from the south into the Groot Sandsloot. The catchment in this area is dominated by settlements and cultivated lands and where the natural vegetation is modified. The settlements have no formal services and therefore the dumping of solid waste and potential pollution from organics (sewage and household wastes) are a concern. The heavy grazing pressure and trampling from cattle in addition to poorly constructed and maintained roads contribute to the erosion in the catchment. Sand mining was noted in the tributary and this contribute to the collapse of the stream banks • The second site (GS 3) is on the main stem of the river near site GS 4 (at confluence) and the impacts are similar with the grazing, trampling and wood harvesting resulting in elevated erosion into the Groot Sandsloot. The increased runoff (hard surfaces and exposed soils in the catchment) resulted in the increase flow velocities and therefore deeper incising of the channel. This changed the streambed characteristics for example the filling of deeper pools with sediment and exposing of the riverbanks resulting in collapsing during high flow events. • Towards site GS 2, the habitat is modified with serious erosion in some sections and the modification of the channel characteristics. There are sections where the channels were widened due to the poor natural vegetation on banks and then the encroachment of terrestrial vegetation into the channel in dyer periods. In some instances, the encroached areas responded positively where the vegetation slowed flow velocity and therefore lower the impacts of accelerated erosion. In other parts, severe bank erosion was observed and this has led to a collapse of the river banks and changes to the streambed morphology. The impoundments just above site GS 2 act as sediment traps and further to reduce flow velocity during rain events and this had mild positive impacts on the stream morphology • Site GS 1 is at the N11 and here the habitat is severely modified. The catchment between Site GS 2 and GS 1 is severely eroded as a result of a near total loss of natural vegetation. This is in response to cultivation on the slopes, heavy grazing, trampling, wood harvesting and subsequent sand mining activities. The result is serious erosion above the road. The narrow bridge further contributes to the increase of flow velocities and this resulted in a deepening of the channel upstream and downstream of the road bridge. • The site on the access road to the mining complexes main entrance (Site GS 5) is modified as a result of the upstream and downstream activities and the natural vegetation is in a fair condition. The impacts upstream are related to the settlements east of the N11, the mining complex activities north of the site (e.g. stores, tailings facilities, concentrators) and the roads and road bridge narrowing the river channel, resulting in the accelerated flow velocities (increased erosion) downstream • Site GS 6 (west of the mining complex) is in the settlements with encroachment into the riparian zone. These activities have a negative impact on the river bank stability resulting in increased erosion. The buildings in the riparian area, dumping of refuse and increased runoff and erosion have a negative impact on the habitat integrity and water quality of the river downstream. • The site just before the confluence with the Mogalakwena River (Site GS 7) is associated with the settlements and agricultural activities near the two rivers. Grazing, trampling, harvesting of wood, cultivation and erosion have a negative impact on the	• Of the three system evaluated, the Mohlosane catchment and stream habitat is the most modified. The largest impact associated with the system is the extensive erosion in the larger catchment. The small catchment is dominated by settlements, roads, storm water runoff from the hard surfaces, sand mining activities, grazing and trampling. All these practices contribute to the excessive erosion on the exposed and vulnerable soils. • This will have an impact on water retention and penetration reducing any groundwater recharge from the system in the catchment (KS 1 – 4). Site KS 4 is in the upper reach of the Mohlosane River, KS 3 in the area between two small (historically defined) tributaries, KS 2 in a larger tributary to the north and KS 1 where the river crosses under the N11. • The sites below the mining complex are modified and associated with the settlements in the area. Site KS 5 south of the mining complex is modified. The historic and recent impacts include agriculture, the mining developments, wood harvesting, grazing, trampling, dumping of household refuse and erosion. • The site downstream of this area (Site KS 6) is in the larger settlement complex southwest of the mine and apart from runoff, possible sewage pollution, dumping of refuse, encroachment into the riparian zone, the harvesting of wood, grazing and trampling contribute to the habitat modification, erosion, pollution of water resources and the poor integrity of the stream habitat and channel. • Site KS 7 is just before the confluence of the Mohlosane River with the Mogalakwena River. It is downstream of the settlements and an extensive area of cultivated lands. Apart from the modified natural vegetation in the area, the river channel and banks are modified and eroded. This have a definite negative impact on the water resources downstream.	• The habitat at all sites In the Mogalakwena River is modified. At Site MG 1 the impacts are related to upstream and site related activities and include abstraction, flow modifications (instream and river banks, cultivation, grazing and trampling) with some alien invasive – mostly *Eucalyptus spp*. in the channel lowering the integrity of the river. Water resource impacts further include possible pollution (changes in water quality) from the numerous settlements in the catchment and return flows from sewage, dumping of refuse and spillage from small and medium industries in the area. • At Site MG 2 the impacts are related to the mining activities (return flows from the Groot Sandsloot), settlements, wood harvesting, cultivation, grazing, trampling, erosion and dumping of refuse. During rain events the runoff of sewage and shallow subsurface water flows will impact on the water quality. The numerous abstraction points and impoundments in the rivers modify the flow regime of the tributaries and ultimately in the main channel of the Mogalakwena River. • At Site MG 3 the cumulative impacts from the upstream areas are mostly related to flow modifications and water quality with additional inputs from the Mohlosane River modifying the water quality. These impacts include flow modifications, abstractions (weirs and dams), flow diversions, settlements, refuse dumping and the numerus impacts related to the agricultural activities. The natural vegetation to a large extent is modified and was noted in the surveys associated with the tributaries, pioneer woody and grass species dominate with encroachment prominent is large areas. In addition, the increase of alien invasive species (erode and exposed soils) is a concern in the larger catchment area of the river system. The fact that this section between MG 3 and MG 4 borders the Groenfontein/Mooihoek Nature Reserve, doesn't contribute to the potential improvement of the river habitat, as the eastern boundary is open to the settlements and communities for use. • Site MG 4 is the lowest point surveyed. This site will have an important monitoring value, as it is the point where the total cumulative impacts with relation to water resource impacts can be measured. Where Site MG 1 can be considered as the site where the inflows of pollutants can be measured, the last site is the endpoint where inputs from the Groot Sandsloot, the Mohlosane River and the Wit River can be analysed.

Witriver (Thwathwe River)	Groot Sandsloot	Mohlosane River (Klein Sandsloot)	Mogalakwena River
increased erosion impacting on the integrity of the river banks and the instream habitat	Groot Sandsloot, with the stream habitat and integrity negatively impacted. Dumping of household refuse contribute to pollution of the water resources. • When looking at the riparian vegetation associated with the system it is clear that the tributaries considered as ephemeral in nature, don't have the typical obligate and preferential species present. In some instances, some facultative species can be found, but in general it will be dominated by the upland species. • The areas downstream of the mining complex is modified with harvesting of wood, trampling and grazing having a negative impact on the species diversity and composition and with some encroachment of the pioneer woody species in areas. • The species composition in the area east of the N11 is modified with the pioneer such as *Vachellia tortilis* subsp. *heteracantha* dominating as a result of historic vegetation removal (building material and fire wood). Other species present on the streambanks that are more abundant are *Searsia lancea, Peltophorum africanum* and *Vachellia permixta*. • Downstream of the mining complex the species include *Vachellia tortilis* subsp. *heteracantha, V. nilotica* subsp. *kraussiana, V. rehmanniana, V. permixta, Olea europaea subsp. africana, Combretum imberbe, C. molle, C. apiculatum, Gymnosporia buxifolia, Sclerocarya birrea, Ziziphus mucronata, Dichrostachys cinerea, Spirostachys africana, Searsia lancea, S. leptodictya, Peltophorum africanum, Vitex rehmannii, Flueggea virosa, Grewia flaviventris and G. vernicosa*. The alien invasives include *Ricinus communis, Tagetes minuta, Senna didymobotrya, Datura stramonium, Jacaranda mimosifolia, Morus nigra and Schinus molle*.		
Riparian vegetation assessment			
• The riparian vegetation along the river is severely modified. In most cases the vegetation is absent due to wood harvesting • The riparian zone along the tributaries of the Wit River will be represented by terrestrial vegetation or some of the upland riparian species, as the system is considered to be an ephemeral system with very infrequent flows. • The number of impoundments have further modified the flow regime resulting in lower flows during rain event and this will have a negative impact of the vegetation on the streambanks. • In certain areas of the rivers main channel, the riparian vegetation is absent or very scarce due to harvesting over time. In some areas the cultivation activities encroached close to the streams and this had a negative impact on the vegetation as well.	• Due to the "no flow" conditions, there was no opportunity to sample for fish or macro- invertebrates and therefore the existing PES conditions will be used as baseline for the determination of the current ecological conditions.	• The total modification has made it impossible to do any biodiversity surveys in the stream channels. During the survey of the upper section (east of the N11), the whole catchment was dry and no open or surface water was observed.	• The natural vegetation in general is modified. • Wood harvesting, large areas exposed for cultivation and grazing contribute to the changes in vegetation biodiversity and composition and large areas are dominated by pioneer woody species such as *Vachellia tortilis subsp. heteracantha, V. permixta* and *Dichrostachys cinerea*. Other woody species present (in low numbers) include *Combretum erythrophyllum*, C. *zeyheri, V. erioloba, Gymnosporia buxifolia, Ormocarpum trichocarpum, Ziziphus mucronata, Vachellia rehmanniana, V. karroo, V. sieberiana var. woodii, V. hebeclada subsp. hebeclada, Diospyros lycioides var. guerkei, Commiphora pyracanthoides, Sclerocarya birrea, Searsia leptodictya* and *Senegalia caffra*. Alien invasives include *Eucalyptus spp*., *Melia azedarach, Senna didymobotrya, Ricinus communis, Datura stramonium, Schinus molle, Jacaranda mimosifolia, Morus nigra, Melia azedarach* and *Agave sisalana*.
Biodiversity			
• Due to the lack of water in the system, no biodiversity sampling was conducted and at this point	• Due to the "no flow" conditions, there was no opportunity to sample for fish or macro- invertebrates and therefore the existing PES conditions will be used as baseline for the determination of the current ecological conditions	• The total modification has made it impossible to do any biodiversity surveys in the stream channels. During the survey of the upper section (east of the N11), the whole catchment was dry and no open or surface water was observed.	• Due to the fact that the river had had no significant flow for a while, no fish or macro-invertebrate surveys were conducted at any of the sites

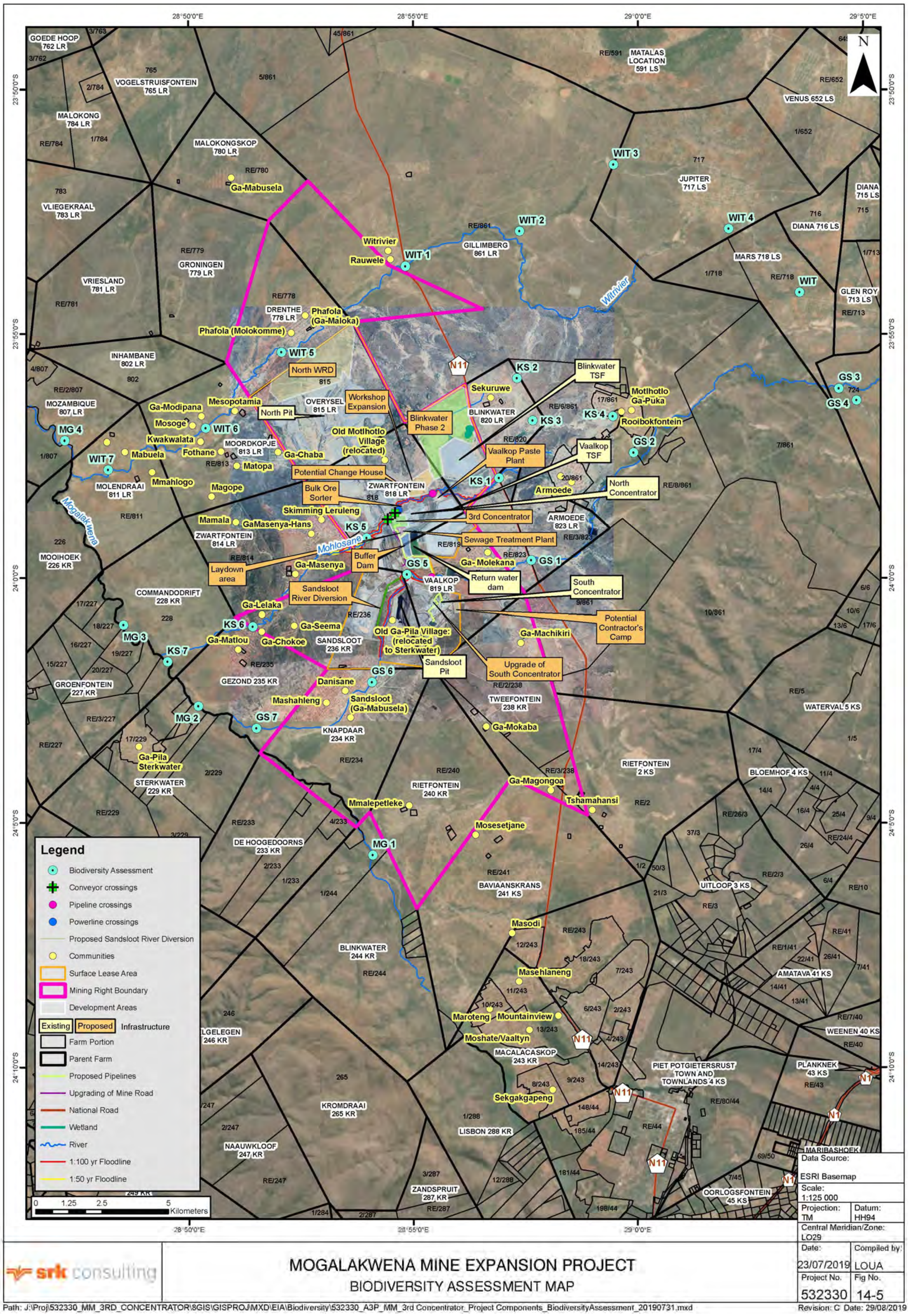


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Figure 14-5: Location of surface water biodiversity features

14.5 Noise

The information presented in this section is extracted from the specialist Noise study compiled by dBAcoustics in 2019.

The noise survey was conducted to determine the prevailing ambient noise levels in the vicinity of the proposed Mogalakwena Mine expansion project and at the residential areas along the boundaries of the mining right area. It is important to note that the measuring points for the study area were selected to be representative of the prevailing ambient noise levels for the study area and include all the noise sources such as distant traffic noise, agricultural activities but exclude traffic noise which was intermittent in the vicinity of the measuring points. The measuring points are illustrated in Figure 14-6 and Table 14-5.

14.5.1 Baseline noise

The purpose of the environmental noise study was to determine the environmental baseline noise levels at the mine expansion areas. The noise baseline information were used to calculate the possible noise intrusion levels from the mine expansion activities at the noise receptors in the vicinity of Mogalakwena Mine. The distances between the noise sources and the receptors, topography, vegetation, noise level at the noise source and the wind direction are all variables that may have an impact on how the sound will be propagated to and perceived by the noise receptor/s.

14.5.2 Current noise sources

The following are noise sources in the vicinity of and the boundaries of the study area:

- MM mining activities noise;
- Traffic noise along the feeder roads to the Mogalakwena Mine complex and abutting noise sensitive areas;
- Distant traffic noise from the abutting feeder roads;
- Traffic noise from the N11 road;
- Subsistence farming activities noise;
- Insects;
- Birds; and
- Wind noise

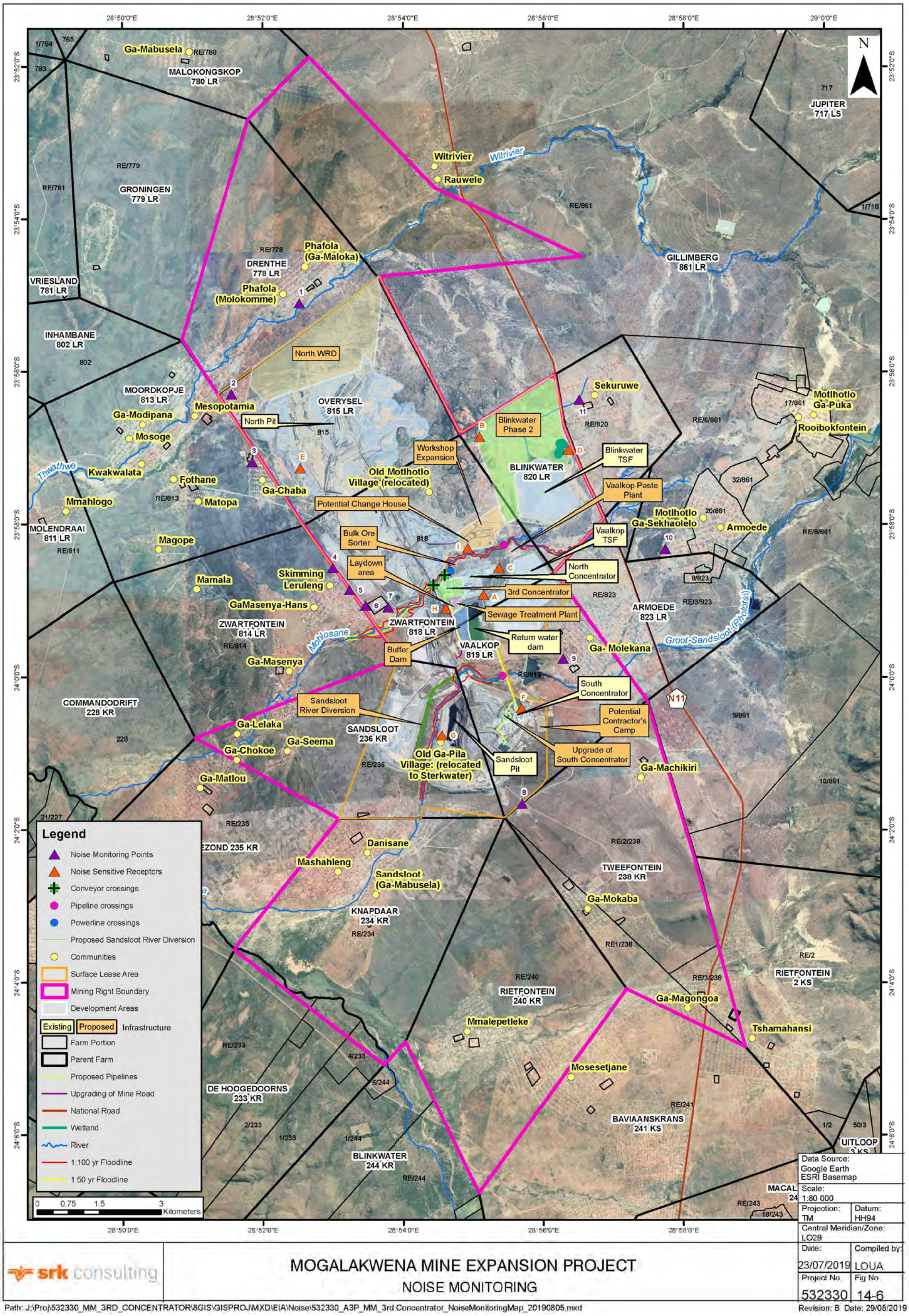


Figure 14-6: Mogalakwena Mine noise monitoring points

Table 14-5: Measuring points and co-ordinates for the study area

Position	Latitude	Longitude	Remarks
1	23^0 55.099' S	028^0 52.521' E	Phafola Village at the boundary facing the northern section of Mogalakwena Mine.
2	23^0 56.298' S	028^0 51.553' E	Kwakalata Mesopotania Village along the south-eastern side facing Mogalakwena Mine.
3	23^0 57.183' S	028^0 51.850' E	Ga-Tshaba Village on the eastern side of the village facing Mogalakwena Mine.
4	23^0 58.577' S	028^0 52.997' E	Ga-Masenya Village on the eastern side of the village facing Mogalakwena Mine (main WRD).
5	23^0 58.862' S	028^0 53.238' E	Ga-Masenya Village on the eastern side of the village facing Mogalakwena Mine (main WRD).
6	23^0 59.067' S	028^0 53.463' E	Ga-Masenya Village on the eastern side of the village facing Mogalakwena Mine (main WRD).
7	23^0 59.092' S	028^0 53.787' E	At Seritarite School.
8	24^0 01.658' S	028^0 55.696' E	Along feeder road to Ga-Mapela Village with the MSC to the North.
9	23^0 59.755' S	028^0 56.280' E	Western side of Ga-Molekana Village facing MM.
10	23^0 58.327' S	028^0 57.735' E	Western side of Ga-Sekhaolelo Village facing the N11 and Mogalakwena Mine.
11	23^0 56.373' S	028^0 56.509' E	At Sekuruwe facing the N11 and the Blinkwater TSF expansion.
A	23^0 58.925' S	028^0 55.146' E	Southern side facing the north concentrator.
B	23^0 56.856' S	028^0 55.091' E	Eastern side facing the north concentrator.
C	23^0 58.573' S	028^0 55.370' E	Eastern side facing the north concentrator.
D	23^0 57.026' S	028^0 56.354' E	Along the N11 facing the proposed Blinkwater TSF.
E	23^0 57.264' S	028^0 52.536' E	Western side of the northern open pit.
F	24^0 00.410' S	028^0 55.686' E	North-eastern side of the south concentrator.
G	24^0 00.763' S	028^0 54.553' E	South-western side of the south concentrator.
H	23^0 59.108' S	028^0 54.611' E	Western side of the proposed M3C along the existing feeder road.
I	23^0 58.320' S	028^0 54.921' E	Southern side of the existing administrative buildings.

14.5.3 Noise survey

The prevailing ambient noise levels are indicted in Table 14-6 and shows the noise sources currently in the area such as domestic, traffic noise, distant mine noise and natural noise sources.

Leq is the average noise level for the specific measuring point over a period of time, the Lmax is the maximum noise level and the Lmin is the minimum noise level registered during the noise survey for the specific area in dBA.

Table 14-6: Noise levels for the day and night in the study area

Position	Day time				Night Time			
	Leq - dBA	Lmax (Fast) - dBA	Lmin (Fast) - dBA	Remarks	Leq - dBA	Lmax (Fast) - dBA	Lmin (Fast) - dBA	Remarks
1	**34.8**	59.8	27.7	Domestic activities and distant mining activities.	**38.8**	56.6	28.4	Distant insects, domestic activities and distant mining activities.
2	**35.7**	53.7	25.6	Domestic activities and distant mining activities.	**33.7**	58.8	26.8	Distant insects, domestic activities and distant mining activities and hauling.
3	**40.8**	60.3	28.1	Distant domestic activities – Tlakana primary school.	**37.5**	57.7	33.1	Distant pit mining activities and tipping.
4	**44.1**	57.6	32.6	Domestic , traffic and birds.	**46.6**	73.4	33.1	Earthworks, tipping and traffic.
5	**53.2**	74.1	39.9	Ground works and tipping activities.	**55.7**	72.4	37.7	Ground works and tipping activities.
6	**45.3**	48.3	26.6	Distant mining activities and no traffic.	**41.8**	64.8	37.3	Distant mining activities and south Concentrator.
7	**45.2**	61.2	34.9	Seritarita School. Distant mining and traffic noise.	**43.6**	57.5	38.1	Distant mining and traffic noise.
8	**36.2**	61.3	26.0	Distant MSC noise not audible due to the wind.	**35.3**	48.3	26.6	Distant MSC noise and insect noise.
9	**42.9**	56.8	36.1	Distant plant and domestic noise.	**39.2**	57.3	32.6	Distant domestic noise and insects.
10	**39.1**	51.8	31.8	Domestic and distant traffic noise from the N11.	**34.6**	49.1	22.9	Domestic, distant traffic noise from the N11 and insects.
11	**39.9**	57.5	30.5	Domestic and distant traffic noise from the N11.	**28.1**	47.0	19.0	Distant traffic noise from the N11 and insects.
A	**59.9**	71.1	57.5	MNC noise along the boundary of concentrator.	**58.6**	63.3	56.4	MNC noise along the boundary of concentrator.
B	**62.5**	67.9	60.8	MNC noise along the boundary of concentrator.	**61.8**	65.1	60.5	MNC noise along the boundary of concentrator.
C	**62.5**	69.0	53.1	Distant Crusher noise.	**62.7**	65.5	58.6	Distant Crusher noise.
D	**40.8**	54.5	24.5	Distant mining activities.	**45.2**	61.5	29.1	Distant mining activities.
E	**32.6**	63.2	22.9	Hauling & Mining activities.	**49.0**	57.2	42.2	Hauling & Mining activities.
F	**57.2**	72.9	54.2	Distant Concentrator.	**57.6**	64.4	55.4	Distant Concentrator.
G	**54.2**	74.5	43.3	Distant Concentrator.	**63.0**	71.1	60.6	Distant Concentrator.
H	**62.9**	80.6	48.6	Traffic noise.	**58.4**	71.5	48.3	Traffic noise. & Distant sub-station noise.
I	**57.0**	65.2	53.1	Distant Concentrator.	**53.2**	60.5	50.3	Distant Concentrator.

The calculated averages throughout the study area are as follows:

- Northern boundary – Daytime 35.3dBA and night time 36.3dBA;
- Eastern boundary – Daytime 39.5dBA and night time 36.9dBA;
- Southern boundary – Daytime 39.6dBA and night time 37.3dBA;
- Western boundary - Daytime 45.7dBA and night time 45.0dBA;

Sound levels were used in determining the noise intrusion level for each project component during the construction, operational and closure/rehabilitation phases of the proposed project. The criteria for assessing the magnitude of a noise impact are illustrated in Table 14-7.

Table 14-7: Noise intrusion level criteria

Increase Δ-dBA	Assessment of impact magnitude	Colour code
0 <Δ≤ 1	Not audible	
1 <Δ≤ 3	Very Low	
3 <Δ≤ 5	Low	
5 <Δ≤ 10	Medium	
10 <Δ≤ 15	High	
15 <Δ	Very High	

14.5.4 Noise intrusion levels during the construction and operational phases

In terms of the Noise Regulations a noise disturbance is created when the prevailing ambient noise level is exceeded by 7.0dBA or more. The noise intrusion levels during the pre-construction phase are given in Table 14-8 (clearing of footprint areas) and Table 14-9 (construction activities). From the tables it can be concluded that the threshold value of 7.0dBA may potentially be exceeded at MP2 (Kwakalata Mesopotania Village) during the pre-construction and construction phases.

The noise intrusion levels during the operational phase are illustrated in Table 14-10, the average measured noise level of 37.5dBA may increase more than the threshold value of 7.0dBA at MP2 (Kwakalata Mesopotania Village) during the day and night time periods.

Table 14-8: Noise intrusion levels (in dBA) during pre-construction phase

Position	Middle of the Third Concentrator	Primary crusher	Blinkwater TSF Expansion	North WRD	Buffer dam	Debottlenecking plant	Contractors camp	Sewage plant	Contractor's laydown area	Workshop area (Upgrade)	Blinkwater Filter and Press Plant	Upgrade of the mine access road	Diversion of the Groot Sandsloot	Cumulative Levels	Cumulative noise level - Daytime	Intrusion noise level – daytime
Phafola Village – MP1	7.2	5.9	7.8	25.9	6.6	2.3	10.0	7.2	6.9	8.7	9.7	6.7	5.0	26.4	35.4	**0.6**
Kwakalata Mesopotania Village – MP2	8.3	7.1	6.8	43.5	7.8	3.7	14.4	8.1	8.6	8.9	9.1	8.5	7.0	43.5	44.2	**8.5**
Ga-Tshaba Village – MP3	10.8	10.0	7.7	17.7	9.8	5.2	19.2	9.1	10.7	11.0	10.7	10.3	9.0	23.4	40.9	**0.1**
Ga-Mesenya Village – MP4	18.9	17.6	11.3	10.5	15.6	8.9	27.7	13.5	16.3	14.5	12.3	18.1	13.8	29.2	44.2	**0.1**
Ga-Mesenya Village – MP5	17.9	16.4	11.2	9.5	16.9	10.1	23.2	14.2	18.1	14.9	12.5	19.7	15.4	27.4	53.2	**0.0**
Ga-Mesenya Village – MP6	19.7	17.9	11.3	8.7	18.3	11.1	19.6	15.4	20.0	15.3	13.4	19.9	17.2	27.2	45.4	**0.1**
Seritarite School – MP7	21.2	19.7	12.2	8.3	19.6	11.7	19.7	16.2	21.2	15.8	13.3	20.9	17.8	27.9	45.3	**0.1**
Ga-Mapela Village – MP8	11.3	8.6	6.2	3.2	13.1	13.3	9.2	10.0	12.2	8.8	7.3	12.6	26.6	27.6	36.8	**0.6**
Ga-Molekana – MP9	18.4	13.9	13.2	4.9	19.1	17.0	10.7	19.8	18.7	16.4	13.5	18.3	19.2	27.2	43.0	**0.1**
Ga-Sekhaolelo – MP10	11.4	8.7	11.7	4.9	10.9	8.7	7.6	12.4	11.0	12.5	12.4	10.7	10.7	20.7	39.2	**0.1**
Sekuruwe – MP11	10.6	8.8	35.4	11.7	10.0	6.4	9.9	13.0	11.3	15.3	19.3	10.6	9.2	23.2	40.0	**0.1**

Table 14-9: Noise intrusion levels (in dBA) during construction phase

Position	Middle of the Third Concentrator	Primary crusher	Blinkwater TSF Expansion	North WRD	Buffer dam	Debottlenecking plant	Contractor's camp	Sewage plant	Contractor's laydown area	Workshop area (Upgrade)	Blinkwater Filter and Press Plant	Upgrade of the mine access road	Diversion of the Groot Sandsloot river	Cumulative Levels	Cumulative noise level - Daytime	Intrusion noise level - daytime
Phafola Village – MP1	7.2	6.4	7.8	30.4	4.1	2.3	2.5	-0.3	-0.6	1.2	9.7	4.7	5.0	30.5	7.2	**1.4**
Kwakalata Mesopotania Village – MP2	8.3	7.6	6.8	48.0	5.3	3.7	6.9	0.6	1.1	1.4	9.1	6.5	7.0	48.0	8.3	**12.6**
Ga-Tshaba Village – MP3	10.8	10.5	7.7	22.2	7.3	5.2	11.7	1.6	3.2	3.5	10.7	8.3	9.0	23.5	10.8	**0.1**
Ga-Mesenya Village – MP4	18.9	18.1	11.3	15.0	13.1	8.9	20.2	6.0	8.8	7.0	12.3	16.1	13.8	24.2	18.9	**0.0**
Ga-Mesenya Village – MP5	17.9	16.9	11.2	14.0	14.4	10.1	15.7	6.7	10.6	7.4	12.5	17.7	15.4	23.7	17.9	**0.0**
Ga-Mesenya Village – MP6	19.7	18.4	11.3	13.2	15.8	11.1	12.1	7.9	12.5	7.8	13.4	17.9	17.2	24.0	19.7	**0.0**
Seritarite School – MP7	21.2	20.2	12.2	12.8	17.1	11.7	12.2	8.7	13.7	8.3	13.3	18.9	17.8	24.8	21.2	**0.0**
Ga-Mapela Village – MP8	11.3	9.1	6.2	7.7	10.6	13.3	1.7	2.5	4.7	1.3	7.3	10.6	26.6	27.2	11.3	**0.5**
Ga-Molekana – MP9	18.4	14.4	13.2	9.4	16.6	17.0	3.2	12.3	11.2	8.9	13.5	16.3	19.2	24.7	18.4	**0.1**
Ga-Sekhaolelo – MP10	11.4	9.2	11.7	9.4	8.4	8.7	0.1	4.9	3.5	5.0	12.4	8.7	10.7	18.4	11.4	**0.0**
Sekuruwe – MP11	10.6	9.3	35.4	16.2	7.5	6.4	2.4	5.5	3.8	7.8	19.3	8.6	9.2	22.2	10.6	**0.1**

Table 14-10: Noise intrusion levels (in dBA) during the operational phase

Position	Middle of the Third Concentrator	Primary crusher	Blinkwater TSF Expansion	Northern waste rock dump	Buffer	Debottlenecking plant	Contractor's camp	Sewage plant	Contractor's laydown area	Workshop area (Upgrade)	Blinkwater Filter and Press Plant	Mine access road	Groot Sandsloot river	Cumulative Levels	Cumulative noise level - Daytime	Cumulative noise level - Night time	Intrusion noise level - daytime	Intrusion noise level - night time
Phafola Village – MP1	10.2	15.9	7.8	30.9	-10.4	10.3	-7.0	-9.8	-0.1	1.7	9.7	-5.3	-12.0	31.0	36.3	39.5	**1.5**	**0.7**
Kwakalata Mesopotania Village – MP2	11.3	17.1	6.8	48.5	-9.2	11.7	-2.6	-8.9	1.6	1.9	9.1	-3.5	-10.0	48.5	48.7	48.6	**13.0**	**14.9**
Ga-Tshaba Village – MP3	13.8	20.0	7.7	22.7	-7.2	13.2	2.2	-7.9	3.7	4.0	10.7	-1.7	-8.0	23.6	40.9	37.7	**0.1**	**0.2**
Ga-Mesenya Village – MP4	21.9	27.6	11.3	15.5	-1.4	16.9	10.7	-3.5	9.3	7.5	12.3	6.1	-3.2	21.3	44.1	46.6	**0.0**	**0.0**
Ga-Mesenya Village – MP5	20.9	26.4	11.2	14.5	-0.1	18.1	6.2	-2.8	11.1	7.9	12.5	7.7	-1.6	21.5	53.2	55.7	**0.0**	**0.0**
Ga-Mesenya Village – MP6	22.7	27.9	11.3	13.7	1.3	19.1	2.6	-1.6	13.0	8.3	13.4	7.9	0.2	22.2	45.3	41.8	**0.0**	**0.0**
Seritarite School – MP7	24.2	29.7	12.2	13.3	2.6	19.7	2.7	-0.8	14.2	8.8	13.3	8.9	0.8	22.6	45.2	43.6	**0.0**	**0.0**
Ga-Mapela Village – MP8	14.3	18.6	6.2	8.2	-3.9	21.3	-7.8	-7.0	5.2	1.8	7.3	0.6	9.6	22.2	36.4	35.5	**0.2**	**0.2**
Ga-Molekana – MP9	21.4	23.9	13.2	9.9	2.1	25.0	-6.3	2.8	11.7	9.4	13.5	6.3	2.2	25.8	43.0	39.4	**0.1**	**0.2**
Ga-Sekhaolelo – MP10	14.4	18.7	11.7	9.9	-6.1	16.7	-9.4	-4.6	4.0	5.5	12.4	-1.3	-6.3	19.1	39.1	34.7	**0.0**	**0.1**
Sekuruwe – MP11	13.6	18.8	35.4	16.7	-7.0	14.4	-7.1	-4.0	4.3	8.3	19.3	-1.4	-7.8	22.3	40.0	29.1	**0.1**	**1.0**

14.6 Visual

The information presented in this section is extracted from the specialist Visual Impact study undertaken by SRK in 2019.

14.6.1 Sense of place

The sense of place for the communities around the mine is closely related to that of employment as it is assumed that many of the villages directly surrounding the mine have developed due to the mine's existence. However, permanent residents in the area who are not reliant on the mine for a livelihood may experience the area in a different way. Travellers using the N11 and surrounding road networks will have a transient sense of place associated with mining while travelling through the landscape.

Frequent travellers will be used to the landscape through which they travel and the location of the proposed new structures, being situated within the mine area and adjacent to existing structures, should not result in an altered sense of place.

A land cover map was developed for the area around the mine (Figure 14-7) to spatially determine the predominant land use type in the area. Based on the land use map the predominant land use to the east of the mine include a modified natural environment (thicket and woodland) with urban areas (villages) developed in-between. According to the land use map the predominant land use to the west of the mine it is cultivated land associated with villages and commercial agriculture further north-west. The sense of place in an 5km radius around the mine is thus likely to be a combination between mining, agriculture and an overall modified natural landscape.

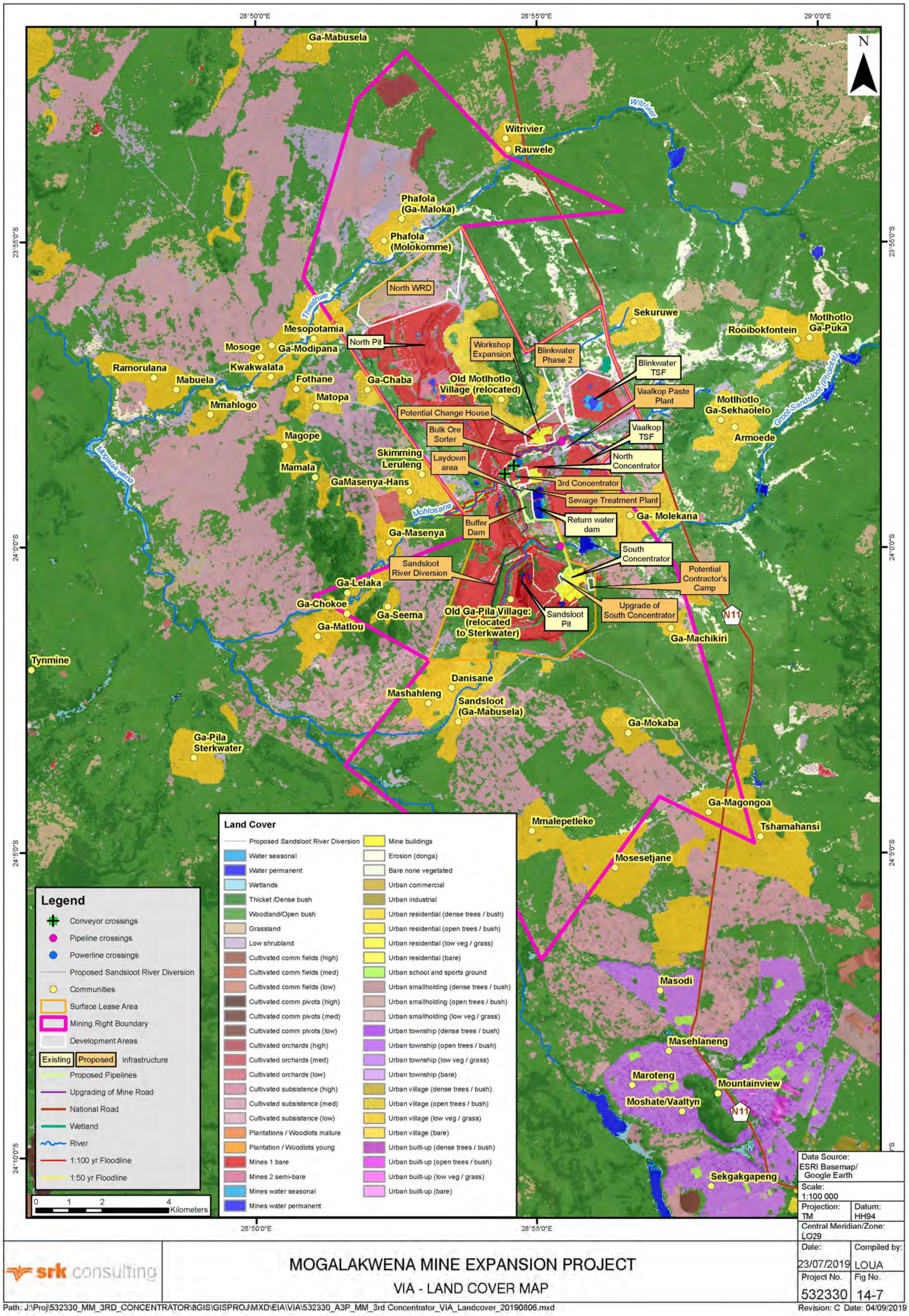


Figure 14-7: Predominant Land Uses surrounding Mogalakwena Mine

14.6.2 Visual exposure

Visual exposure is determined by an object "zone of visual influence" or how visible an object may be in the landscape. The visual exposure of an object can be broken down into two elements:

- Firstly, how exposed is the object to the surrounding area? This can be determined by the topography in which the object is located (Figure 14-8).
- Secondly, how exposed are viewers to the object? This can be determined through topography and land use in which the viewer is situated (Figure 14-9).

The following section outlines how both of these elements were used in determining the overall visual exposure of the key structures/infrastructure associated with the proposed expansion

The topography of an area can limit or expose the visibility of an object. In order to assess how topography influences the visual exposure of a feature, a predictive model known as a "viewshed" is used.

Table 14-11 below outlines a set of Visibility Criteria that were used to rank how visible the mining infrastructure may be from the selected viewpoints. Each of the viewpoints identified in Figure 14-9 have been rated according to visual exposure criteria, which is a combination of ratings in Table 14-11 and verification through a site visit.

Table 14-11: Visibility criteria (Exposure)

Visibility Ranking – after Site Visit Verification			
Not Visible	Marginally Visible	Visible	Highly Visible
Final Visibility Criteria (Exposure Rating)			
1	2	4	5

The findings in terms of visual exposure are summarised below.

- Based on the average calculated heights of the proposed North WRD and Blinkwater 2 TSF, the exposure rating is **visible (4)**. This rating is attributed to the undulating topography surrounding the mine, and the number of villages and alignment of the N11 adjacent to the mine area. Existing vegetation, although being relatively low growing, act as a visual buffer towards views of the proposed mine infrastructure from various areas. In addition, the North WRD and TSF will be extensions to existing structures.
- The Third Concentrator and de-bottlenecking plant is **marginally visible (2)** due to these structures being planned between existing mine structures which will provide screening to potential visual receptors driving on the N11 or residing in the villages around the mine.

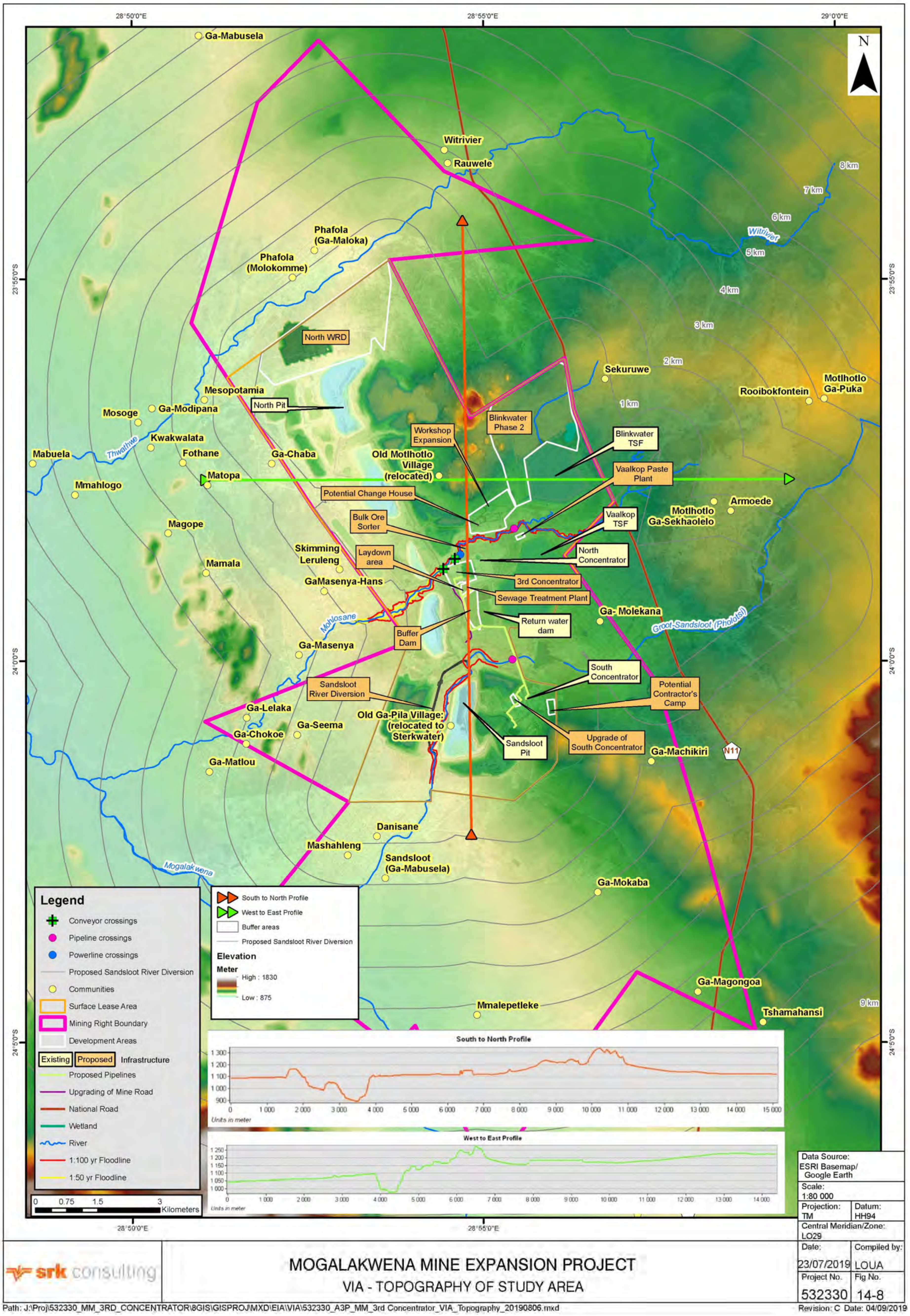


Figure 14-8: Mogalakwena Mine Topography Map

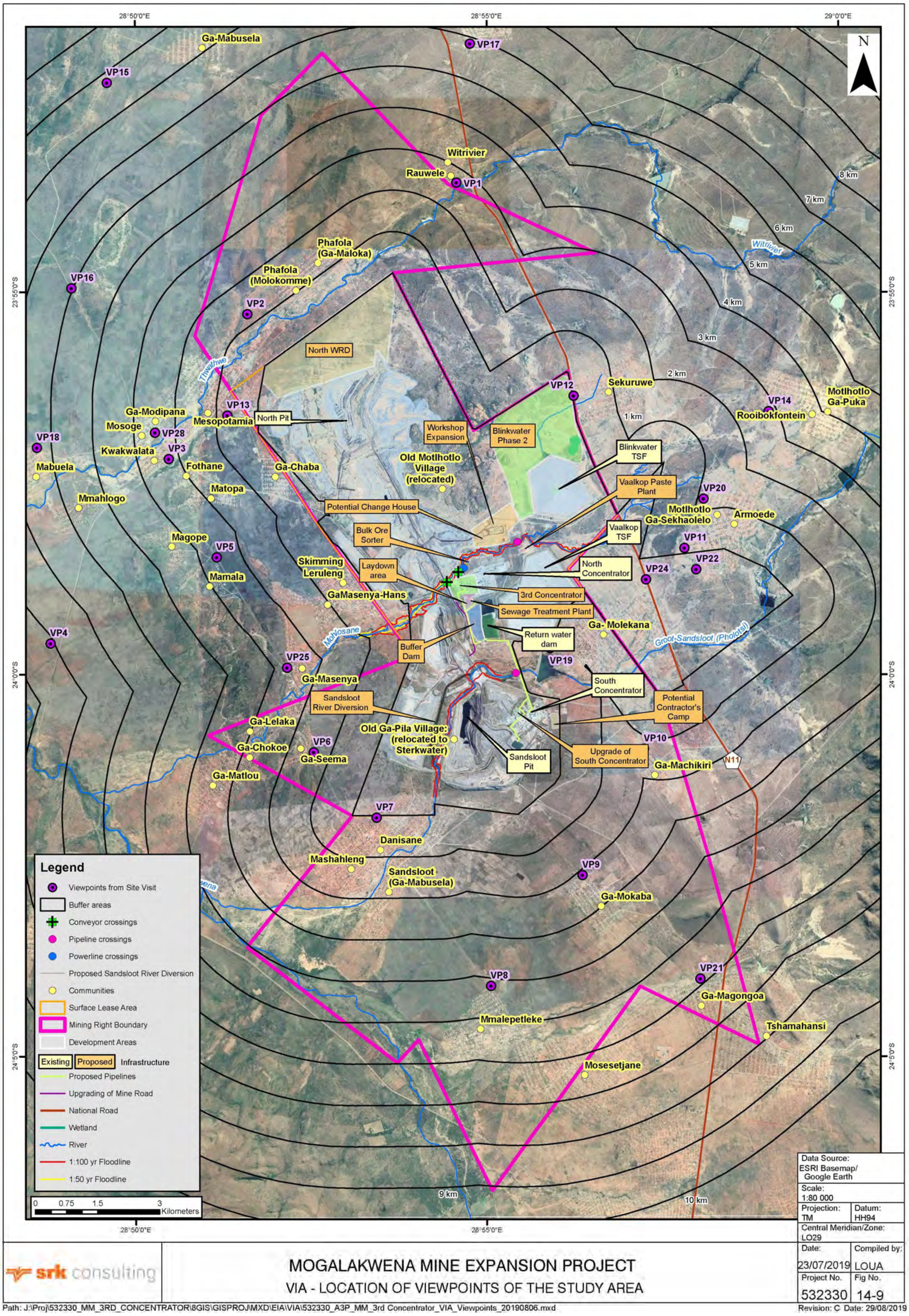


Figure 14-9: Location of viewpoints of the study area

14.6.3 Viewing distance and visibility

The rating system (Table 14-12) has been incorporated spatially with the viewshed to moderate distance between a viewer and an object. This rating system does not however, take into account the existing features (such as vegetation and man-made structures). Using the selected viewpoints, it is possible to create a representative ranking for viewing distance and visibility for the infrastructure.

Table 14-12: Distance Rating System

Location of development (From Viewpoint)	Category	Value	Description
0 to 0.5 km	Adjacent	5	Adjacent – The mine can clearly be seen. Usually on the property boundary or property grounds.
0.5 km to 1 km	Foreground	4	This is the zone in which details such as colour, texture and form can be appreciated. Objects in this zone are highly visible unless obscured by other landscape features, existing structures or vegetation.
1 km to 3 km	Middle ground	3	The zone which occupies the area “between” detail and indistinct colour and line discernment. Objects in this zone can be classified as visible to moderately visible unless obscured by other elements within the landscape.
3 km to 5 km	Distant middle ground	2	This zone is discerned by means of line and colour. Texture and form are generally not seen. Objects in this zone can be classified as marginally visible to not visible. Areas beyond 3 km are usually not investigated as the impact would be negligible on these areas.
5 km and greater	Background	1	Background – Not Visible (The mine can hardly / not be seen).

The proposed North WRD and TSF falls within the **Adjacent (5) category**, as these structures can be classified as being visible from the adjacent villages. It should be noted that due to the topography, existing vegetation and existing mining activities and related infrastructure, that views towards the mining infrastructure may be obscured from certain locations within the landscape. The North WRD and TSF will be extensions to existing infrastructure which will increase the visual exposure of the existing structures.

The M3C and debottlenecking plant falls within the Foreground (4) as the plants will be in close proximity to villages, i.e. M3C to Leruleng and Ga-Masenya and the MSC debottlenecking plant to Ga-Molekana.

By analysing the fuzzy viewshed (Figure 14-10) , which represents the cumulative viewshed of all the key proposed infrastructure, it is likely that the new infrastructure will be more visible to visual receptors to the north-west, west and east whereas the areas to the south will be shielded from views.

14.6.4 Visual absorption capacity

The Visual Absorption Capacity (VAC) is the potential for the area to conceal / mitigate the impact of the mining infrastructure through natural or man-made features in the landscape. Factors contributing to the VAC include:

- Topography and vegetation that is able to provide screening and increase the visual absorption capacity of a landscape;
- The degree of urbanisation compared to open space. A highly urbanised landscape is better able to absorb the visual impacts of similar developments;
- An interrelated landscape comprising a unified environment; and
- The scale and density of surrounding developments.

Visual absorption within the wider area of influence will further be provided by:

- Residential suburbs or villages which may reduce the visibility of the site to people residing in the centre or towards the back of the residential area;
- The existing road infrastructure between viewpoints further than 2 km away; and
- Powerlines, railway lines etc.

The VAC is rated from high (1) to low (5) based on the capacity of the environment to absorb the visual impact of the facility. The VAC will be high when the environment can impede the infrastructure and as such, the colour of a facility can also determine its VAC. The VAC will be low in areas where the topography is flat and natural features such as trees, outcrops and mountains are absent.

The area within which the mine is situated is generally flat to undulating. Beyond the mine boundaries the topography changes into gentle undulating hills to mountainous areas further to the south-west and east. Due to many villages being in close proximity to the mine and planned new infrastructure/structures, the topography of the surrounding area, and relatively low growing vegetation, the VAC is rated as **Medium (3)** for the proposed North WRD and TSF and **High (1)** for the M3N and MSC debottlenecking plant.

14.6.5 Sensitivity of viewers

The sensitivity of viewers is determined by the number of viewers and by how likely they are to be impacted upon. Sensitivity is also dependent on the viewer's perception of the area and their ability to adapt to changes in the environment. This can also include how frequently they are exposed to the view i.e. static views from houses would have a higher sensitivity than transient views experienced by motorists.

Residents living in close proximity to the mine are considered to be more sensitive towards the mining operations compared to those travelling through the study area. Based on the analysis the most sensitive viewers are considered to include (Refer to Figure 14-10):

- The villages in the mine area or directly adjacent to the mine in all directions; and
- Motorists travelling along the N11. However, these motorists are expected to only have transient views of the mining activities.

The viewer sensitivity is ranked from high (5) to low (1) based on the probable perceptions of the viewers and their willingness to change. The viewer sensitivity for the mine is rated as being **Medium-low (2)**. This rating is attributed to the mine being in existence for a number of years but also considering that the propose North WRD and TSF expansions will occur in close proximity to villages/settlements.

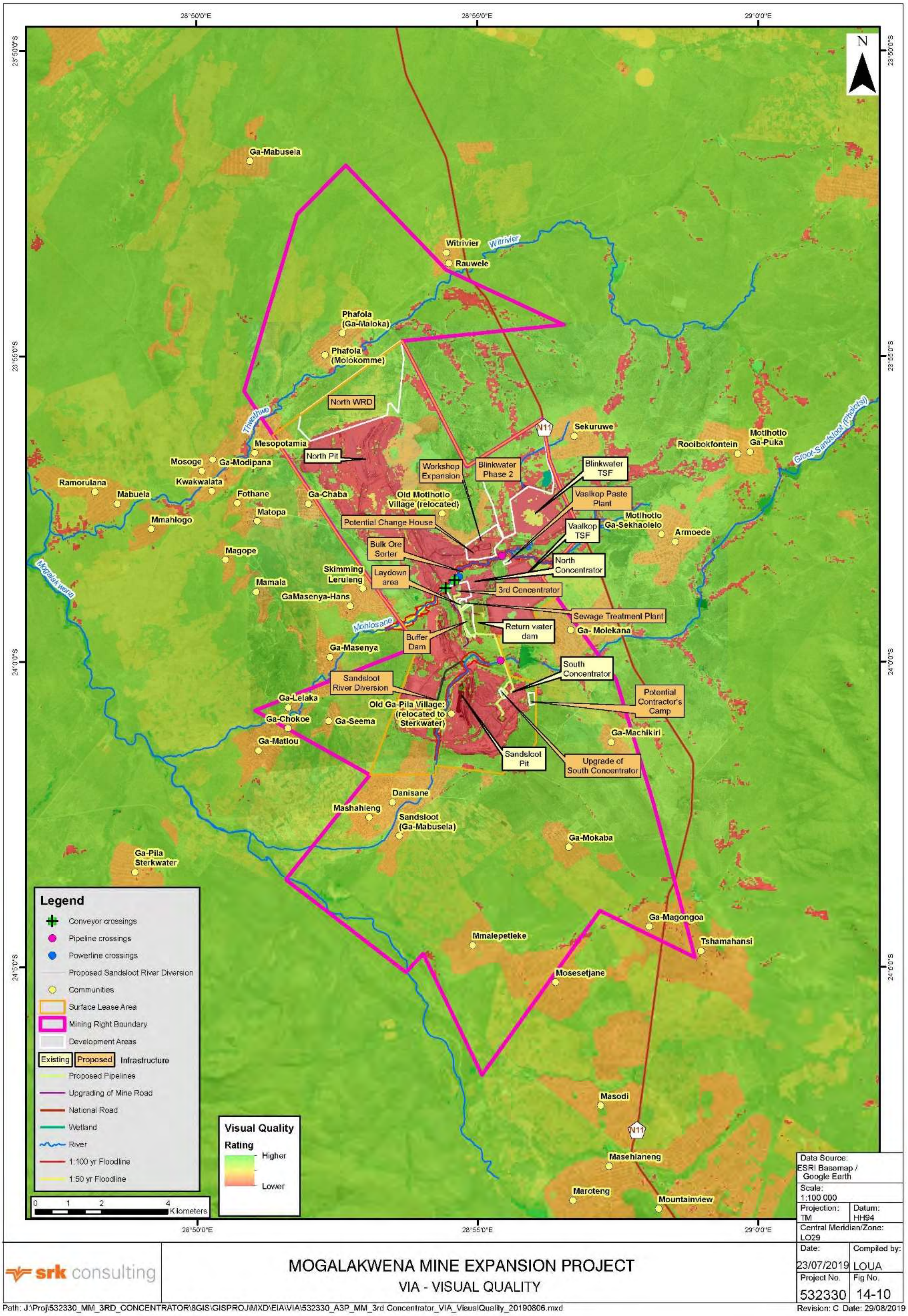


Figure 14-10: Fuzzy viewshed of the proposed infrastructure

14.7 Air quality

The information presented in this section is extracted from the specialist Air Quality study undertaken by SRK in 2019.

14.7.1 Ambient air quality

Air quality monitoring data from Mogalakwena Mine is presented in this section. Data was received for dust fallout and PM_{10}. A total of 32 dust fallout sampling stations have been installed in and around the Mogalakwena Mine project area. Eighteen are Residential Area dust fallout units and fourteen are Non-residential Area dust fallout units. Three PM_{10} sampling stations have been installed within the Mogalakwena project area. PM_{10} data for the period 2015 to 2018 was acquired from Mogalakwena Mine. The dust fall out monitoring location details are provided in Table 14-13 and the location of the monitoring stations are presented in Figure 14-11.

Table 14-13: Air quality monitoring stations (DFO and PM_{10})

Name	Parameter	X	Y
P34	DFO	28.92500	-24.00240
P46		28.89850	-23.98570
GTS		28.86400	-23.95280
Morgan		28.86920	-23.96070
P9		28.91550	-23.99170
TS		28.93350	-23.98530
TEXS		28.93560	-23.98340
TES		28.93570	-23.97790
P21		28.92510	-23.97380
P31		28.91830	-23.97380
ZWNDS		28.89840	-23.98450
PPRN		28.88920	-23.97440
GTRDS		28.87150	-23.95570
NB		28.86350	-23.93970
Hans Langa		28.87108	-23.99244
Manamela HSE no 385		28.85464	-23.94231
Mashishi		28.86558	-23.95767
House 100559		28.84453	-23.95022
Nyaatlo 020169		28.85228	-23.98153
Mahlanya 100068		28.87411	-23.91872
Matso 010290		28.87425	-24.00478
PUKA-444		28.99549	-23.94385
PAPO-19		28.96724	-23.97352
RAMMUTLA-95		28.94327	-23.94315
MALOKA KGORO-10019		28.87884	-23.91166
MPHELA-132		28.90722	-23.95878
DOLO-20120		28.93960	-23.98302
MORUDI-10278		28.94652	-23.99186

Name	Parameter	X	Y
Kgwetsana Daycare		28.87413	-24.01452
Modikwe Secondary		28.89118	-24.03016
PM1	PM_{10}	28.88620	-23.96690
PM2		28.92820	-24.01610
PM3		28.91983	-23.96710
Camp 5	PM_{10} occupational exposure monitoring	28.90119	-23.99224
Camp 7		28.89605	-23.96321
Camp 10		28.88549	-23.94317

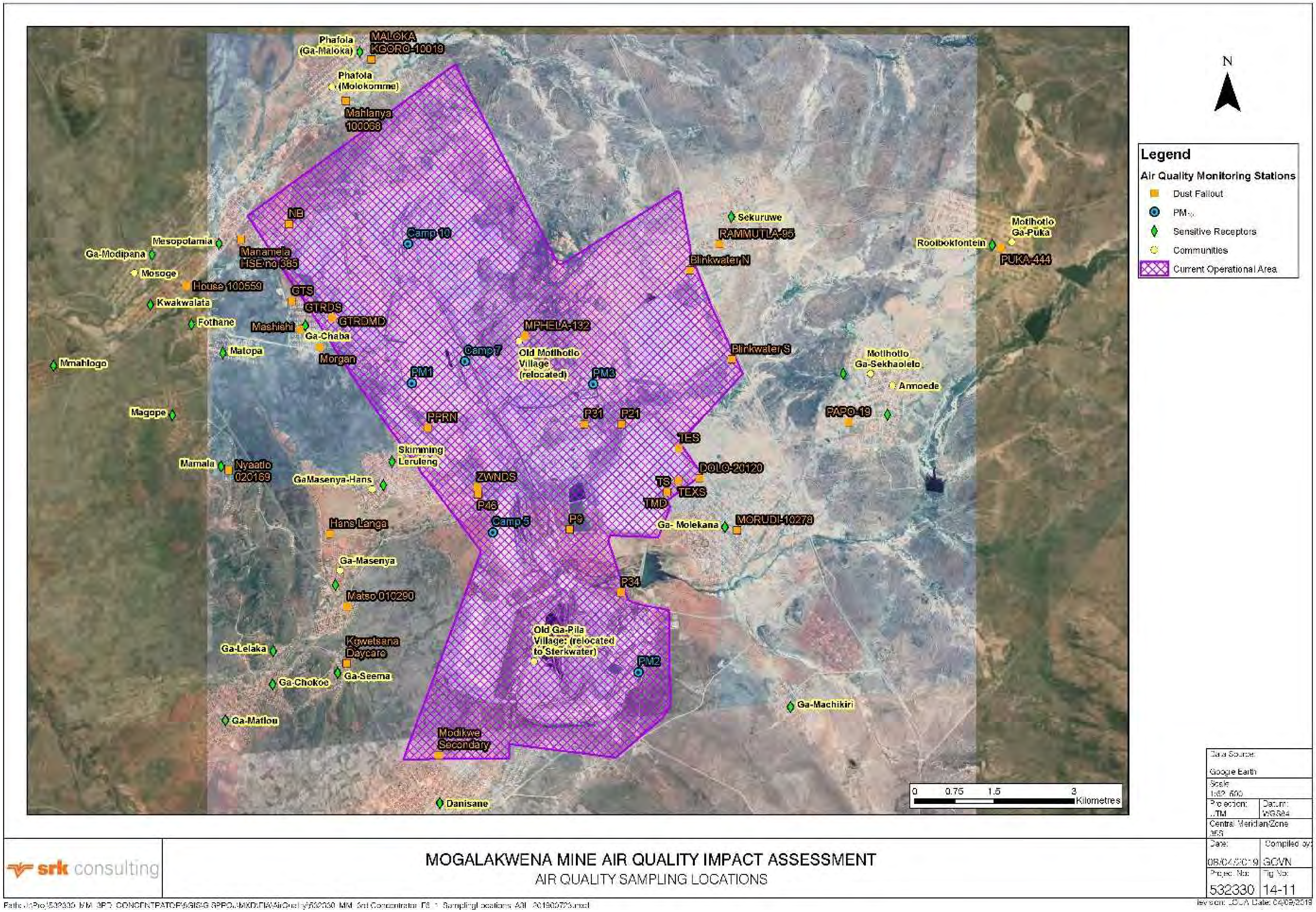


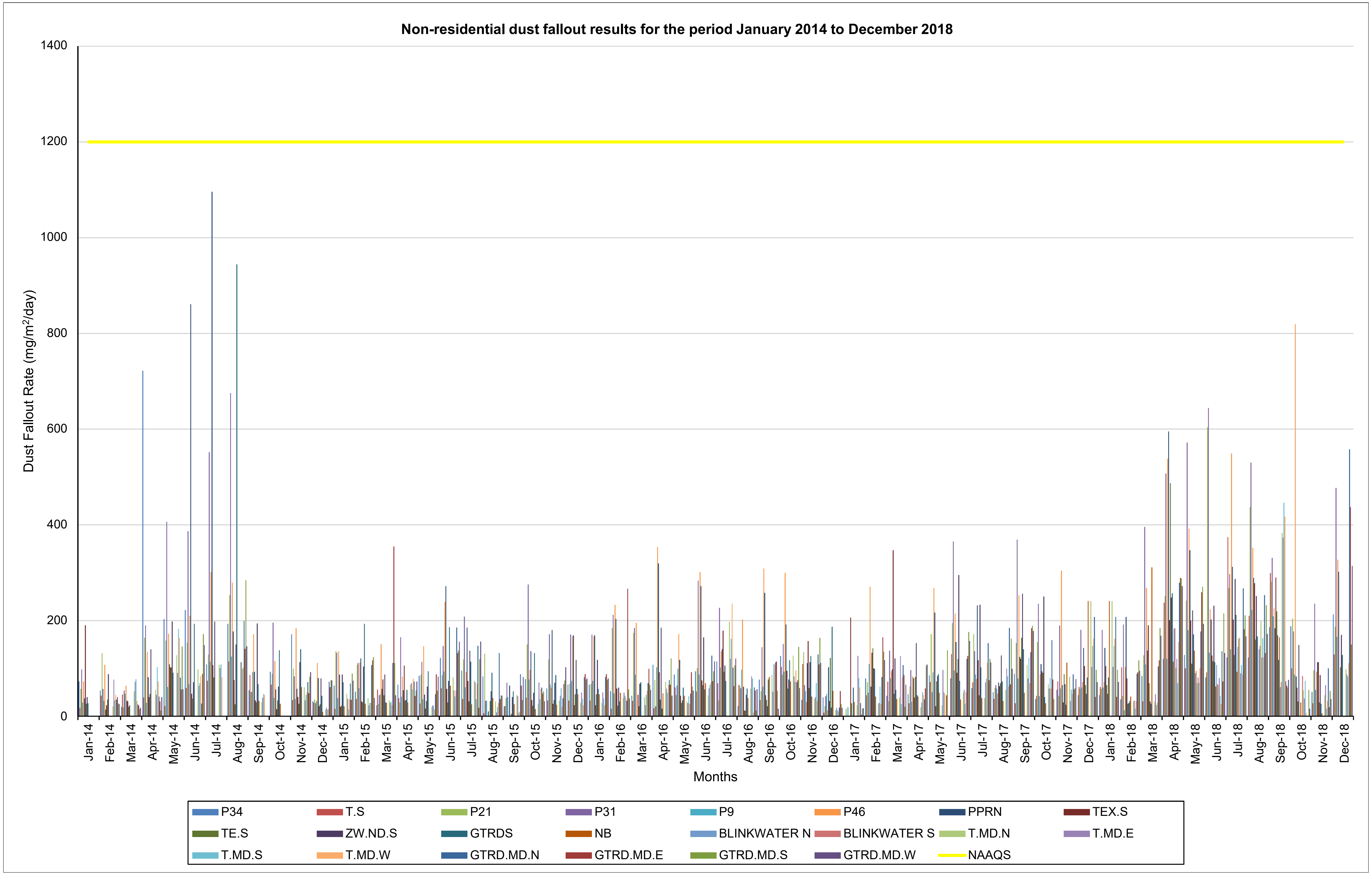
Figure 14-11: Air quality sampling locations at Mogalakwena Mine

Dust fallout

The average monthly dust fallout results for January 2014 to December 2018 is presented Figure 14-12 and Figure 14-13 and indicate the monthly dust fallout rate for Non-residential and Residential Area sampling stations respectively. The monitoring network comprises of eighteen residential and fourteen non-residential dust fallout monitoring sites.

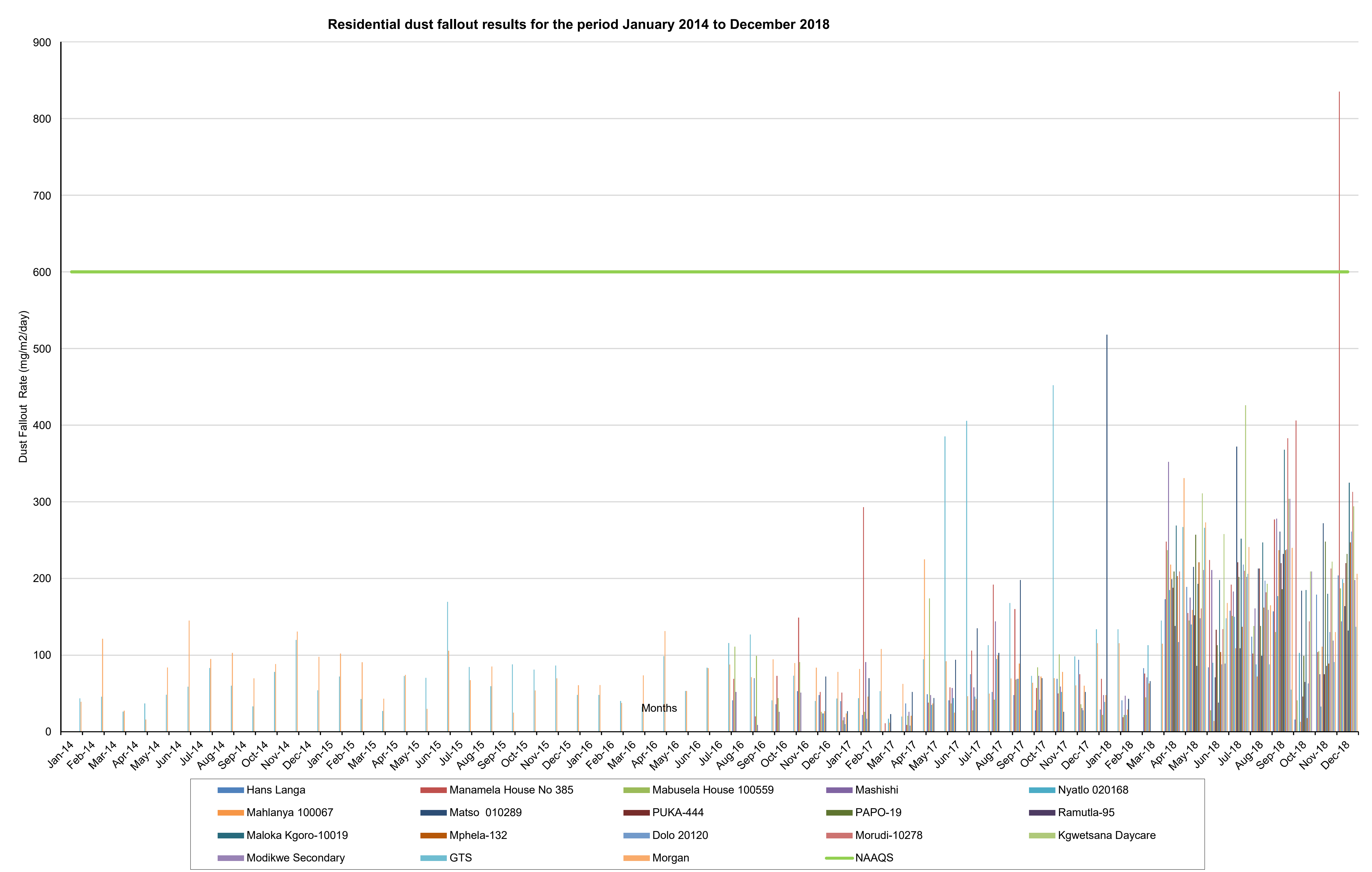
The average monthly dust fallout rates for Non-residential and Residential Areas are below the respective standards at all monitoring points. There is no discernible trend in the Non-residential Area dataset, other than the dust fallout rates not exceeding the standard of 1 200 mg/m^2/day. Hence all Non-residential Area monitoring points are compliant with the National Dust Control Regulations Standard of 1 200 mg/m^2/day (Figure 14-12).

Dust fallout at the residential sites were below the Residential Area Standard of 600 mg/m^2/day, except at Manamela House no. 385 (835 mg/m^2/day in December 2018) (Figure 14-13). For most of the monitoring period there is no discernible trend in the data, however with the addition of monitoring points from 2017 onwards there has been an increase in dust fallout rates. However, the dust fallout rates remain below the Residential Area Standard of 600 mg/m^2/day.



srk consulting	**MOGALAKWENA MINE EXPANSION PROJECT** NON-RESIDENTIAL DUST FALLOUT RESULTS	Project No. 532330

Figure 14-12: Non-residential dust fallout results for the period January 2014 to December 2018



srk consulting	**MOGALAKWENA MINE EXPANSION PROJECT** RESIDENTIAL DUST FALLOUT RESULTS	Project No. 532330

Figure 14-13: Residential dust fallout results for the period January 2014 to December 2018

PM_{10}

PM_{10} monitoring at the Mogalakwena Mine site is undertaken for both ambient air quality monitoring and occupational exposure monitoring.

The average daily PM_{10} results for ambient air quality are presented in Table 14-14 and daily concentrations in Figure 14-14. PM data was sourced from the three on-site PM_{10} monitors (PM1, PM2 and PM3) located within the Mogalakwena Mine project area. The particulate matter monitors located on-site are located in close proximity to emissions sources, hence are considered source monitoring points.

PM1

The averaged 24-hour PM_{10} concentrations for PM1 ranged from 5.2 µg/m^3 (February) to 16.1 µg/m^3 (September) and are below the South African NAAQS of 75 µg/m^3. The highest 24-hour concentration observed at PM1, is 75 µg/m^3 (August 2018), which is equivalent to the 24-hour PM_{10} standard.

PM2

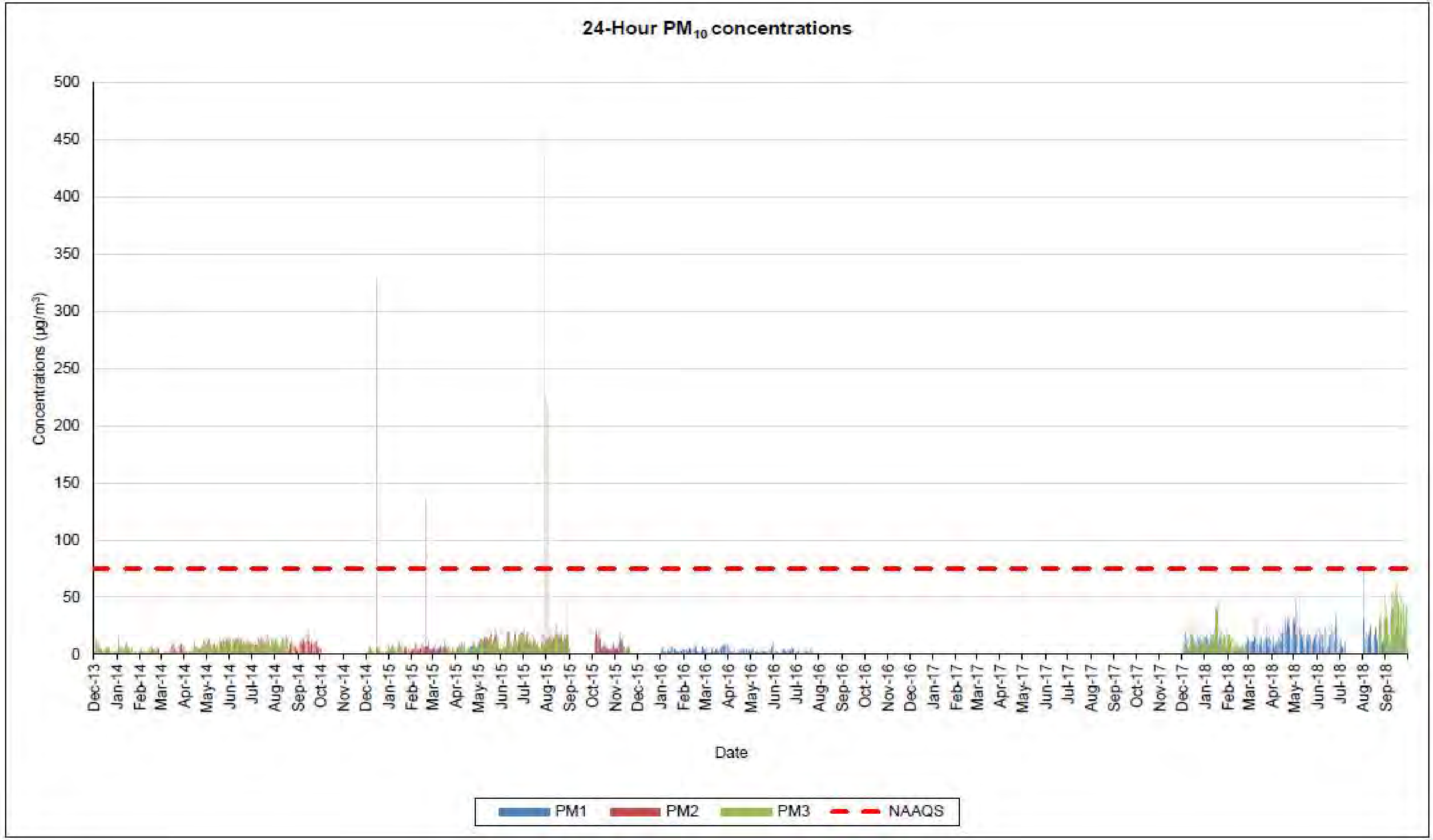
Average 24-hour PM_{10} concentrations at PM2 ranged from 4.5 µg/m^3 (January and March) to 26.6 µg/m^3 (August). Similar to PM1, the average 24-hour concentrations do not exceed the standard of 75 µg/m^3. The average 24-hour PM_{10} concentrations decrease during the wet season and increase during the dry season. The 24-hour PM_{10} concentrations show five exceedances of the standard during the monitoring period, with the highest being 457 µg/m^3 on 1 August 2015. It should be noted that four out of the five exceedances occurred in 2015. The maximum number of exceedances of the standard allowed in one year is four, hence the PM2 monitoring station has been compliant with this condition.

PM3

At the PM3 monitoring station, the average 24-hour concentration for each month is below the standard of 75 µg/m^3. Similar to the PM2 monitoring station, the PM_{10} concentrations decreases during the wet season and increases during the dry season. The 24-hour PM_{10} concentrations do not exceed the standard of 75 µg/m^3. The PM_{10} concentrations are shown to gradually increase over the years, with the concentrations in 2018 being higher than the preceding years.

Table 14-14: Average daily PM_{10} concentrations for the period

Month	PM1	PM2	PM3
Units	(µg/m^3)	(µg/m^3)	(µg/m^3)
January	9.1	4.5	10.2
February	5.2	6.6	7.8
March	8.8	4.5	5.6
April	10.2	4.9	5.1
May	11.4	12.4	10
June	9.1	11	10.3
July	7.2	11.4	11.4
August	14.3	26.6	14.3
September	16.1	11.2	40.1
October	9	8.7	28.1
November	7.2	6.6	6.4
December	12.8	8.7	6.1
NAAQS	75	75	75



srk consulting	MOGALAKWENA MINE EXPANSION PROJECT 24-HOUR PM_{10} CONCENTRATIONS AT ALL THREE MONITORING STATIONS	Project No. 532330

Figure 14-14: 24-hour PM_{10} concentrations at all three monitoring stations

14.7.2 Dispersion modelling

Dispersion models are able to forecast ambient concentrations and deposition levels as a function of emissions source parameters, emission rates, terrain features and meteorological conditions. These models are useful tools for ascertaining spatial and temporal patterns in the ground level concentrations and deposition attributed to emissions from various sources. Dispersion modelling was undertaken for the proposed Expansion Project which included identified potential sensitive receptors.

A list of community sensitive receptors are presented in Table 14-15. Monitoring point receptors in Table 14-16 have been identified as sensitive receptors in close proximity to the mine area (Figure 7-1). The receptors presented all fall within the dispersion modelling domain, hence the selection.

Table 14-15: Receptors in close proximity to the mine

Receptor	Site Description	Coordinates	
Ramorulana	Community	683483	7349730
Mabuela	Community	684158	7349360
Ga-Pila Sterkwater	Community	684530	7338235
Mmahlogo	Community	685171	7348589
Mosoge	Community	686720	7350310
Kwakwalata	Community	687016	7349707
Ga-Modipana Mosoge	Community	687058	7350656
Magope	Community	687405	7347626
Fothane	Community	687786	7349328
Mamala	Community	688310	7346652
Ga-Mabusela	Community	688312	7359662
Ga-Matlou	Community	688322	7341856
Mesopotamia	Community	688326	7350845
Matopa	Community	688374	7348780
Ga-Chokoe	Community	689221	7342520
Ga-Lelaka	Community	689238	7343150
Ga-Tshaba	Community	689934	7349277
Ga-Seema	Community	690452	7342721
Phafola (Molokomme)	Community	690496	7353774
Phafola (Ga-Maloka)	Community	691033	7354427
Ga Masenya	Community	691364	7346257
Skimming Leruleng	Community	691534	7346694
Mashahleng	Community	691631	7339791
Danisane	Community	692344	7340239
Sandsloot (Ga-Mabusela)	Community	692533	7339218
Witrivier	Community	694204	7356814
Rauwele	Community	694278	7356491
Mmalepetleke	Community	694700	7335880
Mosesetjane	Community	697192	7334734
Ga-Mokaba	Community	697647	7338806
Ga- Molekana	Community	697796	7345368
Sekuruwe	Community	697998	7351215
Ga-Machikiri	Community	698986	7341960

Receptor	Site Description	Coordinates	
Ga-Magongoa	Community	700035	7336371
Motlhotlo Ga-Sekhaolelo	Community	700583	7348213
Armoede	Community	700991	7347987
Tshamahansi	Community	701592	7335615
Rooibokfontein	Community	702914	7350610
Motlhotlo Ga-Puka	Community	703286	7350664

Table 14-16: Monitoring point receptors

Receptor	Site Description	Coordinates	
P34	Dust fallout Unit	695815	7344169
P46	Dust fallout Unit	693144	7346056
GTS	Dust fallout Unit	689681	7349746
Morgan	Dust fallout Unit	690199	7348864
P9	Dust fallout Unit	694865	7345368
TS	Dust fallout Unit	696706	7346051
TEXS	Dust fallout Unit	696922	7346259
TES	Dust fallout Unit	696941	7346868
P21	Dust fallout Unit	695868	7347337
P31	Dust fallout Unit	695176	7347346
ZWNDS	Dust fallout Unit	693135	7346189
PPRN	Dust fallout Unit	692214	7347320
GTRDS	Dust fallout Unit	690440	7349415
NB	Dust fallout Unit	689649	7351198
TMD	Dust fallout Unit	696706	7346051
GTRDMD	Dust fallout Unit	690440	7349415
Hans Langa	Dust fallout Unit	690343	7345346
Manamela HSE no 385	Dust fallout Unit	688744	7350921
Mashishi	Dust fallout Unit	689835	7349205
House 100559	Dust fallout Unit	687703	7350058
Nyaatlo 020169	Dust fallout Unit	688446	7346580
Mahlanya 100068	Dust fallout Unit	690760	7353507
Matso 010290	Dust fallout Unit	690648	7343975
PUKA-444	Dust fallout Unit	703079	7350554
PAPO-19	Dust fallout Unit	700158	7347309
RAMMUTLA-95	Dust fallout Unit	697764	7350706
MALOKA KGORO-10019	Dust fallout Unit	691252	7354283
MPHELA-132	Dust fallout Unit	694071	7349025
DOLO-20120	Dust fallout Unit	697330	7346295
MORUDI-10278	Dust fallout Unit	698021	7345307
Kgwetsana Daycare	Dust fallout Unit	690621	7342897
Modikwe Secondary	Dust fallout Unit	692333	7341141
PM1	PM_{10} Monitor	691920	7348155
PM2	PM_{10} Monitor	696120	7342648
PM3	PM_{10} Monitor	695342	7348086

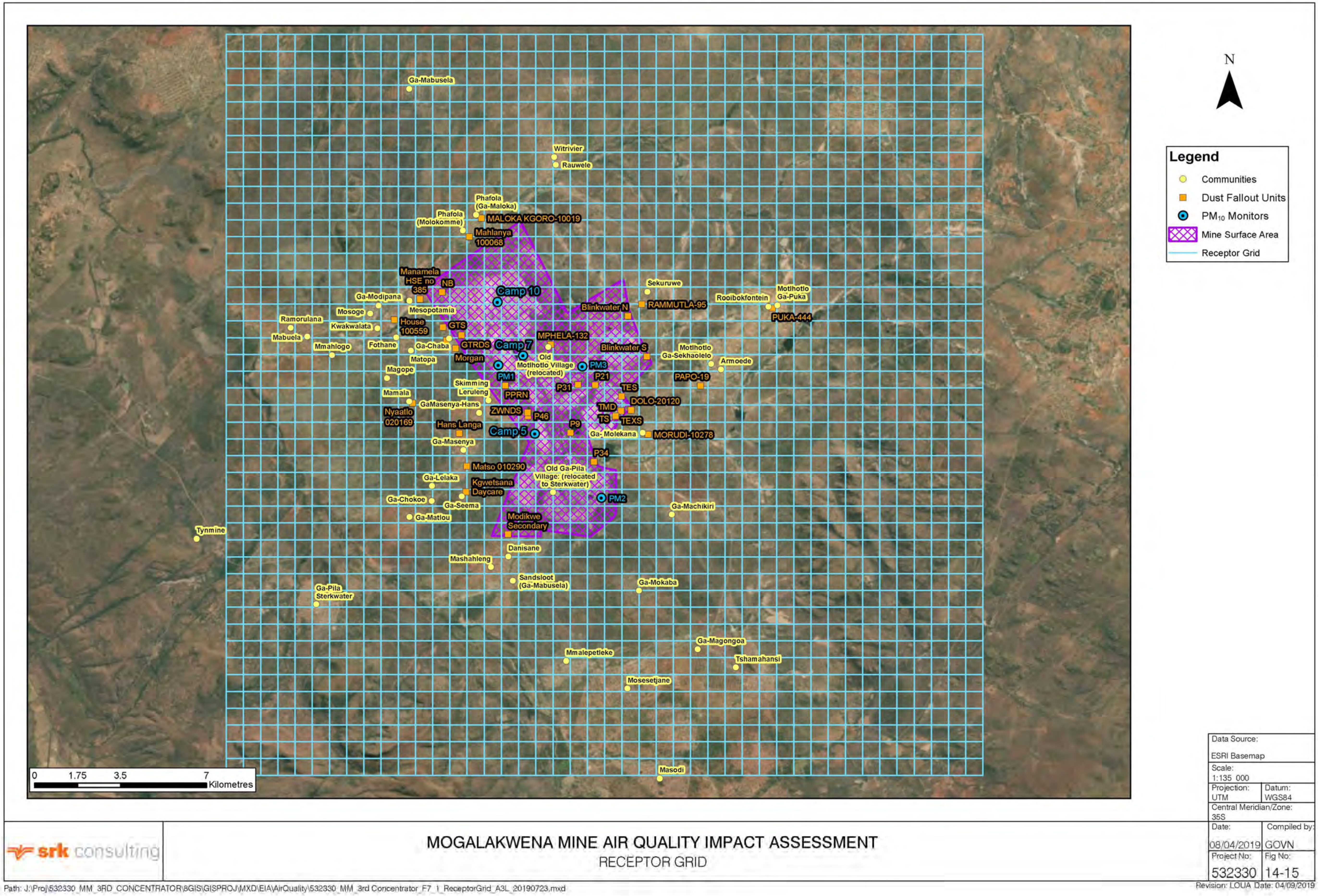


Figure 14-15: Air quality receptor grid

14.7.3 Modelling results

The models were set up based on the project description for the proposed activities. One scenario was run with the proposed infrastructure and implementation of mitigation measures for activities such as materials handling, windblown dust from the NWRD, TSF and stockpiles and the vehicle entrainment of dust from the haul roads.

PM_{10}

The PM_{10} modelling results for the operational phase are presented in Table 14-17 and Figure 14-16, which includes the modelling results for the sensitive receptors located within in the modelling domain. The results presented are only for the proposed operational phase activities at the mine, with management measures in place.

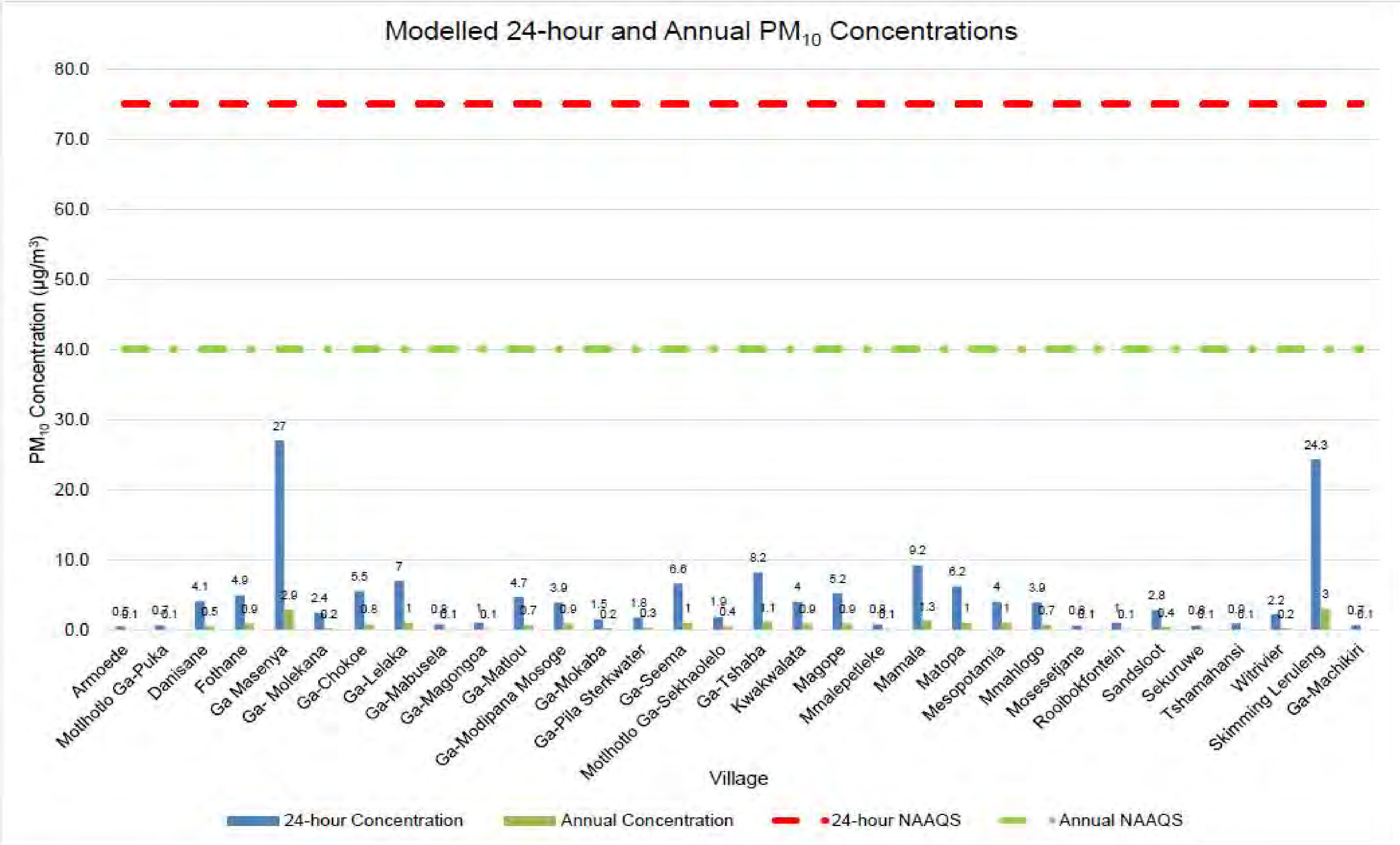
The predicted 24-hour and annual PM_{10} concentrations are for a scenario where management measures are in place. The maximum predicted concentration of PM_{10} occurs within the mine boundary. The pollutant plume moves towards the southwest and west of the mine. The predicted 24-hour concentrations at the sensitive receptors are below the South African NAAQS of 75 µg/m^3. The predicted concentrations at the sensitive receptors range from 0.5 µg/m^3 (Armoede) to 27 µg/m^3 (Ga Masenya). The general trend in the dispersion of PM_{10} is that concentrations decrease with distance away from the mine.

Similarly, the predicted annual PM_{10} concentrations at the sensitive receptors are below annual NAAQS of 40 µg/m^3. The model indicates that the maximum predicted annual concentration is falls within the mine boundary, at the proposed PM_{10} generating activities. The predicted annual concentrations range from 0.1 to 3.0 µg/m^3.

Table 14-17: Predicted mitigated PM_{10} concentrations at the sensitive receptors

Receptors	Co-ordinates		24-hour	Annual
	X	Y	µg/m^3	µg/m^3
Armoede	700991	7347987	0.5	0.1
Motlhotlo Ga-Puka	703286	7350664	0.7	0.1
Danisane	692344	7340239	4.1	0.5
Fothane	687786	7349328	4.9	0.9
Ga Masenya	691364	7346257	27	2.9
Ga- Molekana	697796	7345368	2.4	0.2
Ga-Chokoe	689221	7342520	5.5	0.8
Ga-Lelaka	689238	7343150	7.0	1.0
Ga-Mabusela	688312	7359662	0.8	0.1
Ga-Magongoa	700035	7336371	1.0	0.1
Ga-Matlou	688322	7341856	4.7	0.7
Ga-Modipana Mosoge	687058	7350656	3.9	0.9
Ga-Mokaba	697647	7338806	1.5	0.2
Ga-Pila Sterkwater	684530	7338235	1.8	0.3
Ga-Seema	690452	7342721	6.6	1.0
Motlhotlo Ga-Sekhaolelo	700070	7348220	1.9	0.4
Ga-Tshaba	689934	7349277	8.2	1.1
Kwakwalata	687016	7349707	4	0.9
Magope	687405	7347626	5.2	0.9

Receptors	Co-ordinates		24-hour	Annual
	X	Y	µg/m^3	µg/m^3
Mmalepetleke	694700	7335880	0.8	0.1
Mamala	688310	7346652	9.2	1.3
Matopa	688374	7348780	6.2	1.0
Mesopotamia	688326	7350845	4.0	1.0
Mmahlogo	685171	7348589	3.9	0.7
Mosesetjane	697192	7334734	0.6	0.1
Rooibokfontein	702914	7350610	1.0	0.1
Sandsloot	692533	7339218	2.8	0.4
Sekuruwe	697998	7351215	0.6	0.1
Tshamahansi	701592	7335615	0.9	0.1
Witrivier	694204	7356814	2.2	0.2
Skimming Leruleng	691534	7346694	24.3	3.0
Ga-Machikiri	698986	7341960	0.7	0.1
Mabuela	684158	7349360	3.1	0.6
Mashahleng	691631	7339791	3.4	0.4
Mosoge	686720	7350310	4.1	0.9
Phafola (Ga-Maloka)	691033	7354427	1.9	0.4
Phafola (Molokomme)	690496	7353774	2.2	0.6
Ramorulana	683483	7349730	2.6	0.6
Rauwele	694278	7356491	2.2	0.2
SA NAAQS			**75**	**40**



srk consulting	**MOGALAKWENA MINE EXPANSION PROJECT** MODELLED 24- HOUR AND ANNUAL PM10 CONCENTRATIONS	Project No. 532330

Figure 14-16: Modelled 24- hour and annual PM_{10} concentrations

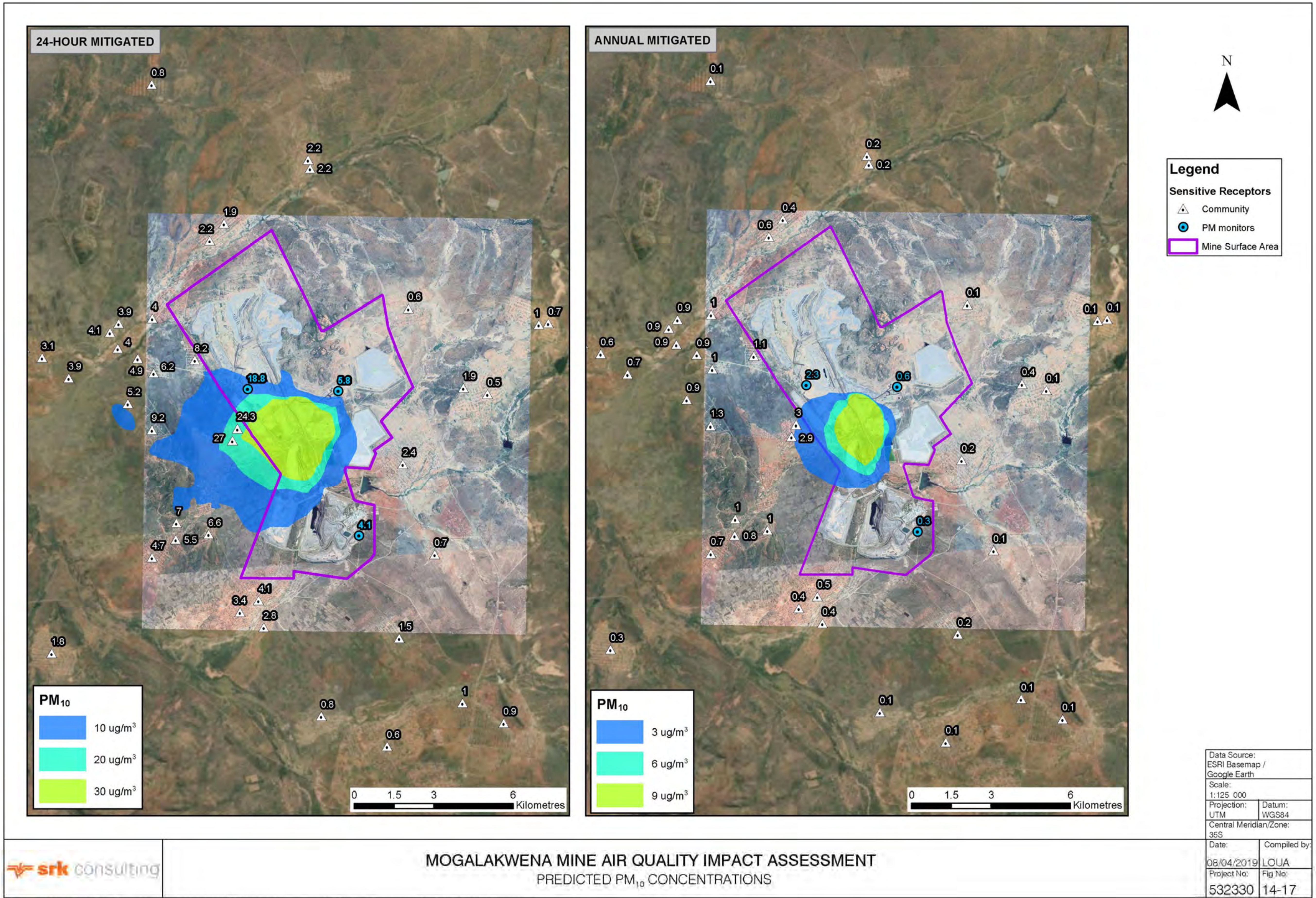


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Figure 14-17: Predicted PM_{10} concentrations

$PM_{2.5}$

The predicted 24-hour and annual $PM_{2.5}$ concentrations are presented in Figure 14-18 for a scenario where management measures are in place. The maximum predicted concentration occurs within the mine boundary. The predicted 24-hour concentrations at the sensitive receptors are below the South African NAAQS of 40 µg/m^3 at all the sensitive receptors. The predicted concentrations at the sensitive receptors range from 0.08 µg/m^3 (Mosesetjane, Tshamahansi and Armoede) to 2.6 µg/m^3 (Ga Masenya). The general trend in the dispersion of $PM_{2.5}$ is that concentrations decrease with distance away from the mine.

Similarly, the predicted annual $PM_{2.5}$ concentrations at the sensitive receptors are below annual NAAQS of 20 µg/m^3. The maximum predicted annual concentration is located on-site at the proposed activities. The predicted annual concentrations range from 0.01 to 0.29 µg/m^3. Predicted concentrations at the sensitive receptors indicate that $PM_{2.5}$ concentrations will decrease further away from the site.

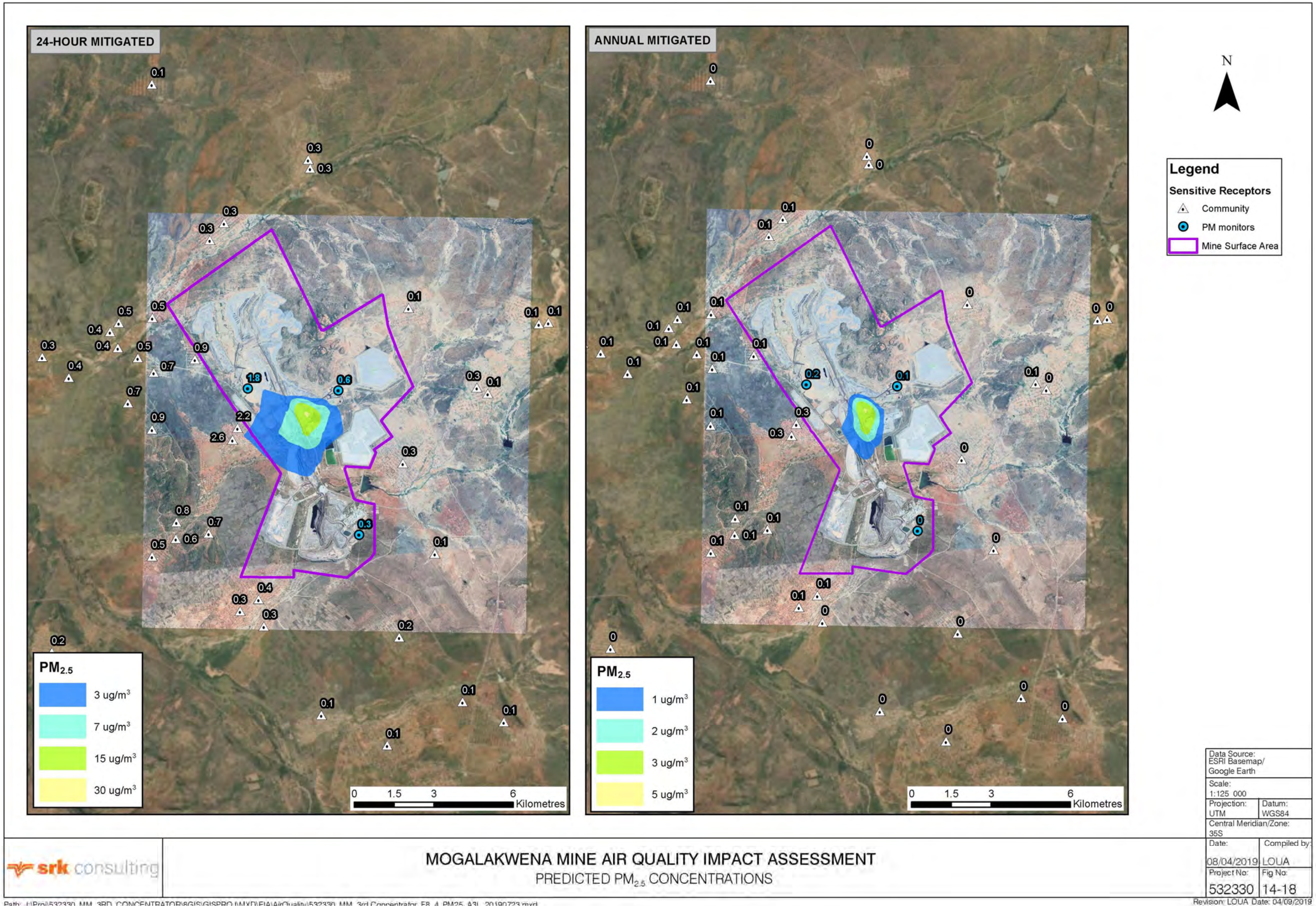


Figure 14-18: Predicted $PM_{2.5}$ concentrations

Dust Fallout

The dust fallout modelling results for the operational phase includes the modelling results for the sensitive receptors within the modelling domain.

With management measures in place, the dust fallout rates at the sensitive receptors are below the Residential Area standard of 600 mg/m^2/day, with the highest concentration occurring within the mine boundary. The plume is predicted to be concentrated over the main operational activities such as the crushing activities at the concentrator, TSF and WRD (Figure 14-19). The predicted concentrations range from 2.0 mg/m^2/day (Motlhotlo Ga-Puka) to 48.0 mg/m^2/day (Phafola). The predicted dust fallout rates will reduce significantly within the boundary of the mine, hence predicting very low concentrations at the sensitive receptors beyond the boundary of the mine.

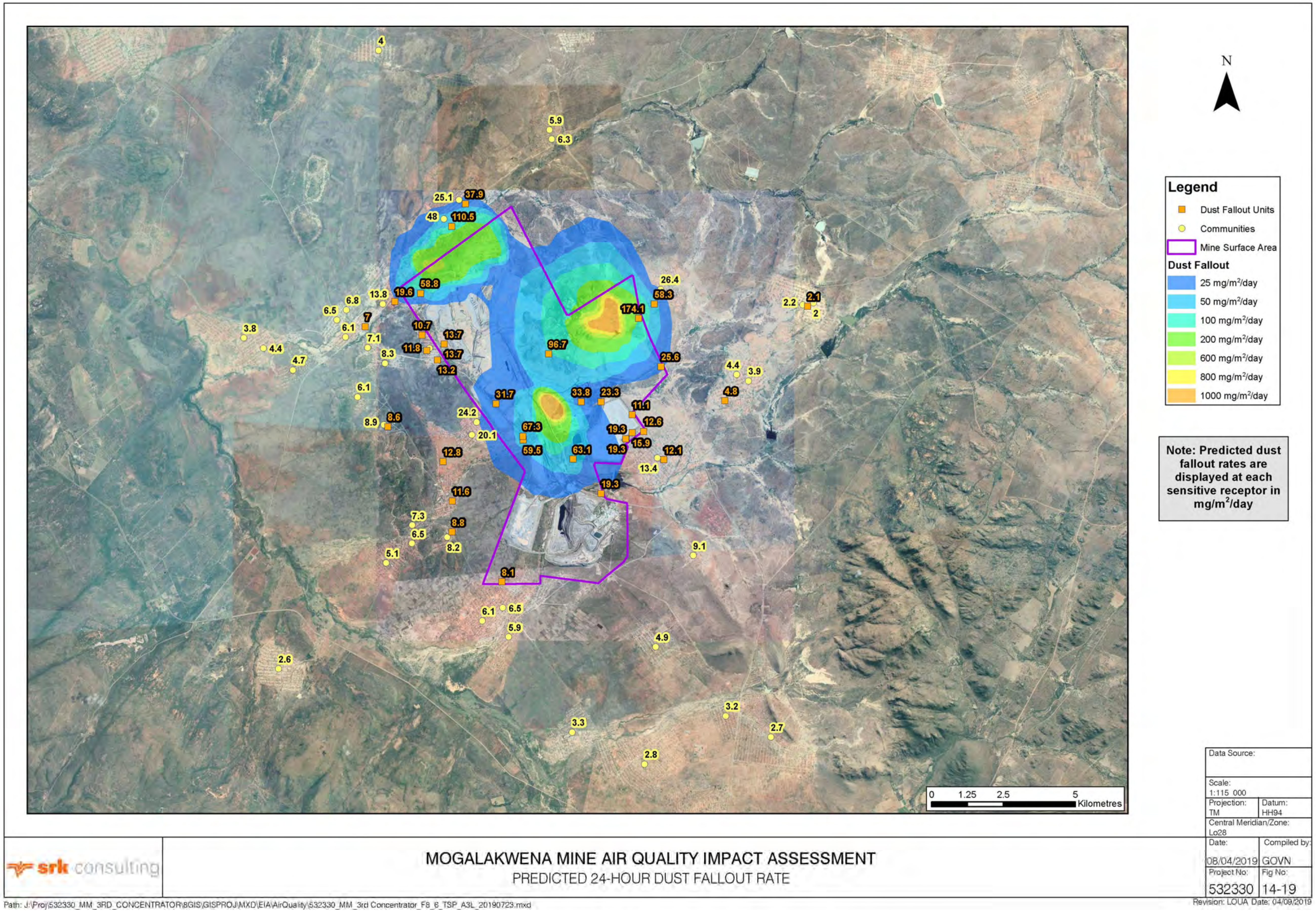


Figure 14-19: Predicted 24-hour dust fallout rate

14.8 Archaeological and cultural heritage

The information presented in this section is extracted from the specialist Heritage and Palaeontology studies undertaken by PGS Heritage, 2019.

Extensive heritage specialist studies have been undertaken during previous environmental authorisation processes associated with Mogalakwena Mine. In addition to the previous studies, an extensive heritage assessment was undertaken as part of the proposed Expansion Project to identify potential archaeological and heritage sites within the footprint area of the proposed expansion infrastructure. This study identified a total of 71 archaeological and heritage sites as indicated in Figure 14-20 and comprised the following:

- Eleven sites containing confirmed graves and burial grounds. See MMEP 10, MMEP 13, MMEP 17, MMEP 18, MMEP 21, MMEP 24, MMEP 27, MMEP 31, MMEP 34, MMEP 36 and MMEP 66.
- Four sites containing possible graves. See sites MMEP 2, MMEP 22, MMEP 30 and MMEP 40.
- Two sites containing relocated burial grounds which may still contain graves. See sites MMEP 7 and MMEP 69.
- Twenty-eight homesteads where the potential risk for the presence of unmarked stillborn graves exist. See sites MMEP 4, MMEP 11, MMEP 12, MMEP 14, MMEP 16, MMEP 19, MMEP 23, MMEP 26, MMEP 28, MMEP 29, MMEP 33, MMEP 35, MMEP 39, MMEP 41, MMEP 44, MMEP 45, MMEP 46, MMEP 51, MMEP 53, MMEP 54, MMEP 55, MMEP 59, MMEP 61, MMEP 62, MMEP 64, MMEP 68, MMEP 70 and MMEP 71.
- One historic farmstead which is certainly older than 60 years and quite likely older than 100 years as well. The farmstead site also comprises a historic farmstead and a confirmed burial ground. See site MMEP 43.
- Twelve Stone Age sites. See sites MMEP 1, MMEP 5, MMEP 6, MMEP 8, MMEP 9, MMEP 15, MMEP 47, MMEP 48, MMEP 49, MMEP 52, MMEP 60 and MMEP 67.
- One possible rain-making site. This site is MMEP 57.
- One Late Iron Age stonewalled site. See site MMEP 50.
- Eight sites comprising historic to recent stonewalling. See sites MMEP 20, MMEP 25, MMEP 37, MMEP 42, MMEP 56, MMEP 58, MMEP 63 and MMEP 65.
- One site comprising a single lower grinding stone. See site MMEP 32.
- One site comprising a rock boulder associated with cupules and stonewalling. See site MMEP 3.
- One site comprising a rubbing post. See MMEP 38.

Some of the heritage sites assessed is of a low heritage significance and have not been included in the heritage impact assessment. The reason for this is that sites of low significance will not require mitigation. These sites are MMEP 1, MMEP 8, MMEP 15, MMEP 20, MMEP 25, MMEP 32, MMEP 37, MMEP 52, MMEP 56, MMEP 58, MMEP 60, MMEP 63, MMEP 65 and MMEP 67.

A map and summary table of all the archaeological and cultural heritage sites identified within the Mogalakwena Mine mining right area to date is shown in Appendix 10. Some of these sites have been relocated as part of the existing mining activities and the original location of these sites are shown on the map.

14.8.1 Palaeontology study

A palaeontology desktop assessment was undertaken as part of the proposed Expansion Project, the section below provides a summary of the desktop study:

The study area where the proposed infrastructure associated with the proposed Expansion Project will be located partially incorporates outcrop area of the Chuniespoort Group of the early Proterozoic Transvaal Supergroup, which includes Malmani Subgroup dolomites and limestones that are considered to be of high palaeontological sensitivity. There is a high likelihood that stromatolitic fossil assemblages may be present in most of the outcrop areas.

Consequently, the following infrastructure and associated activities may be affected:

- Proposed Third Concentrator Site
- Buffer Dam
- Contractors Laydown Area
- Upgrading of a section of an existing mine road
- Upgrade of the South Concentrator

Although the proposed study area is exempted from further palaeontological assessment, areas where the footprint is underlain by Malmani Subgroup sediments and excavations more than 1 meter deep into the Malmani Subgroup bedrock needs to be monitored by a professional palaeontologist as part of a Phase 1 assessment in case of chance exposure of stromatolite fossil remains, while such excavations are still open.

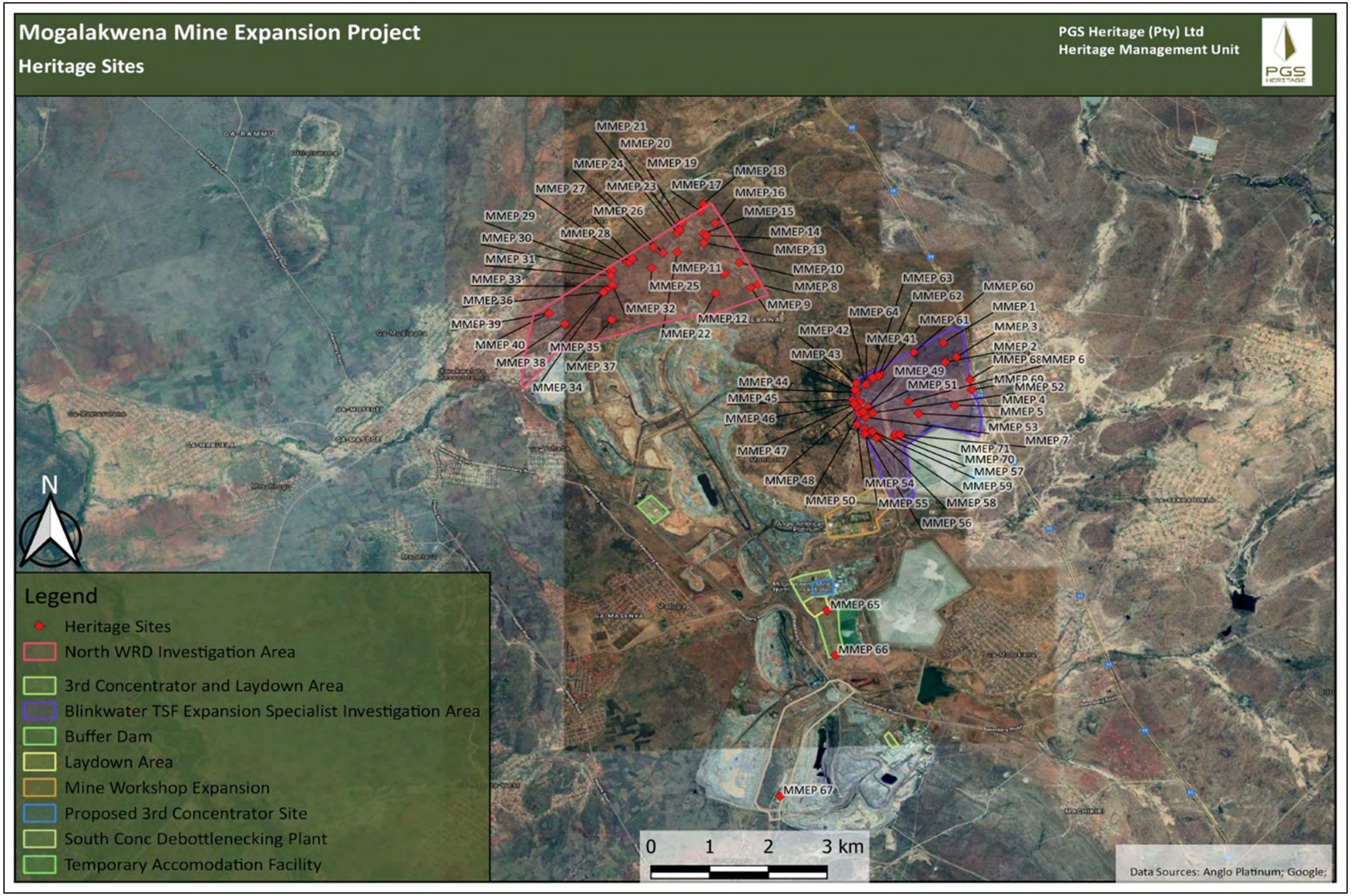


Figure 14-20: Identified heritage sites associated with the expansion project

14.9 Geohydrology

The information presented in this section is extracted from the specialist Hydrogeological study undertaken by Itasca Africa (Pty) Ltd in 2019.

14.9.1 Aquifers

There are three aquifer systems underlying the Mogalakwena Mine area:

- There is a **localised primary aquifer** that occurs in the drainage channels of the Sandsloot, Mohlosane, and Witrivier non-perennial streams that drain the Mine area to the Mogalakwena River. Sub-surface flow throughout the year in the sandy sediments is intercepted in the shallow boreholes (<15 m depth average where measurable) that are used extensively by the local communities as their domestic water supply.
- The wetland to the east of Blinkwater 1 TSF, arises as springs fed by runoff and the shallow groundwater from the intrusive Utrecht Granite that forms the relief (hills) to the northwest and northeast of Blinkwater 1 TSF. Prior to the construction of Blinkwater 1 TSF, the springs were a source of the Mohlosane Stream. Following construction of Blinkwater 1 TSF, ponding to the north of the TSF occurs and sub-surface drains from the overflow of the wetland continue to feed the Mohlosane.
- The **weathered bedrock aquifer** extends to a depth of at least 30 -50m within the weathered bedrock units. The weathered zone is more permeable than the underlying bedrock due to weathering and the presence of fractures. Deep weathering is associated with the Sandsloot and Mohlosane Rivers and tectonic structures. The weathered bedrock aquifer is hydraulically in connection with the alluvial aquifer in the non-perennial streams which may be gaining from or losing to the groundwater depending on the water table and the season.
- Groundwater flow in the **unweathered bedrock** is controlled mainly through fractures and joints and major fault blocks which are hydraulically connected. Higher yields occur in the shear zones at the contact with the Platreef, which serves as the main storage component of the aquifer, with some contribution by seepage from the overlying weathered zone. The unweathered norites and pyroxenites have low primary porosity and hydraulic conductivity (K) values.
- The dykes may compartmentalize flow due to their low permeability.

Groundwater vulnerability

Groundwater vulnerability gives an indication of how susceptible an aquifer is to contamination. Aquifer vulnerability is used to represent the intrinsic characteristics that estimate the sensitivity of various parts of an aquifer to being adversely affected by a contaminant load imposed from surface.

Most of the Mine area falls within the medium and low vulnerability rating. The medium vulnerability area corresponds to the Malamani Dolomites to the south of the Mine.

The regional aquifer of the study area is calculated as having a “Low to medium” vulnerability to contamination. However, the shallow alluvial aquifer along the water courses is likely to have a higher vulnerability due to the shallow water table and higher recharge.

Aquifer classification

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 5.0 L/. The underlying Malamani dolomite to the south of the Mine is characterised as a ‘Karst aquifer’ with yields of around 0.5 to 2.0 L/s

The South African Aquifer System Management Classification is presented by five major classes. A micro-fractured matrix in the fractured aquifers provides storage capacity with limited groundwater movement, 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.

Based on the National Aquifer Classification map, the aquifer system underlying the site is regarded a “major aquifer” for the dolomites and a “minor aquifer” for the remainder of the Mine Area.

Regardless of the poor quality of the groundwater and the low yields of the fractured aquifer, the fact that the informal households in the surrounding villages use the groundwater as their main water supply, the aquifer around the Mine is classified as a sole-source aquifer system, according to the DWS classification system (1998). 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.

14.9.2 Groundwater levels

The location of the existing monitoring boreholes and piezometers at Mogalakwena Mine is shown in Figure 14-21 with a brief summary of the measured groundwater-level data provided below:

- The depth to the groundwater table is generally between 0.5 to 24 mbgl.
- Groundwater flow is from SE to NW towards the Mogalakwena River, from > 1150 mamsl upgradient of the Mine to 1060 mamsl downgradient of the mine.
- The pits have been mined below the groundwater table and therefore are localised sinks or discharge points to the groundwater flow.
- Significant groundwater level fluctuations occur, in response to the recharge and discharge cycles that occur during the wet and dry seasons in the shallow alluvial boreholes.
- Almost all the measured groundwater levels in the deeper Mine monitoring boreholes do not fluctuate with precipitation events. This suggests that the recharge to the bedrock groundwater system during precipitation is limited to the unsaturated, permeable topsoil and fractured rocks and discharges via the alluvial sediments as sub-surface flow. The recharge from precipitation to the deeper groundwater system is a slow infiltration process.
- There is no obvious vertical hydraulic gradient, however, a minor downward vertical gradient was observed. For the low hydraulic conductivity value rocks at the Mogalakwena Mine, it is reasonable to observe no obvious or minor downward vertical gradients at the piezometers that are outside the perimeter of the open pits, confirming that the cone of drawdown due to the mining is steep and does not extend laterally.

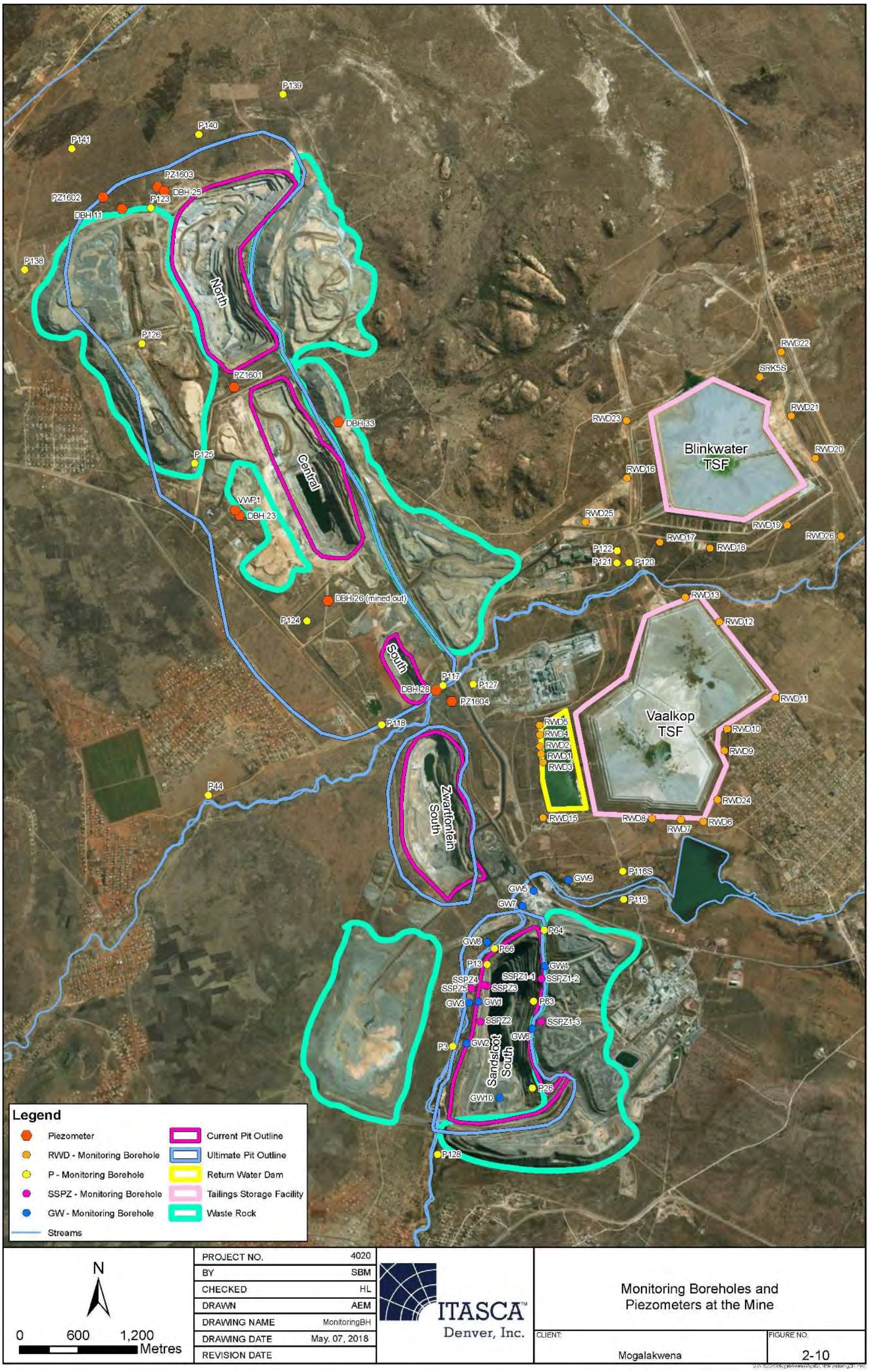


Figure 14-21: Monitoring boreholes and piezometers at Mogalakwena Mine

14.9.3 Current groundwater usage

Although an attempt has been made to quantify groundwater usage within the catchment, there are many uncertainties and available groundwater in the greater catchment should be re-evaluated on a regional scale.

The water balance shows that sufficient water is available from current sources for the expansion.

Hydrocensus

The latest hydrocensus was conducted by Aqua- Earth Consulting (AEC) and Itasca in June 2018. The scope of this hydrocensus was to identify groundwater users within 10 km radius of the mine.

The parameters measured were: Temperature, pH, Electrical Conductivity (EC), Oxygen- Reduction Potential (ORP), Dissolved Oxygen (DO) and Total Dissolved Solids (TDS).

The locations of the hydrocensus sampling points have been included in the groundwater specialist report (Appendix 16 as well as the IWWMP) and were classified as follows:

- Upstream of the mine
- Downstream of the mine
- Mine
- Western side of Mogalakwena river
- Other points which were included but not sampled

Mine water supply/active dewatering boreholes

There are approximately 51 water supply pumping boreholes for potable use in the Mine area as three wellfields: PPL, Blinkwater, and Commandodrift. The Blinkwater and Commandodrift wellfields are located downgradient of the Mine along the Mogalakwena River. The PPL wellfield is located near the TSFs and RWDs and many of these boreholes act as scavenger wells controlling leachate from the unlined Vaalkop. The Commandodrift wellfield is currently not in use.

Currently, there are no active dewatering boreholes to reduce seepage into the open pits and lower the groundwater below the pit bottom. However, the Mine plans to install dewatering boreholes to target the seepage that occurs within the North Pit.

Passive dewatering from pit sumps

Passive dewatering includes the seepage water derived from the open-pit bottom and along the open-pit sidewalls, and during the wet season from weathered-bedrock deposits, that is collected in the pit sumps and pumped out of the open pits for use in the Mine processes. The dry season seepage can be considered as an estimate of the bedrock seepage (i.e. groundwater inflows) without the effect of precipitation.

Community boreholes

Groundwater is the main water supply to the communities for domestic consumption and for livestock watering. Based on the recent hydrocensus, 92% of the boreholes located in villages surrounding the Mine, (both upstream and downstream), are used as their domestic water supply. It is noted that most of the communities are clustered along the banks of the Witrivier, Mohlosane and Sandsloot rivers due to the availability of water from the shallow boreholes exploiting sub-surface flow throughout the year. Other villages at distance from the alluvial drainage channels are likely to be exploiting the weathered aquifer.

Although no pumping-rate data are available, it is reasonable to assume that all boreholes pump at low rates to supply the domestic needs. The effect of these pumping boreholes on the regional groundwater flow condition below the weathered zone is likely to be very limited. The effect of these domestic pumping boreholes on the migration of the solutes related to Mine operation is also likely to be small.

Other mining activities

Illegal sand mining along the alluvial water courses (Sandsloot) has been noted and could impact on the shallow alluvial aquifer that is used by the communities both in terms of reduced baseflow and deterioration in water quality.

Other formal mining activities within the catchment include the Platreef Underground Mining operations at a distance of 8 km from Mogalakwena and to depths of > 800 mbgl.

14.9.4 Groundwater quality

The latest groundwater quality results from April-May 2018 were compared with the groundwater-quality standards i.e. SANS 241:2015 and the 2018 Mogalakwena Mine WUL permit limits (AEC 2018). The boreholes are divided into two groups according to their location - the TSFs and Mine boreholes located around the Mine.

The following is a summary of the 2017-2018 groundwater-quality sampling at the Vaalkop and Blinkwater 1 TSF:

- The majority of the boreholes around the TSFs have poor groundwater quality when compared to the SANS drinking water standards and the existing Mine WUL due to solute loading to the groundwater from the unlined facilities.
- The elevated electrical conductivity is due to high concentrations of sulphate, chloride, magnesium and sodium in most of the shallow boreholes that intercept the shallow seepage from the facilities.
- Elevated magnesium and fluoride are most likely due to the geology (olivine rich rocks for magnesium and fluoride associated with granites).
- Elevated nitrate concentrations (as N) that exceed the WUL limit were measured for boreholes RWD11 and RWD17.
- Boreholes RWD19, RW23D and SRK5S considered representative of background groundwater (upgradient of Blinkwater 1 TSF) in the vicinity of the tailings dams and have relatively good water quality.
- High total iron concentrations above the WUL limit were reported at borehole SRK5S but this is more likely associated with the humic acids in the natural wetland upgradient of the TSF.

The following is a summary of the groundwater-quality sampling results for boreholes located at the Mine for the sampling period 2017-2018 (AEC):

- The groundwater quality from most of the Mine monitoring boreholes have marginal to poor groundwater quality due to elevated magnesium, chloride and sulphate.
- Boreholes P125, P126; P128, P143 and P144 have measured nitrate concentration above the SANS limit.
- DBH14 and DBH15 (were drilled for pit dewatering purposes but not equipped) have of good quality and below the SANS and WUL limits.
- Boreholes for monitoring of hydrocarbon contamination (February 2018 that were not dry) include HC10, HC3, HC5 and HC9. All total petroleum hydrocarbons (TPH) C6-C10 and C10-C40 were below detection limits.

The general chemistry associated with the pit sumps, the return water dams and pollution control dams from the 2018 monitoring report are compared with the WUL limits and the IRP guidelines for protection of water resources. The following points are noted:

- Elevated concentrations of sodium, chloride, sulphate and nitrate occur in these surface water samples indicating poor water quality due to mining and blasting activities.
- The highest sulphate occurs in the return water dam (695 mg/L) whereas the highest nitrate occurs in the Central Pit sump.

- The pH is alkaline for all these surface water samples (7-9).
- The water from these surface water facilities is re-used in the plant make-up and is not released to the environment.

The simulated concentrations for chloride, sulphaste, TDS and nitrate around in the mining facilities in 2018 is shown in Figure 14-22 and Figure 14-23

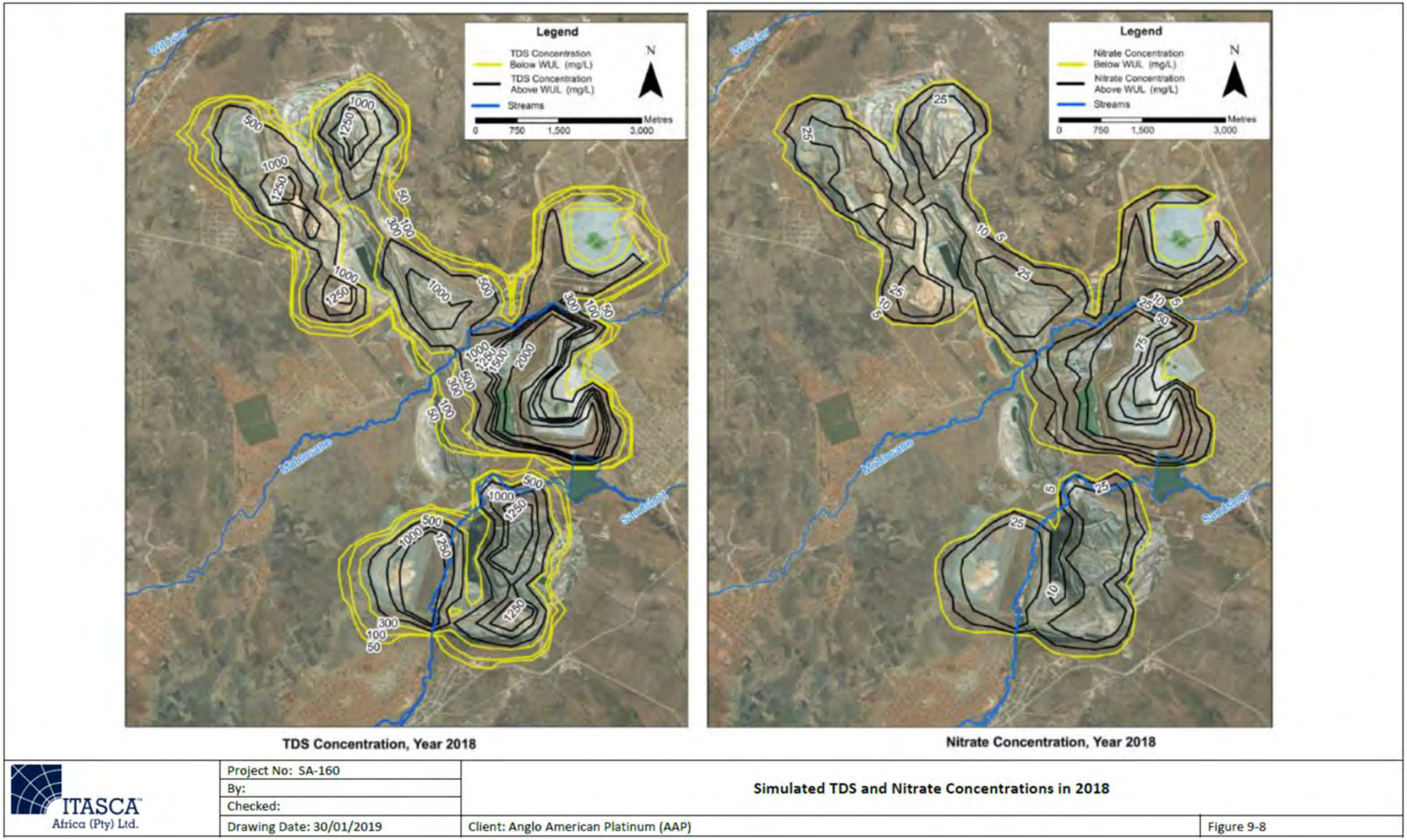
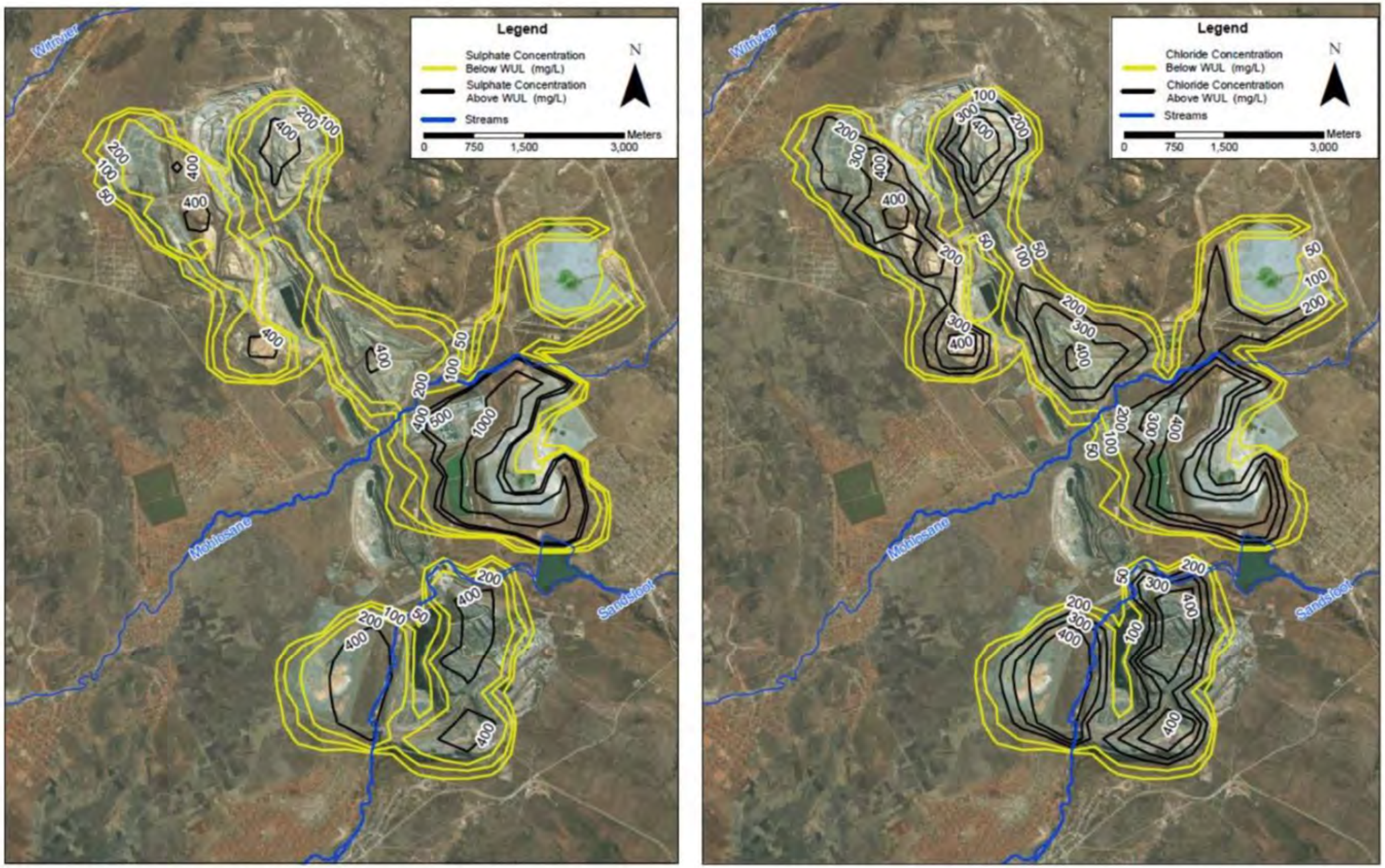


Figure 14-22: Simulated TDS and Nitrate Concentrations in 2018



Sulphate Concentration, Year 2018

Chloride Concentration, Year 2018

ITASCA Africa (Pty) Ltd.

Project No: SA-160	Simulated Sulphate and Chloride Concentrations in 2018
By:	
Checked:	
Drawing Date: 30/01/2019	Client: Anglo American Platinum (AAP) — Figure 9-7

Figure 14-23: Simulated Sulphate and Chloride Concentrations in 2018

14.9.5 Groundwater Modelling

The addition of the proposed M3C will mean that the current openpit mining plan that has already been authorised, will be mined faster. Therefore the groundwater model has incorporated the proposed mine plan up to 2028.

Numerical models were developed based on the Conceptual Hydrogeological Model. The groundwater flow and solute-transport models were calibrated to the available groundwater-level and groundwater-quality data available at the Mine site. The models used site-specific hydraulic parameters and geologic data provided by Mogalakwena Mine.

- In general, open-pit bedrock-induced seepage will remain relatively constant within each open pit as the open pits progress deeper, due to the low K values of the deep bedrock. As the open-pit mining cuts laterally expand, (the surface area of the open pits), the bedrock seepage rate will increase.
- Seepage predictions do not account for the evaporation and absorption of water in loosened material. Due to the large evaporation rate at the Mine, it is likely that bedrock seepage would be reduced by as much as 40% during the dry season. In the wet season, it is anticipated that the loss due to evaporation and absorption would be lower. The reduction in bedrock seepage due to evaporation and absorption loss may be negligible during the wet season when the ground is saturated.
- Drawdown will extend along the Platreef from the Drenthe Fault to the Sandsloot South Open Pit southern boundary. The drawdown will not propagate beyond 500m away from the open pits due to the low K values of the unweathered bedrock.
- Constituent concentrations (i.e. nitrate, TDS, chloride, and sulphate) begin to increase in areas where TSFs and RWDs expand through time. By the end of 2028, most increases in constituent concentrations are within 100 m of the mining facility boundaries.
- As a TSF closes, the solute loading begins to decrease through time as the seepage reduces and the TSF dries out. The potential seepage through a TSF after closure is low due to the low K value of the tailings material. The solute loading through time after closure is related to the seepage of residual saturation in the tailings material.
- The primary receptor of the simulated constituents is the open pits.
- The simulated concentration contours through 2028 show elevated solute concentrations around the Sandsloot, Mohlosane, and Witrivier Rivers. There is potential during high-precipitation events that saturated alluvium and weathered bedrock may allow groundwater solutes to migrate into the surface-water system.
- After the pit-lake infilling, the pit-lake water elevation will still be below the groundwater level. Pit lakes are simulated to be terminal sinks for the groundwater system due to low groundwater seepage and high evaporation. A terminal sink would result in continuous solute loading from the groundwater system. Due to the pit lakes becoming terminal hydraulic sinks for the groundwater system, it is expected that the constituent concentrations will continue to rise through time during closure until they reach the saturation and equilibrium condition.
- There is an increasing trend in constituent concentrations due to the lakes being terminal sinks and evaporation. All constituent concentrations will exceed background concentrations at some time point after pit-lake infilling begins.

Figure 14-24 shows the simulated drawdown in 2018 (currently), and in 2028 assuming the pit are mined according to the Mine Schedule as per previously approved mine plans

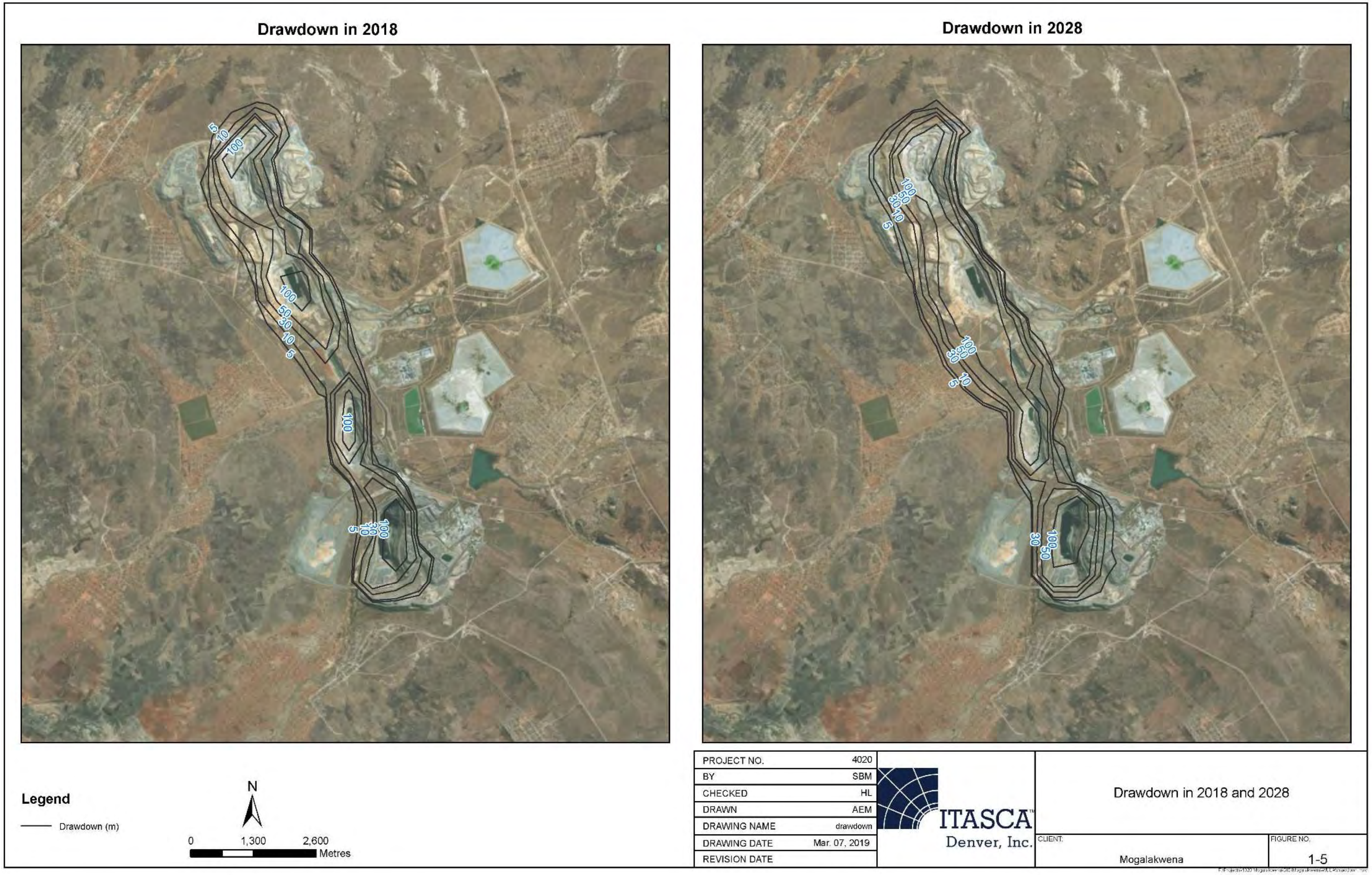


Figure 14-24: Modelled Drawdown in 2018 and 2028

14.10 Surface water hydrology

The information presented in this section is extracted from the specialist Surface Water study undertaken by SRK in 2019.

The Mogalakwena Mine area is situated in quaternary catchment A61G, (Limpopo River Water Management Area A6) (Figure 14-25) approximately 30 km northwest of Mokopane, in the Mogalakwena Local Municipality of the Limpopo Province. There are three main rivers that may be impacted upon by the expansion project, namely the Groot Sandsloot (Pholotsi) River, Mohlosane River and Witrivier.

14.10.1 Wetlands

A wetland has previously been identified on Blinkwater 820 LR, in close proximity to the existing Blinkwater TSF and has been assessed as part of the biodiversity and soils specialist studies and has been taken into consideration in the design of the Blinkwater 2 TSF. Specific management measures for the protection of the wetland has been included in the design of the Blinkwater 2 TSF which will be submitted to DWS as part of the WULA. The overall objective of wetland protection is to mitigate impacts of the proposed Blinkwater 2 TSF on the wetland such that the quantity of water, quality of water, soil and vegetation is protected.

14.10.2 Surface water use

Domestic and industrial use

MM abstracts water from three wellfields within the mine lease area and surrounds. Communities surrounding the mine also rely on groundwater for potable and domestic use.

Industrial use in the immediate area is limited to mining operations. Process water is made up of sewage effluent from the Mokopane and Polokwane sewage works, open pit water and process water dams that includes the return water from the TSFs. Wellfield water supplements the process water. The water is contained within the mine’s dirty water circuit and this captured water is also used in the process.

Refer to Section 8.12 for details relating to Mogalakwena Mine water supply.

Livestock watering and irrigation

Surface water is used for farming and livestock watering, although this is severely limited by the intermittent nature of flow in the rivers. The communities surrounding the mine also make use of the water in the Groot Sandsloot (Pholotsi) River when the water comes to surface.

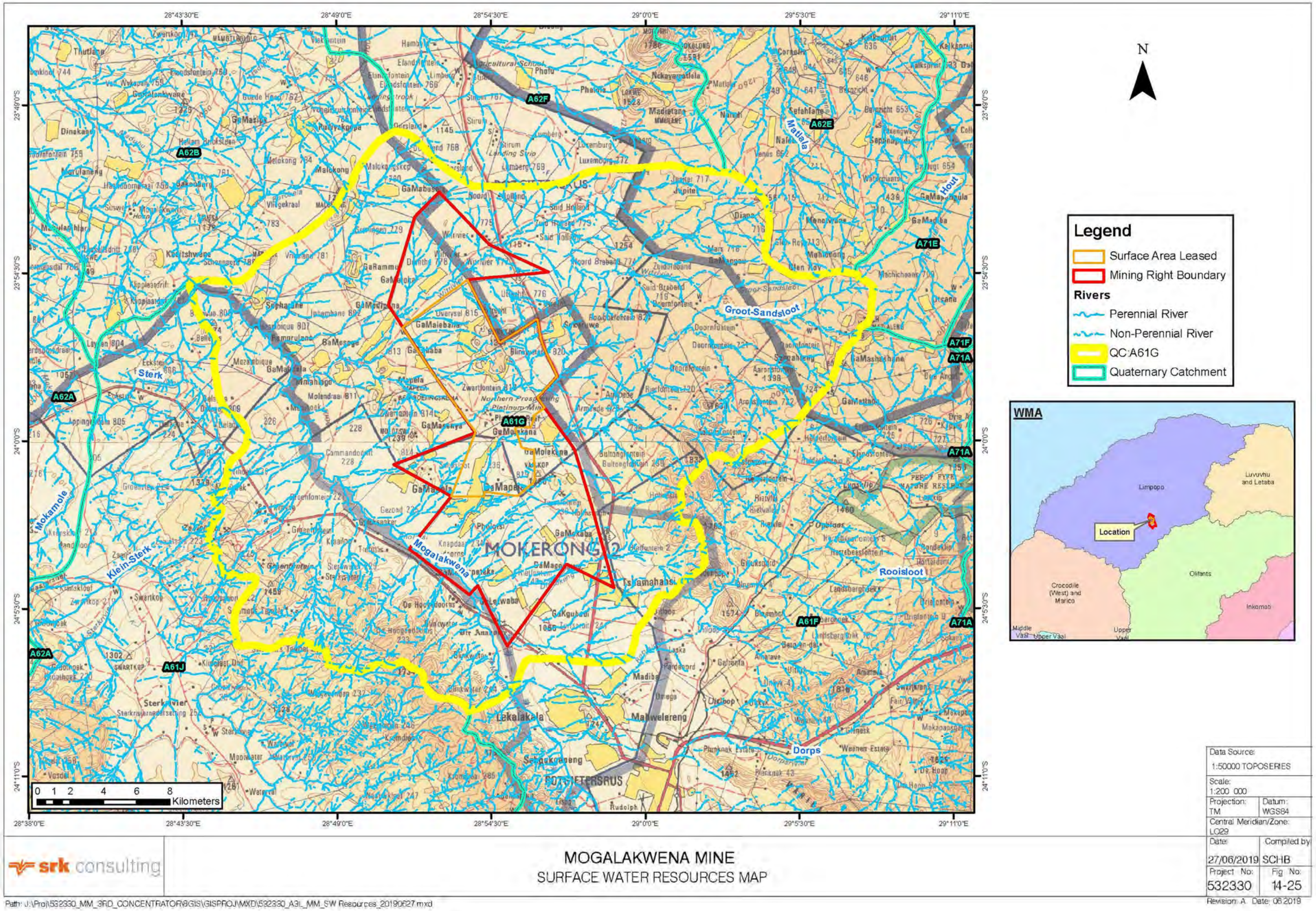


Figure 14-25: Water Management Area

14.10.3 Surface water hydrology

Catchment characteristics

Catchment area and river lengths were determined from the 5 m contour data as abstracted from the 1:10 000 topographical maps. These catchments were then plotted on the 1:50 000 maps. The catchment characteristics are presented in Table 14-18. The catchment areas for the catchments are indicated in Figure 14-26.

Table 14-18: Summary of catchment characteristics

Catchment Name	Area (km²)	Longest Watercourse (m)	10:85 Slope (m/m)	Tc (hours)
Mohlosane	56	7600	0.016	2.2
Groot-Sandsloot	176	20 000	0.012	3.56
Witrivier	237	32 000	0.011	5.29
Witrivier tributary	5.03	3300	0.02	0.75

Note: 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.

Tc: 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

Flood peaks

The flood peaks were determined for each catchment presented in Table 14-19 and Figure 14-26

Table 14-19: Peak flow summary

Peak Flow and Volume		Return Period (years)					
		2	**5**	**10**	**20**	**50**	**100**
Catchment Mohlosane: 56 km²							
Peak Flows (m³/s)	**SDF Method**	10	57	102	155	234	301
Catchment Groot Sandsloot: 176 km²							
Peak Flows (m³/s)	**SDF Method**	54	86	116	155	235	324
Catchment Witrivier: 237 km²							
Peak Flows (m³/s)	**SDF Method**	21	126	226	342	518	667
Catchment Witrivier tributary 5.03 km²							
Peak Flows (m³/s)	**Rational Method**	12	18	25	32	44	58

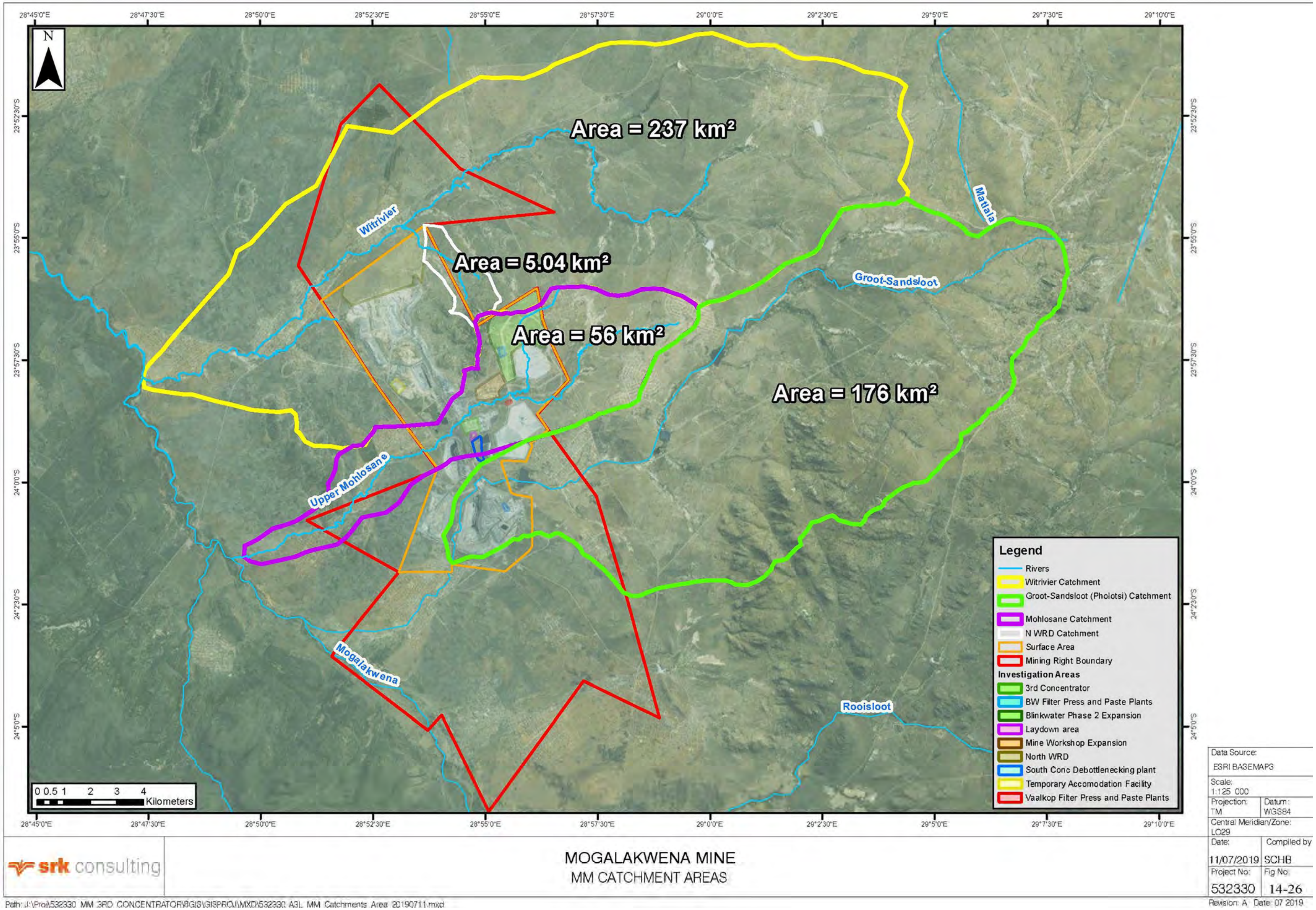


Figure 14-26: Mogalakwena Mine catchment areas

Floodlines

This section outlines the floodlines calculated for the site. The 1:50 and 1:100 year floodlines determined for the Mohlosane River, Groot Sandsloot (Pholotsi) River, Witrivier and Witrivier tributary and are presented in Figure 14-27 to Figure 14-29. The floodlines were calculated using the HEC-RAS model, which determines the flood levels for various peak flows using standard Manning's based hydraulic equations. The input required to run the model includes:

- Contour data 1 m and 5 m;
- "Roughness" of the watercourse which is obtained from a site visit establishing the Manning's number to be 0.030 and 0.040 for the banks; and
- Adopted runoff peak flow were estimated using the SDF and Rational method.

The floodlines indicate the following:

Witrivier River

- The WRD area shown on Figure 14-27 indicates the specialist investigation area. A wider area than what is required for the WRD was investigated to allow for the positioning of the WRD to be situated outside the floodlines and 100 m away from the river as per GN704
- The proposed North WRD investigation area along the Witrivier it is not affected by the 1:100 year floodlines. There is a tributary of the Witrivier that is within the proposed investigation area for the North WRD but the proposed WRD will be positioned not to encroach on the 1:100year floodline in this area.
- Under current conditions, before any mine related activity, a portion of Phafola village, west of the Witrivier and west of North WRD will be inundated by the flood water; and
- The average existing flood depth based on the 1:100-year floodline is approximately 0.32 m along the portion of Phafola village, west of the Witrivier.

Mohlosane River

- The proposed M3C and laydown investigation area includes a small section located inside the 1:100-year floodline. Infrastructure within the investigation area will be positioned to be outside the floodline.

Groot Sandsloot (Pholotsi) River

- The proposed MSC debottlenecking plant is outside the 1:100-year floodline.
- The diversion will be able to contain the 100-year flood. The actual constriction in the system is further upstream at the WRD haul road crossing. This crossing greatly reduces the flood events well below what can be expected by the south haul road crossing. Part of the Groot Sandsloot (Pholotsi) River Diversion studies incorporate mitigation measures to ensure impacts caused by the removal of the upstream culvert that may have on the downstream peak flows.

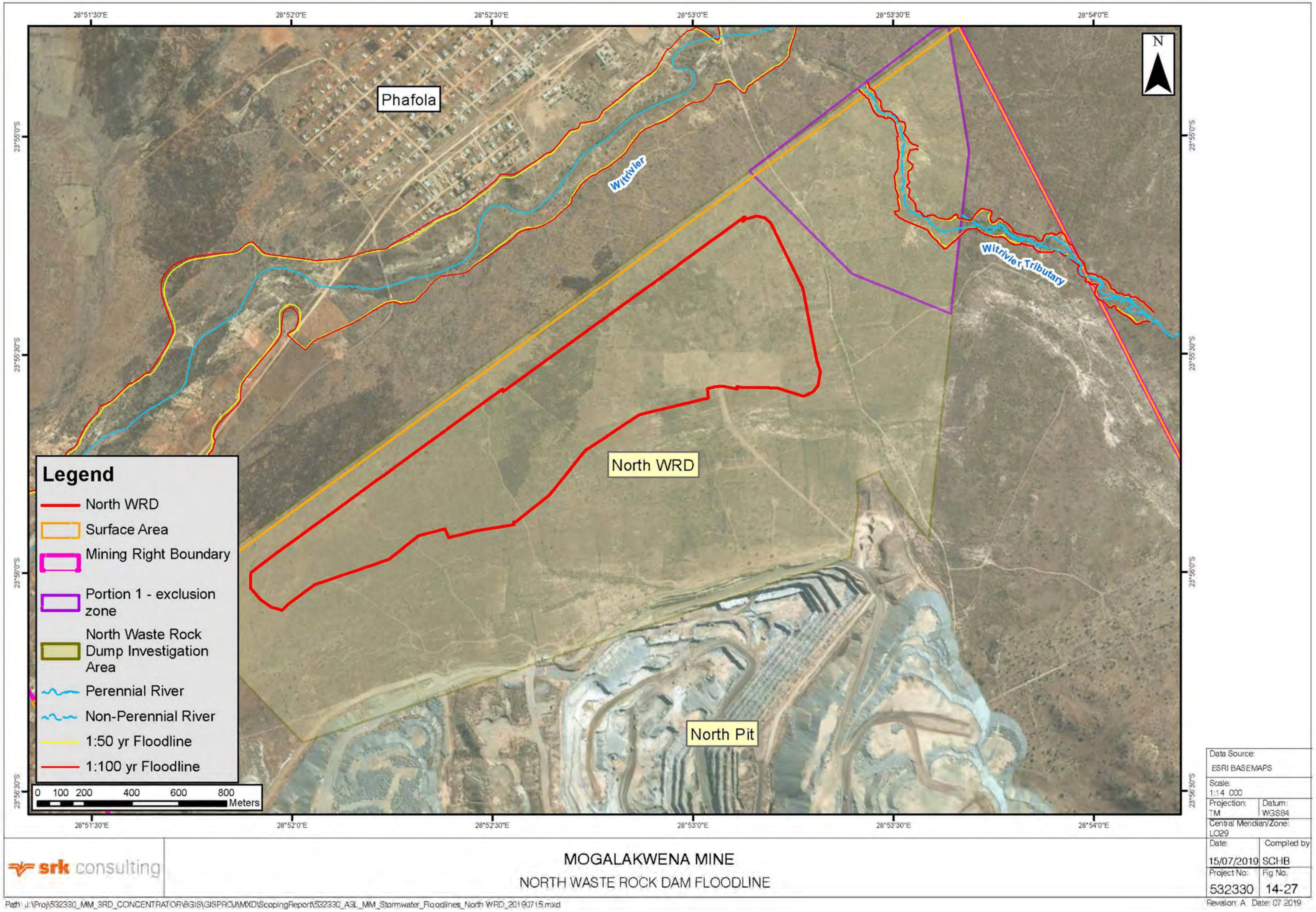


Figure 14-27: North Waste Rock Dump floodline

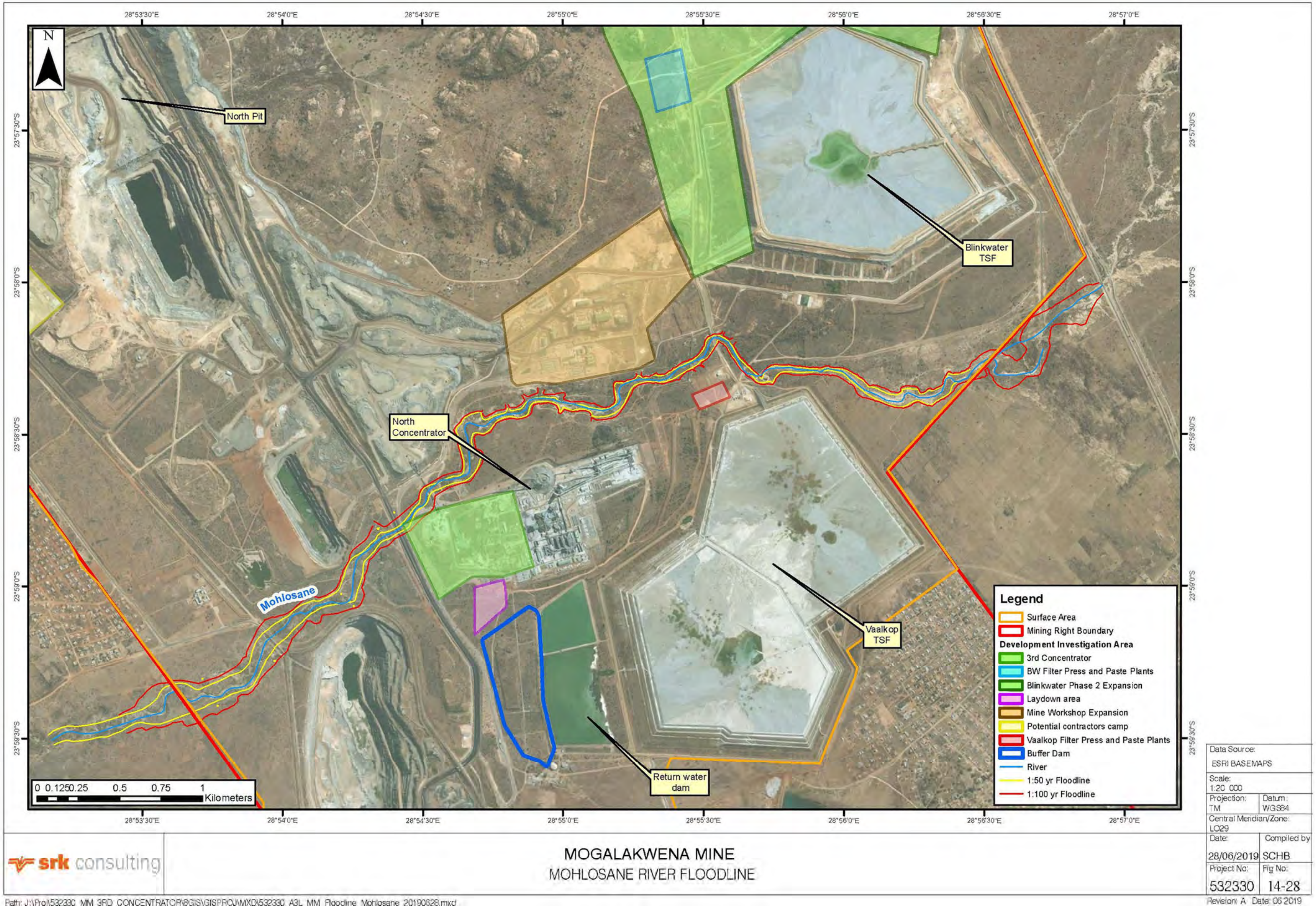


Figure 14-28: Mohlosane River floodline

Figure 14-29: Sandsloot (Pholotsi) floodline

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 system has negligible flow during the dry season and can therefore be classified as non-perennial.

Mean annual runoff

According the revised water management area boundary descriptions (Government Gazette No. 35517) in 2012, Mogalakwena Mine is located in the A61G quaternary catchments of the Limpopo Water Management Area (previously known as Crocodile West and Marico). The quaternary catchment has an average area of 927 km^2, which has a Mean Annual Runoff (MAR) of 16.05 million cubic meters (mcm).

The table below presents the anticipated reduction in MAR, as a consequence of the proposed development.

The Mogalakwena Mine catchment areas and the associated reduction in the MAR is presented in Table 14-20. The proposed developments will result in a reduction of MAR because runoff from any mine infrastructure will be collected and reused within the processing circuit.

Table 14-20: Natural mean annual runoff and loss of mean annual runoff due to proposed development for the local catchments

Catchment	Area (km^2)	MAR (mcm)	Infrastructure area (km^2)	Loss of MAR (%)
Witrivier catchment	237	4.1	5.4	2%
Sandsloot (Pholotsi) River catchment	56	0.97	0.03	0.1%
Mohlosane River catchment	176	3.04	6.3	11%
Witrivier tributary	5.04	0.087	0	0

14.10.4 Surface water quality

Aqua Earth Consulting is tasked by Mogalakwena Mine to compile water quality reports linking mine activities and performance against the WUL conditions. Detailed water analysis of the data is provided in the Aqua Earth quarterly and annual reports, which are submitted to the DWS as per the WUL.

The sample analysis includes all major cations and anions, as well as physical parameters, such as Electrical Conductivity (EC), pH, Total Dissolved Solids (TDS), sulphate (SO_4) and nitrate (NO_3). Surface water samples are collected from surface water bodies situated around the mine on a monthly basis, provided water is present for sampling in the non-perennial rivers. Routine monitoring was initiated in January 2009.

A guideline value for the most sensitive user/condition for each constituent monitored has been identified and is referred to as the Identified Resource Protection (IRP) value. The IRP has been used for the water quality assessment in the absence of WUL limits. It must be stated that the IRP is a precautionary limit and does not represent the environmental considerations of this area, however, this approach is in line with the NEMA Precautionary Principle.

The Witrivier (Thwathwe), Mohlosane (Klein Sandsloot) River and Groot Sandsloot (Pholotsi) River flow in close proximity to and through the mining area. These rivers are tributaries of the Mogalakwena River. Current monitoring points and proposed new monitoring points are presented in Figure 14-30. Current monitoring points are located in areas where water is found in the river. These monitoring locations relate to areas where subsurface water flow daylights in the riverbed.

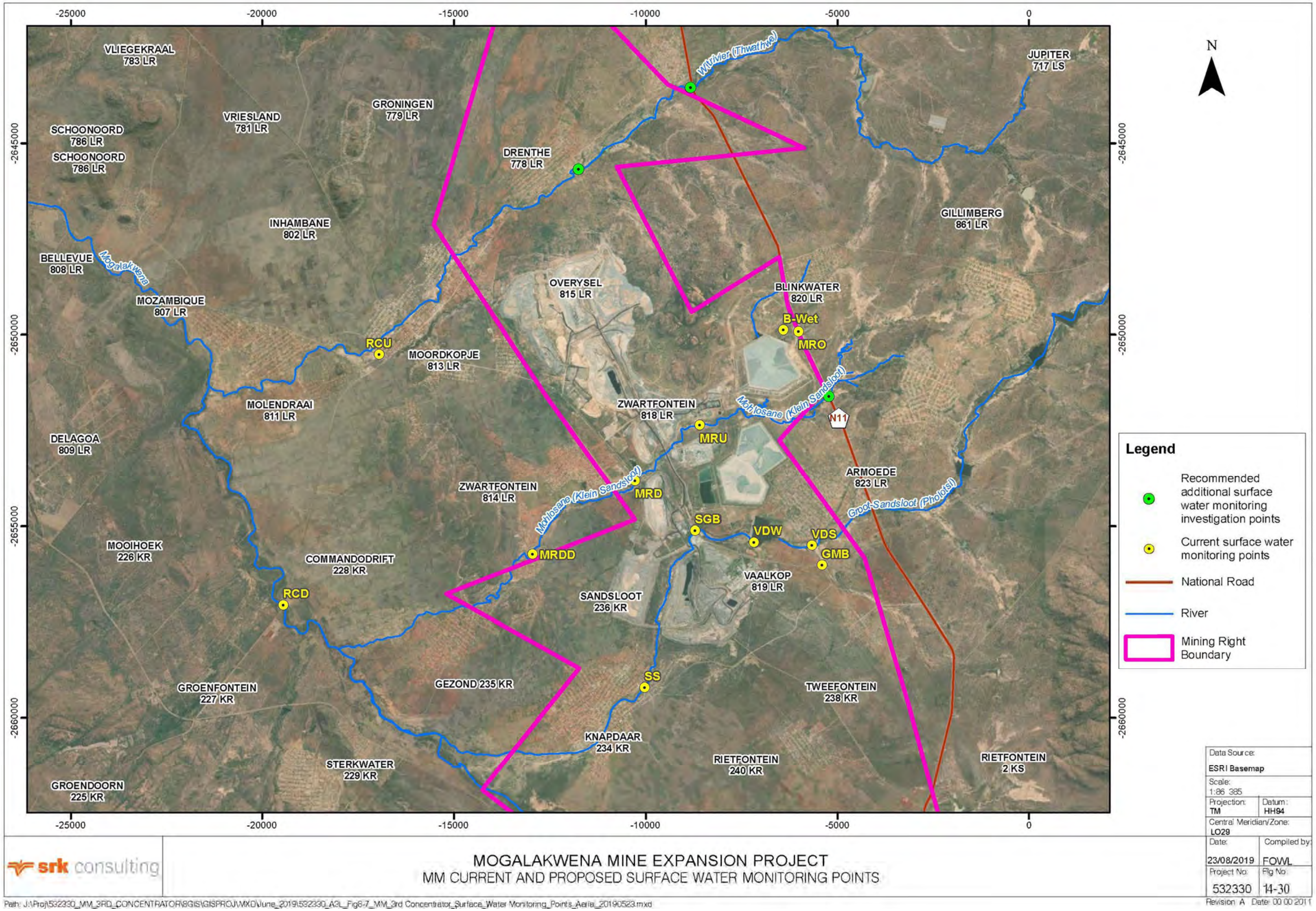
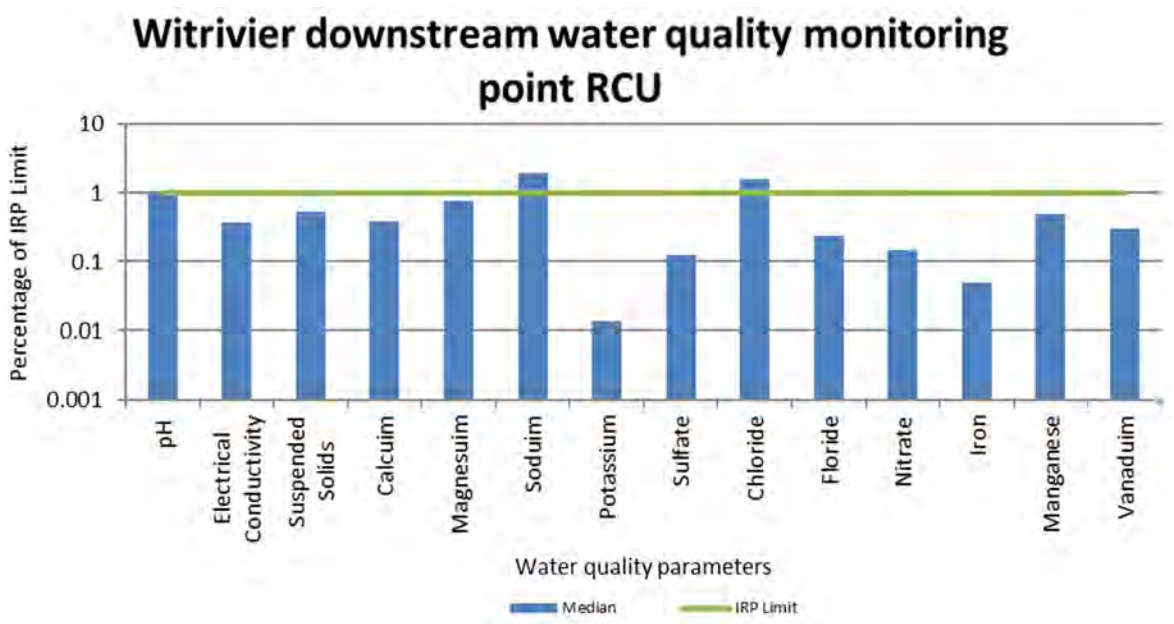


Figure 14-30: Mogalakwena Mine current and proposed surface water monitoring points

Witrivier

The Witrivier flows in a south westerly direction north of the North Pit and through the community. Currently, the only mine monitoring point, RCU, is located downstream of the mine. Figure 14-31: below presents the water quality data spatially in the graphs where log plots present the percentage compliance of the water for the median data between February 2009 and March 2019 and relates to the IRP limits. Parameters extending over the line represent the percentage (on a logarithmic scale) above which the IRP limits are exceeded. Due to the river being non-perennial, water is not always available for sampling. Figure 14-31 indicates that only sodium and chloride median values exceed the IRP limits, the remainder of the parameters remain below the IRP limit. The parameters may indicate some impact from the mining activities, however, upstream monitoring is required in order to compare up and downstream water quality to improve the analysis.

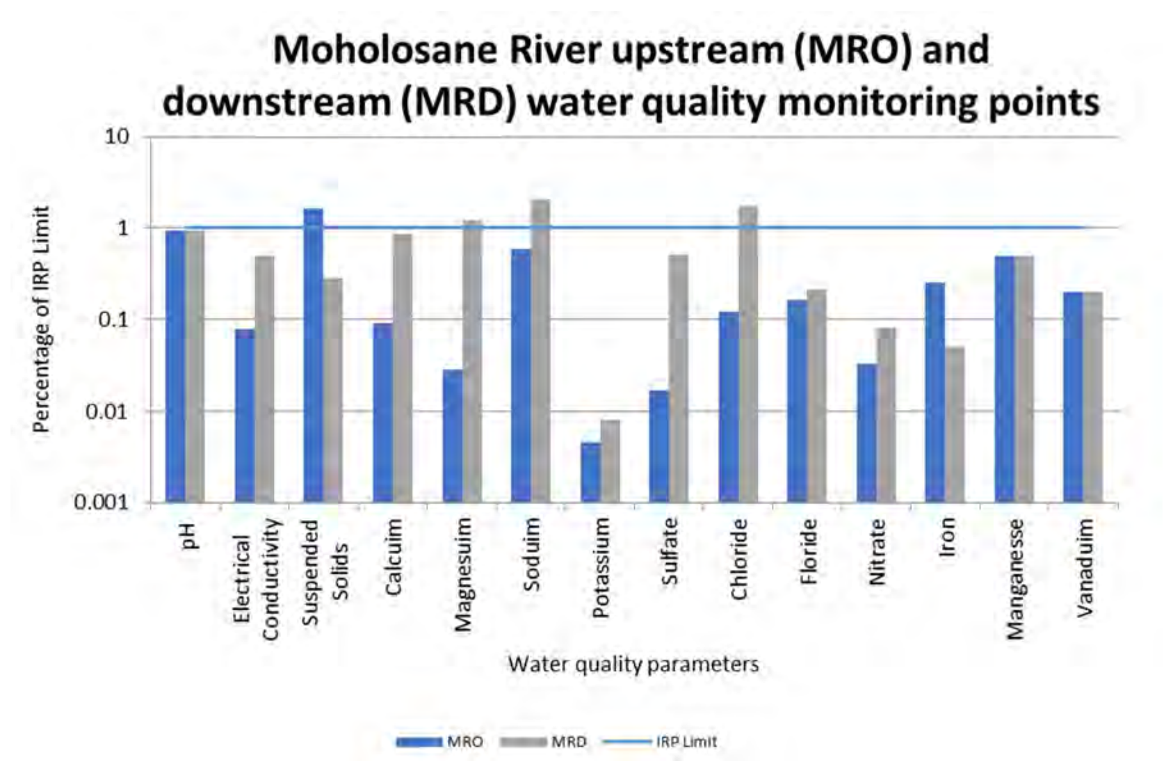


srk consulting	**MOGALAKWENA EXPANSION PROJECT** WATER QUALITY OF MONITORING POINT RCU ON THE WITRIVIER AS COMPARED TO THE IRP LIMIT	Project No. 532330

Figure 14-31: Water quality of monitoring point RCU on the Witrivier River as compared to the IRP limit

Mohlosane River

The Mohlosane River flows in a south westerly direction through the mining area. The original upstream monitoring location (MRU) is now below the Blinkwater 1 TSF and therefore is not representative of upstream conditions. MRU was replaced with MRO which is upstream of the Blinkwater 1 TSF and therefore represents the upstream monitoring point for the mining activities on the Mohlosane River. Figure 14-31 represents the statistical median of the water quality data from MRO between January 2013 and March 2019 and is compared as a percentage to the IRP limits. Figure 14-31 indicates that only suspended solids have exceeded the IRP limit which could be attributed to road runoff due to the proximity of the road to the river monitoring point. The downstream monitoring point is MRD and is used to identify possible impacts on the receiving environment from mining activities. MRD is located close to the mine western perimeter fence along the river. The water quality data of this monitoring point has been received from January 2008 to February 2019. The suspended solids have decreased downstream on the Mohlosane River, as illustrated in Figure 14-31, however the salt load has increased downstream with magnesium (geological influence), sodium and chloride (potential mining influence) exceeding the IRP limits.

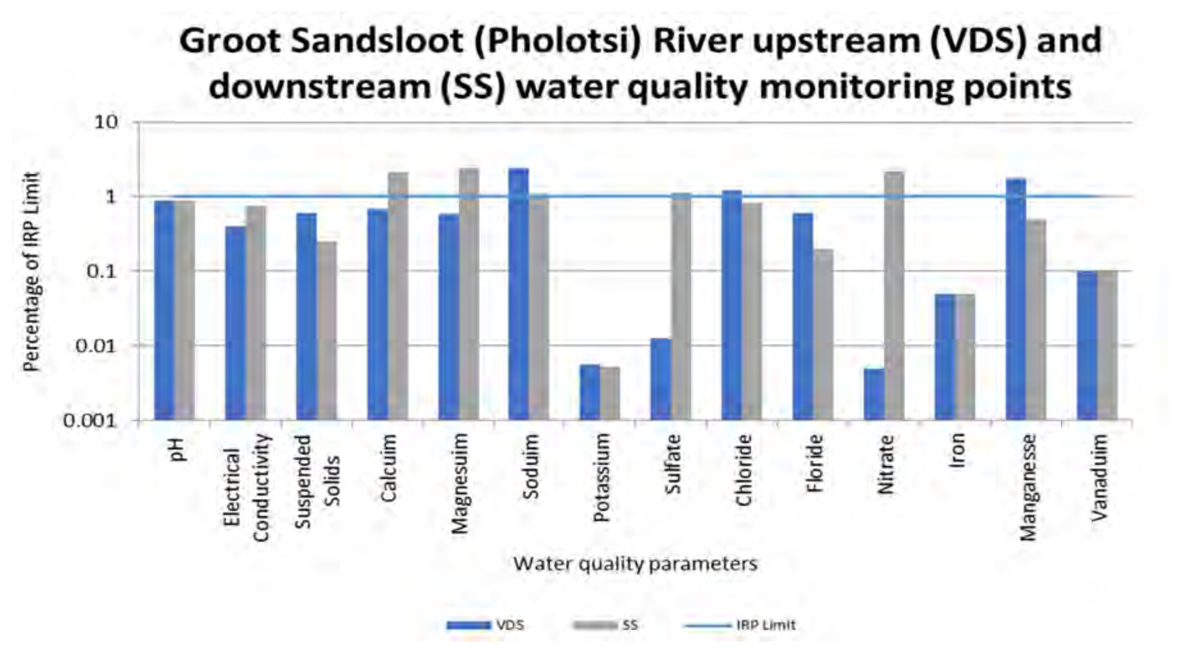


srk consulting	**MOGALAKWENA EXPANSION PROJECT** WATER QUALITY ON THE MOHLOSANE RIVER	Project No. 532330

Figure 14-32: Water quality of upstream monitoring point MRO on the Mohlosane River as compared to the IRP limit

Groot Sandsloot River (Pholotsi River)

The Groot Sandsloot River (Pholotsi River) flows within the mining activity area and Sandsloot community. The upstream monitoring points are VDS, which is located in close proximity to the Ga Molekana community and VDW, which is located within the DWS Vaalkop No. 2 in-stream dam. Figure 14-33: illustrates the statistical median of the water quality data of VDS, received from March 1999 to March 2019, as a percentage compared to the IRP limit. As indicated in Figure 14-33: sodium, chloride and manganese exceeded the IRP limit for the upstream sample. The water quality downstream of the Groot Sandsloot River is monitored at SS. This monitoring point is located within the Danisane Community downstream of the mine. The water daylights here and is therefore the only point suitable for monitoring downstream of the mining activity. No other surface water downstream of the mine and upstream of the community has been found during sampling runs. Water quality data received for SS from May 2008 to March 2019, is presented in Figure 14-33: and indicates that calcium, magnesium, sulphate and nitrate exceed the IRP limit. Calcium and magnesium may be related to the geology of the area whereas sulphate contribution may be the result of mining activities and nitrate contributions the result of both community and mining activities.



srk consulting	**MOGALAKWENA EXPANSION PROJECT** WATER QUALITY MONITORING ON THE GROOT SANDSLOOT (PHOLOTSI) RIVER	Project No. 532330

Figure 14-33: Water quality of upstream monitoring point (VDS) and downstream monitoring point (SS) on the Groot Sandsloot (Pholotsi) River as compared to the IRP limit

The location of the current surface water monitoring points is dictated by the presence of water in the rivers. The rivers are non-perennial and flow is only associated with rainfall events. Subsurface river flow daylights in certain areas within each of the river beds and this is where the monitoring points have been located. The intermittent flow in the rivers causes periodic anomalies/outliers in the data and impacts on the interpretation of the water quality data, for example, suspended solids increase after rainfall events and this impact is not necessarily directly associated with mining activities.

Monitoring point RCU is the only monitoring point on Witrivier and it is recommended that additional upstream monitoring points be included in the monitoring programme before any construction in the area commences. Upstream monitoring on the Mohlosane River may require an additional monitoring point to the southeast of MRO. Median values for sodium and chloride increase in the downstream monitoring point (MRD) on the Mohlosane River and this is mirrored in the Witrivier monitoring point (RCU) also located downstream of the mining activities. This indicates possible local mining activity influence on the rivers during rainfall events. The nitrate and sulphate median values exceed the IRP limit in the downstream monitoring point (SS) on the Groot Sandsloot River and may be as a result of mining activities, however communities may also contribute to the nitrate load. The long term trends, however, indicate that concentrations of sulphate and nitrate are decreasing.

14.11 Socio-economic structure

The information presented in this section is extracted from the specialist Socio-economic study compiled by SRK in 2019.

14.11.1 Regional context

Background

The Mogalakwena Mine is situated approximately 30 km north-west of the town of Mokopane (formerly Potgietersrus) within the Mogalakwena Local Municipality (MLM), which forms part of the greater Waterberg District Municipality (WDM) of the Limpopo Province.

According to the MLM Integrated Development Plan (IDP), MLM consists of three proclaimed townships (i.e. Mokopane, Mahwelereng and Rebone) and 178 villages. The municipality has been demarcated into 32 wards and a larger portion of the municipality is predominantly rural.

The communities in the MLM are governed by Traditional Councils and Leaders, with both the Mapela- and the Mokopane Traditional Authority (TA) being recognised in terms of the Traditional Leadership and Governance Framework Act, Act 2 of 2005 (Framework Act). The Framework Act provides for the establishment of traditional councils that should support municipalities in the identification of community needs; facilitate the involvement of communities in IDP processes; participate in the development of policy and legislation at the local level, amongst others. The Framework Act further states that TAs are responsible for administering the affairs of the traditional community in accordance with customs and traditions, consistent with customary law and the Constitution of South Africa.

The MLM has 178 rural settlements (traditional villages) spread across its municipal boundary, and 70.9% of the population reside in these areas. The MLM has three additional semi-urban settlements (Ga-Pila (Sterkwater), Ga-Puka (Rooibokfontein) and Ga-Sekhoalelo (Armoede)) all proclaimed as a result of relocation due to mining expansion in the Mapela TA area. Mogalakwena Mine is predominantly located on land owned by the Mapela TA with the Mokopane TA situated immediately adjacent to the operation.

The villages in the rural areas are closely linked to subsistence farming, with many households depend on agriculture for their livelihoods. Livestock farming is the predominant enterprise within the peri-urban areas, however, there is limited land to carry the current amounts of livestock. Overgrazing is evident on communal grazing land as compared to privately owned land.

Population size and density

The MLM has had an increase in population size between 2011 and 2016 (307 682 and 328 905 respectively), therefore an annual growth rate per annum from 2011 to 2016 of 1.34%. Using a compound growth rate of 1.34%, it could reasonably be expected that the MLM population will be approximately 342 841 in 2019.

Language and ethnic groups

The majority of the population in the MLM are black African (96.1%), with 2.2% being White. All other race groups make up less than 1% of the population.

The principal spoken languages in the MLM is Sepedi (73.1%), followed by Xitsonga, (9.1%) and IsiNdebele at (6.6%), but Tshivenda (16.5%) is spoken in the Limpopo Province as well.

Gender and age

In the MLM, the population consists of a majority of males (51.6%) as compared to 48.8% of females (2016). Within the MLM, a total of 70.5% represent those of working age (15-65 years). MLM has more female headed households (59.4%). In 2016, the MLM population consisted of 39.9% children (0 – 14 years), 30.8% youth (15 – 34 years), 19.85 adults (35 – 59 years) and 9.4% elders (65+ years).

Property ownership, land use and tenure

Within MLM, 89.71% of the population live in a formal dwelling (flat, apartment, cluster, semi-detached house or townhouse), 0.44% live in a traditional dwelling, 6.53% live in a formal dwelling in a backyard (room flatlet on a property or larger dwelling) and 2.64% live in an informal dwelling/shack, therefore most households within the TA areas live in formal brick structures.

The MLM is faced with the management of environmental challenges regarding the illegal occupation of land, such as development of houses in marshy areas in the Ga Tshokwe (Sterkwater), Telekishi, Blinkwater Mamatlakala areas. According to data obtained from the MLM IDP, 21 167 houses have been built to date and the backlog still stands at 19 882.

Property ownership is directly correlated with tenure security. Land surrounding Mogalakwena Mine is owned by the national government but managed through the TA. This system of tenure is called “permission to occupy” and does not have any legal status. This means that persons living within TA land has a low level of tenure security, leading to lower levels of investment and higher levels of land degradation.

Within MLM, 3.68% of the population rents from a private individual, 4.72% own their house, but it is not paid off yet, 81.84% owns a fully paid off house, and 5.02% occupies a dwelling rent-free.

As mentioned above, property ownership and land tenure are important considerations when assessing land access and use. Many households (73.7%) within the MLM depend on agriculture for their livelihoods, with livestock farming being the prominent enterprise. Unfortunately, due to limited resources, and the land tenure system in place, there is not enough land to carry all the livestock, leading to the overstocking of land, resulting in overgrazing.

A large portion of households that practise agriculture within the MLM rely on poultry (14.5%), livestock (12.1%), grain (5.7%) and other forms of agricultural production.

Migration patterns and labour sending areas

The long history of migrant work in South Africa has resulted in significant patterns of in-migration into local municipalities. The majority (95.6%) of persons living within the MLM are originally from the Limpopo Province. When considering the number of persons living within MLM (1.3%) that were born outside of South Africa, it is evident that foreign nationals are not migrating to the area in great numbers. As such, the majority of the people working in the MLM are born in Limpopo Province.

From the data it is clear that migrant labour do not constitute a large proportion of the MLM population. The people who were born and continue to stay in the MLM should benefit from the operations of the Mogalakwena Mine and other mines in the area. Any economic empowerment transactions from the mines in the MLM should ensure that the recruitment of labour benefits the residents of those areas included in the ZoI.

Household income and poverty intensity

Household income[14] is widely distributed across income brackets in the MLM, a high percentage (15.4%) of households in MLM have no income. This means that not one person in the household

[14] Household income is defined as all receipts by all members of a household, in cash and in kind, in exchange for employment, or in return for capital investment, or receipts obtained from other sources such as pension. Other sources of income are, for example social grants, Unemployment Insurance Fund, remittances, rentals, investments, sales or products, services, etc.

received an income, not even in the form of a pension or social grant and is therefore experiencing extreme poverty.

The majority of the population in MLM (65.8%) is earning between R4,801 and R76,400 per annum. This is considered to be a low annual income and is reflective of inexpensive, labour intensive jobs available in the area. With adjustments for annual inflation, it is likely that those earning between the third and sixth income bracket would be earning between R220 000 and R350 000 in 2019.

Social grants play a vital role in reducing poverty and promoting social development. Over the past few years, the South African government has implemented a myriad of poverty alleviation measures with social assistance being the most notable. According to the MLM (2018), the MLM provides social grants to 61.45% of its total population, which is significantly higher than the average within the WDM (49.20%) and the Limpopo Province (55.67%).

P poor households without access to social grants are more likely to be: a single person household; smaller than poor households in general or households with access to grants in particular; male headed; younger; without an income; and residing in informal settlements.

Approximately 15% of households within the study area do not have a single member of the household earning an income, either through wages or in the form of a pension or social grant. These households are therefore experiencing extreme poverty and, in all likelihood, have inadequate access to food.

Almost two thirds of the households within the study area rely on social grants. Social grants play an important role in food security where households do not have other sources of income. For many households within the study area this is the sole source of income.

The high reliance on social grants could be attributed to high levels of unemployment and slow economic growth within the study area. This has resulted in households being highly dependent on the government, along with large private sector employers such as the Mogalakwena Mine.

Services and infrastructure

According to the latest Community Survey data communities in the MLM were mainly concerned with the cost of electricity, lack of safe and reliable water supply as well as the lack of, or inadequate employment opportunities. These communities were similarly concerned about the inadequate roads in their area. Services are described in more detail in the following sections.

Water

Access to safe water is strongly associated with home ownership and access to services (sanitation, refuse removal, formal dwellings), which means for improved livelihoods, access to municipal infrastructure is paramount. Lack of access to water is more likely in households with four or less rooms, a monthly expenditure of R1, 800 or less and a household head aged 35 years or younger. Non-payment for water (and other services) is likely to be prevalent in these households, as well as in households living in a dwelling fully or partially owned and a household receiving at least one social grant.

Only 49.4% of households within the MLM are supplied with drinking water by the municipality. Alternative sources of drinking water within the MLM are mainly via a water scheme or a borehole.

The townships and villages within the MLM are borehole dependent for water supply. Most of the boreholes are installed along the river banks. The quality of the borehole water is poor, and the outbreak of diarrhoea and other water borne diseases is common in the area.

Sanitation and refuse removal

Sanitation and refuse removal levels are a key indicator of environmental hygiene, which plays an essential role in the prevention of many diseases. Poor sanitation infrastructure and refuse removal services also impacts on the natural environment and the preservation of important natural assets, such as water resources.

The sanitation system remains poor in the rural areas of the MLM, as 47.0% of the population rely on pit latrines without ventilation for their ablutions. Only 22.2% of the population have access to flush toilets connected to a sewerage system.

The majority of households in the MLM (58.8%) rely on their own refuse dumps in their yards, while only 44.2% of households in the WDM have refuse dumps in their yards. Of the total number of households, 30.5% have their refuse removed by the local authority or a private company at least once a week, whereas 2.3% have no access to a refuse service.

Illegal dumping and burning of waste remains a popular means of disposing of waste in both urban and rural areas. Settlements receiving municipal waste collection are Mokopane, Mahwelereng and Rebone. The MLM does not provide the service to rural areas. This situation has led to environmental pollution within the MLM rivers, due to waste being dumped into the main streams and major rivers that pass through the rural landscapes.

Energy

Having adequate and affordable access to energy sources is vital to address household poverty. In order to assess household access, statistics help to assess the diversity, and main sources of energy used by households to satisfy basic human needs (cooking, lighting, heating water, space heating).

The majority of MLM’s population uses electricity for cooking (99.7%), heating (69.5%) and lighting (99.0%), while 30.4% of the households have no access to energy sources for heating.

Access to education

There are 258 schools in the MLM, which is made up of 96 secondary schools, 151 primary schools, 9 combined schools and 2 FET colleges. Other educational facilities include 176 Early Childhood Development (ECD) centres, 1 special school and 47 Adult Basic Education and Training (ABET) centres. Most of the villages surrounding the operation have one or more primary schools and a secondary school, making education accessible to the majority of the population. Despite this, not all children attend school, which is often due to financial factors, regardless of most schools not charging any fees. Many of the schools are understaffed and under resourced making the level of education below an acceptable standard.

In the MLM, out of those currently attending an education institution (i.e. excluding everyone who was not currently attending an educational institution), 23.7% males and 22.5% females attended primary school, with almost equal numbers of males (14.4%) and females (14.8%) attending secondary school. In South Africa, approximately 60% of first graders will ultimately drop out rather than complete Grade 12. Based on a review of the statistics for MLM, this trend seems to be present, with more males dropping out than females.

The majority of persons in the MLM traveling to an educational institution took between 15 and 30 minutes to get to school This is mainly due to the lack of public transport and road conditions not being conducive for a formal transport system. This trend is not isolated, with data showing that about 47.4% of learners from Limpopo, left their place of residence to their educational institutions between 06:30 to 06:59 as compared to about 27% of learners who left their place of residence from 07:00 to 07:59. Limpopo was also the province with the most amount (20.7%) of students having to leave before 06:30.This indicates that learners are generally living far from their schools, or that due to the lack of transportation, students take much longer to travel to school than other learners may.

19.43% of the MLM population older than 5 years have not received any form of schooling. When considering the MLM population, only 4.4% currently has an ABET 1 level education, with fewer than

4% having an ABET 2 level education. Only 4.2% of the population currently holds an ABET 3 level education and only 6.6% holds an ABET 4 level education. Only 12.8% of the MLM population currently holds an education equivalent to Grade 12 or National Qualification Framework (NQF) Level 3. The data generally indicates that there are very low levels of education within the MLM which makes it difficult for persons to find gainful employment.

Health facilities

The MLM has 33 medical facilities, three hospitals (Mokopane Provincial Hospital in Mahwelereng, Voortrekker Hospital in Mokopane Town and George Masebe Hospital in Bakenberg), and 29 clinics and 1 health centre. These hospitals offer improved service to those scattered across the region. Specialist treatment is exclusively available at the major hospitals outside of the municipal area. Clinics are scattered across the municipal area and can be found at Mamaselela, Pholotji, Mahwelereng, Bokwalakwala, Sekuruwe, Tsamahansi, Bakenberg, Dibeng, Mashashane, Jakkalskuil and Lekhureng. Many communities and villages rely on the 12 mobile clinics that are available within the MLM, with more than 80% of the population lives within 120 minutes from health facilities. The distances to the facilities vary from as close as 25 km to as far as 75 km.

Anti-Retroviral Treatment programmes are available at hospitals and some of the clinics in the MLM. The Limpopo Province has managed to reduce the maternal HIV vertical transmission from 2% to 1.1% against a target of 14%.

Transportation infrastructure

Demands for transport shape the urban landscape and influence spatial choices that the persons make in relation to social and economic services such as place of residence, education and work. Similarly, businesses make locational choices based on market proximity and size as well as considerations for ease of temporal and spatial mobility of labour, goods and services. With growing populations that expand towards cities (i.e. urbanisation), the structure and especially size of demands on urban management systems, urban infrastructure and transport services keeps on evolving.

The MLM area is well covered by roads. The road network includes links to both the N1 in the south and the N11 running north-south through the area. Where the N11 serves the eastern border region of the MLM, the R518 fulfils this function along the western part of the MLM. There are good lateral links between the N11 and the R518.

The dominant modes of transport in MLM is minibus taxis. Most workers in the Limpopo Province travelled between 07:00 to 07:59 (26.7%), followed by 25.4% who left home before 06:00. 34.4% of persons walked to their workplace with 24.8% relying on a car or company car driver, 19.1% using a taxi and 11.1% using a bus. Of those who drove to work in the Limpopo Province, 92.1% use a car or a bakkie.

Of those workers relying on public transport, most (62,3%) arrive within a 5-minute walking distance of their workplace, with a fair number (12,8%) having to walk more than 15 minutes to their place of work after using public transport. Taxis were commonly used by travellers in Limpopo (54.6%), with the second most used mode of travel being buses and car/bakkie/truck passengers, both at 13%.

The Limpopo Province had one of the highest percentages of workers classified as rural (21.5%). Limpopo Province was also the only province where the percentage who received travel allowances from their employer increased from 2.7% to 3% between 2003 and 2013. According to the survey, one in ten households in South Africa thought that taxis were too expensive, with households in Limpopo (12,2%) being amongst those who are the most likely to be concerned about the cost of taxis.

Justice and policing

The MLM IDP indicates that numerous socio-economic factors such as poverty, unemployment and lack of education have contributed to an increase in the community's crime rates.

The occurrence of crime is relatively high in the MLM, with Mokopane and Mahwelereng having been identified as crime hotspots. According to annual crime statistics released by the South African Police Service (SAPS) for the Tinmyne Police Station, robbery with aggravating circumstances increased by 46.4% over the 2017/18 reporting year. Robbery at non-residential premises increased by 47.1%, whereas burglary at residential premises increased from 67 to 80 reported cases and theft of motor vehicles increasing by 80% over the same period. Illegal possession of firearms and ammunition increased by 83.3%, whereas drug related crime increased from 154 reported cases to 207 reported cases over the reporting period.

The closest police station to Mogalakwena Mine is the Tinmyne Police Station, which is located approximately 12 km from the site. The Mahwelereng Police Station is the second closest police station, followed by Mokopane, Sestero, Polokwane and the Gilead Police Stations.

14.11.2 Local context

The Mogalakwena Mine is surrounded by 42 villages, 36 of these villages fall under the Mapela Traditional Authority (TA) and 6 villages (out of a total of 20 from the Mokopane TA) fall under Mogalakwena Mine's 50km Zone of Influence (ZoI). This 50 km ZoI has been defined by AAP in their Stakeholder Engagement Plan (AAP, 2019). To facilitate the operationalisation of the Mogalakwena Mine in 1993, several communities, all forming part of the Mapela TA, were physically and economically displaced, including:

- Ga-Pila Village that was physically relocated to the farm Sterkwater to accommodate the Sandsloot pit;
- Mototolo (Ga Sekhaolelo) that was physically relocated to the farm Armoede to accommodate the Vaalkop TSF and the north concentrator;
- Mototolo (Ga-Puka) that was physically relocated to the farm Rooibokfontein to accommodate the Vaalkop TSF and the north concentrator;
- Sekuruwe that was economically displaced due to restricted access to agricultural and grazing land to accommodate the Blinkwater 1 TSF;
- Ga-Molekane that was economically displaced due to restricted access to agricultural and grazing land to accommodate the south concentrator and return water dam; and
- Ga-Chaba that was economically displaced due to restricted access to agricultural and grazing land to accommodate the north pit.

Due to the proposed expansion activities, AAP has also included the following areas into the Mogalakwena Mine ZoI:

- **Mokopane TA:** Mokaba, Machikiri, Sandsloot (Mabusela), Sandsloot (Masenya), Sekgoboko, Malepetleke; and
- **Mapela TA:** Danisani and Mashahleng.

When classifying doorstep[15] communities, however, the approach for this the Social Impact Assessment (SIA) undertaken for the Expansion Project relied on a set of assumptions, which are highlighted below:

- Located within a 1km buffer area of any proposed new infrastructure;
- Identified as a sensitive receptor in terms of noise (dB Acoustics, 2019); and

[15] Villages that are directly impacted by mining, alongside the three resettled communities.

- Identified as a sensitive receptor in terms of air quality (SRK, 2019b).

The names of these villages are summarised in Table 14-21 and the locations of these villages shown in Figure 14-34.

Table 14-21: List of doorstep communities

Mapela TA	Mokopane TA
Danisane	Sandsloot Ga-Mabusela
Ga Chaba	Sandsloot Ga-Masenya
Ga-Modipana	
Ga-Molekana	
Ga- Sekhaolelo (Armoede)	
Mashahleng	
Mesopotamia	
Mosoge	
Phafola Molokomme	
Phafola Ga-Maloka	
Sekuruwe	

The high level ZoI for this project therefore includes the following:

- **The zone of primary physical impact caused by the operation.** This includes the operation's primary site(s) and associated, mine-managed infrastructure (including suppliers and contractor's infrastructure), and potentially includes items such as power transmission corridors, pipelines, access roads, etc. The farm portions on which the mining rights/lease areas are registered are recognised as the zone of primary physical impact;
- **The operation's immediate surrounding communities:** For the purposes of this study these include the doorstep communities that are likely to be most influenced by the development from a socio-economic perspective; and
- The operation's primary labour-sending and money-spending areas and areas further away that may send labour or receive spending.

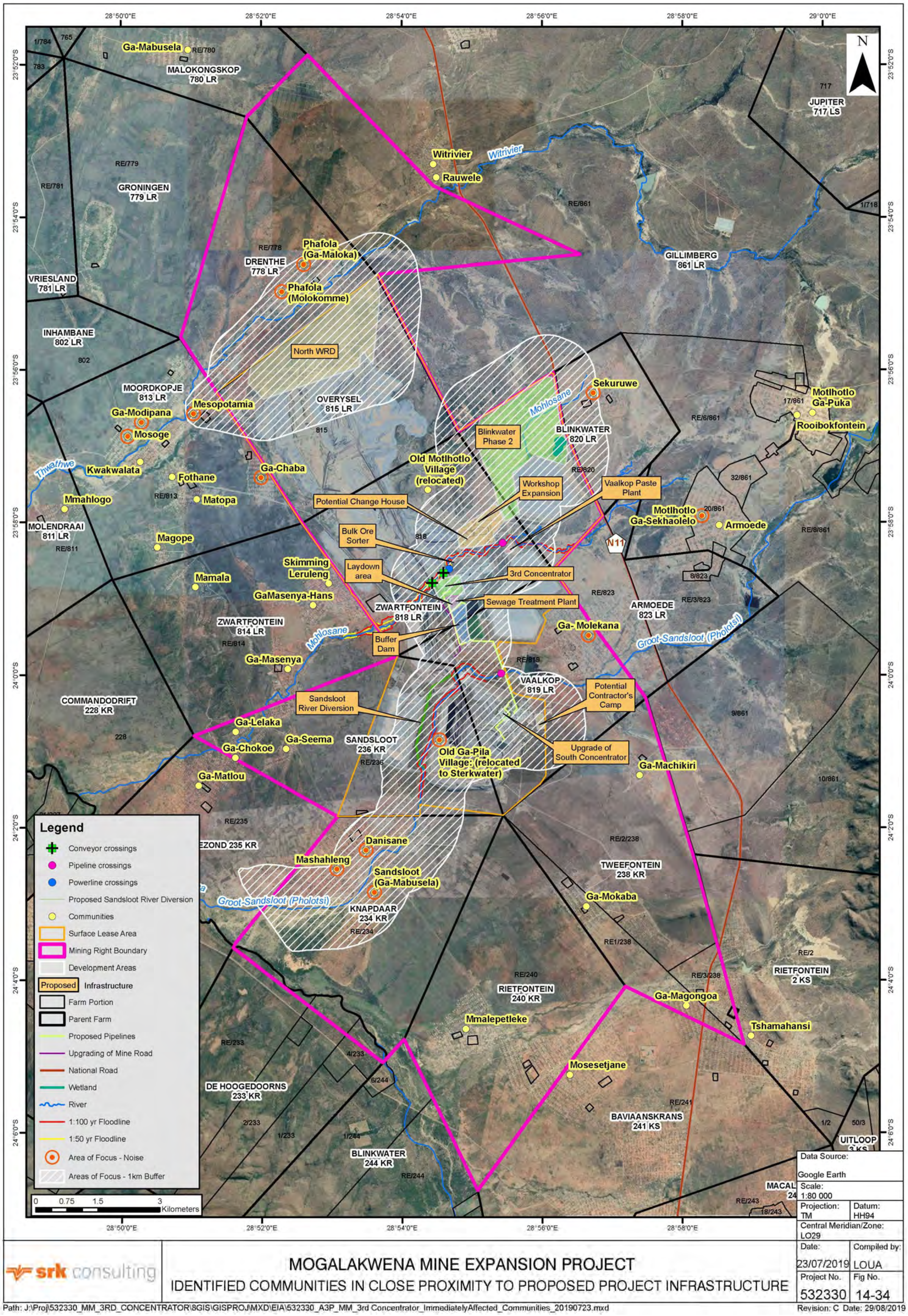


Figure 14-34: Mogalakwena Mine Zone of Influence

15 Possible Mitigation Measures that Could be Applied

The proposed Expansion Project will occur within the Mogalakwena Mine area, which has already been affected by current mining activities. The specialist studies assessed potential environmental and social impacts that may occur as a result of the proposed Expansion Project. Appropriate mitigation and management measures to avoid and /or minimise the identified impacts associated with the project were developed and included in the EMPr (Part B, Section 29).

The mitigation hierarchy was applied throughout the scoping and EIA/EMPr Process. The mitigation hierarchy is an approach to mitigation planning and can be summarised into the following steps:

- Avoidance;
- Minimisation;
- Restoration and
- Offsets.

In the Scoping Phase, mitigation measures are predominantly focussed on avoidance and minimisation. This is done through activities, such as the site layout selection process and implementation of the environmental design criteria, including the environmental sensitivity plan, by the engineering team.

In the Impact Assessment Phase, the findings and recommendations of the specialist studies were used to develop the environmental and operational controls which are focused on impact minimisation and restoration (as part of mine rehabilitation and closure). The mitigation measures are fully described in Part B of this report.

With the mitigation measures applied, the residual risk significance for the assessed impacts and risks is generally low or medium.

16 Motivation Where No Alternatives Where Considered

Alternatives relating to location, infrastructure and transportation were considered in the previous EMPrs compiled for Mogalakwena Mine. The location of the proposed Expansion Project is therefore constrained to the location of the existing infrastructure which has been positioned based on the location of the mineral resource, and proven reserve. As such, no property alternatives were considered for this project. In addition, the infrastructure and activities associated with the proposed Expansion Project will be situated within the current mining rights and surface lease areas. Existing technologies will also be applied to the expansion activities and therefore no technology alternatives are available at this stage of the study. AAP are currently exploring new technology options which could be implemented at Mogalakwena Mine but are not part of the proposed Expansion Project.

17 Statement Motivating the Preferred Site

Alternatives relating to location, infrastructure and transportation were considered for the authorisation of the previous Mogalakwena Mine EMPrs. The location of the proposed project is therefore constrained to the location of the existing infrastructure which has been positioned based on the location of the mineral resource, and proven reserve. As such, no property alternatives were considered for this project. For this reason, no site selection was undertaken. The additional infrastructure will assist Mogalakwena Mine in the optimal mining of their existing and future reserves.

18 Environmental Impact Assessment

This section provides an overview of the impact assessment methodology, specialist findings and recommendations. It also includes the findings of the impact assessment phase which includes both positive and negative impacts identified for the various phases of the project (pre-construction, construction, operation and decommissioning and closure).

18.1 Approach

18.1.1 Prediction of significant environmental issues

Potential environmental issues or impacts associated with the proposed Expansion Project were identified during the EIA phase through a review and consideration of the following:

- The nature and profile of the receiving environment which included both a desktop evaluation (available documents, existing EMPrs, GIS maps) and a site visit to areas where the proposed mining activities will be constructed and operated;
- Understanding of the direct and indirect effects of the project as a whole;
- Inputs received from the I&APs and the authorities during the pre-application phase, scoping phase and EIA phase;
- Inputs received from specialists appointed to conduct the various studies for the proposed Expansion Project; and
- Legal context.

Environmental and social issues have been highlighted in Section 18.2 for each environmental aspect considered. In addition to this, the cumulative impacts have been briefly described in Section 18.4.

18.1.2 Mitigation of impacts

A detailed assessment was conducted to evaluate possible impacts with input from the project team, the specialist studies and I&APs making use of the impact assessment methodology described in section 18.3.

Practical mitigation measures were identified with the following objectives:

1) To firstly strive to prevent the occurrence of the impact; and
2) If the impact cannot me prevented, then measures need to be put in place to minimise the significance of the impact

The mitigation measures associated with the proposed Expansion Project have been included Table 18-3 to Table 18-11.

18.2 Summary of environmental and social impacts identified during the EIA process

The infrastructure associated with the proposed Expansion Project and the areas to be disturbed fall within the Mogalakwena Mine's mining right area, hence the impacts associated with the proposed Expansion Project in these areas are considered to be limited . With the exception of the proposed North WRD and Blinkwater 2 TSF, all other proposed activities will take place within areas which are already disturbed. If managed according to the proposed management measures in Table 18-3 to Table 18-11 and Part B, Section 31, negative impacts associated with construction, operation, closure and post closure phases of the proposed Expansion Project activities can be mitigated and positive impacts can be enhanced.

Table 18-1 includes a summary of the expected impacts, prior to the implementation of management measures, for the various phases of the proposed Expansion Project which have been extracted from the specialist's studies, as well as from the comments received during the stakeholder engagement activities undertaken to date. These impacts have been assessed in line with the impact assessment methodology in Section 18.1.

Table 18-1: Expected impacts arising from project related activities during different project phases

Project Phase	Activity
Pre-construction	• Influx of job seekers into the study area, low levels of employment, loss of cultural heritage, alteration of the physical quality of the living environment, impact on health and social well-being of the communities • Disturbance of soils due to site clearing and preparation • Sedimentation of rivers due to preparation of the site for clearing • Dust generation and emissions due to construction vehicles moving on bare land • Potential impact of several aspects of cultural heritage
Construction	• Natural vegetation loss, loss of habitats, impact on the flows of rivers located in close proximity to proposed infrastructure areas, impact on migration options for animals and birds in the area; • Possible impacts to groundwater from seepage, reduced recharge of groundwater due to increased run-off • Increase in ambient noise levels due to clearing and stripping of topsoil and construction of infrastructure • Influx of job seekers into the study area, limited employment creation • Loss of soil utilisation potential and sterilisation due to placement/construction of permanent structures or hydrocarbon contamination, soil erosion • Pollution to rivers from hydrocarbon spills from construction machinery, deterioration of surface water quality • Dust generation and emissions due to construction vehicles moving on bare land • Visual impacts from the construction mainly due to the generation of dust, vehicle moment and gradual increase in structure footprint which increases visibility
Operation	• Natural vegetation loss, loss of habitats, impact on the flows of rivers located in close proximity to proposed infrastructure areas, impact on migration options for animals and birds in the area • Possible impacts to groundwater from seepage, • Increase in ambient noise levels due to the operation of the Expansion Project activities • Unfavourable perception of the project, opportunities for capacity building, impact on health and social well-being of surrounding communities • Loss of soil utilisation due to contamination from spillage of raw products or by-products, hydrocarbons, reagents and unprotected overland flow of dirty water • Reduced availability of water to downstream water users, • Dust generation due to mine vehicles travelling on bare roads, stockpiling of ore and waste rock • Sedimentation of watercourses due to operational activities; • Visual impacts mainly due to the generation of dust and vehicle moment from the transportation of materials
Closure/ Rehabilitation	• Increase in ambient noise levels due to the operation rehabilitation machinery • Loss of income to surrounding businesses and mine employees, • Pollution to soils from hydrocarbon/reagent spillage from rehabilitation equipment • Pollution to surface water from hydrocarbon spillage from rehabilitation equipment • Impact of dust generated from rehabilitation machinery and from bare areas which need to be vegetated • Visual impacts will include dust generation and visibility of equipment used for demolition
Post-closure	• Improvement of noise, air quality, visual and surface water impacts due to limited or no activities taking place at the sites • Uncontrolled access to rehabilitated sites by animals, vehicles, people will result in compaction and erosion of unprotected/non vegetative sites (over grazing etc.)

Project Phase	Activity
	• Post closure groundwater impacts

18.3 Impact assessment methodology

The EIA impact assessment will focus on the direct and indirect impacts associated with the project. All impacts will be analysed with regard to their extent, intensity, duration, probability and significance. The significance of potential impacts that may arise from the proposed project will be determined in order to assist decision-makers (typically by a designated authority or state agency, but in some instances, the proponent). The significance of an impact is defined as a combination of the consequence of the impact occurring (described as magnitude below) and the probability that the impact will occur.

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:

- Extent (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 environmental significance (importance) of each identified potential impact to be quantified, a numerical value has been linked to each factor. The ranking scales applicable are shown in Table 18-2.

Table 18-2: Impact Ranking Scales

	Duration	Probability
Occurrence	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
		0 – None
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
	0 – None	

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

Significance = (duration + extent + magnitude) x 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 (H) environmental significance impact;
- Between 30 and 60 significance value indicates a moderate (M) environmental significance impact; and
- Less than 30 significance value indicates a low (L) 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[16], the following classes (%) will 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.

18.4 Environmental and social impacts and mitigation measures

The main environmental disturbance / impact will occur during the pre-construction and construction phase of the project as a result of clearing the area as well as the movement of construction vehicles and trucks on the mine during the establishment the various activities associated with the Proposed Expansion Project.

Since Mogalakwena Mine is already an operational mine there are very few additional environmental and social impacts arising from the proposed Expansion Project that have not already been identified as part of previous EMPrs (See Appendix 9) will occur as a result of the proposed activities.

The identified impacts associated with the proposed Expansion Project are provided in The table below list the main project related activities that will be undertaken during the pre-construction phase of the project.

[16] The Loss of Resources aspect will not affect the overall significance rating of the impact.

Pre-construction	Site clearing and grubbing of the footprint areas associated with the proposed expansion project infrastructure and river diversion in preparation of the constructing of these infrastructures.
	Preparation for the construction and upgrade of crossings for powerlines, conveyors, pipelines and roads
	Preparation of the ground and surface water management measures for the NWRD to receive waste rock
	Preparation of the Blinkwater 2 TSF to receive tailings including ground and surface water management measures.
	Preparation of the ground and surface water management measures for the buffer dam
	Preparation of the wetland protection measures

Table 18-3 to Table 18-11.The rating of impacts, as per the methodology described in section 18.3, is also provided. In addition, mitigation measures that may alleviate or result in avoidance of the potential impacts have been included.

The footprint areas that will be disturbed in terms of the pre-construction, construction and operation of the proposed infrastructure are summarized below:

- M3C plant and associated infrastructure including crusher and bulk ore sorting facility: 42 ha;
- North WRD, ore stockpiles and haul roads: 210 ha;
- Buffer dam and associated pipeline system: 30 ha;
- Blinkwater 2 TSF: 245 ha;
- Upgrade of the MSC plant and associated infrastructure: 3.5 ha;
- Upgrade of the STP: 0.2 ha;
- Expansion of the workshop area: 0.9 ha;
- Establishment of a temporary lay-down area: 2 ha;
- Potential contractor's camp: 7 ha;
- Upgrade of mine access road: 4 ha;
- Realignment of the Sandsloot River: 15 ha; and
- Linear infrastructure (crossings, roads, conveyors): 0.65 ha.

Therefore, a total of approximately 561 ha may be disturbed during the construction and operation of the above infrastructure which forms part of the proposed Expansion Project.

The following sections provide further details on the potential impacts (negative and positive), in terms of the various environmental and social aspects for each aforesaid activity and the associated actions that will be undertaken during the implementation of the project.

The potential identified impacts were rated, as discussed in Section 18.3, in terms of the Probability, Duration, Extent and Magnitude that may be associated with the potential impact. The following abbreviations were used in the Impact Assessment Tables to indicate the said impact assessment aspects:

- Pr→ Probability;
- D→ Duration;
- E→ Extent; and
- M→ Magnitude.
- LoR→ Loss of Resource

The table below list the main project related activities that will be undertaken during the pre-construction phase of the project.

Pre-construction	Site clearing and grubbing of the footprint areas associated with the proposed expansion project infrastructure and river diversion in preparation of the constructing of these infrastructures.
	Preparation for the construction and upgrade of crossings for powerlines, conveyors, pipelines and roads
	Preparation of the ground and surface water management measures for the NWRD to receive waste rock
	Preparation of the Blinkwater 2 TSF to receive tailings including ground and surface water management measures.
	Preparation of the ground and surface water management measures for the buffer dam
	Preparation of the wetland protection measures

Table 18-3: Pre-construction impacts applicable to all the proposed expansion activities during site clearing and grubbing of infrastructure areas

Aspect	**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**	**LoR**	**Significance**			**P**	**D**	**E**	**M**	**LoR**	**Significance**		
Geology	The site clearing activities is unlikely to materially affect or be affected by the local geology. No material impact anticipated.									No mitigation measures are required as no material impact is anticipated.								
Topography	The site clearing activities is unlikely to materially affect or be affected by the local geology. No material impact anticipated.									No mitigation measures are required as no material impact is anticipated.								
Air Quality	Dust and gaseous generation from clearing of land, levelling of ground, vehicle entrainment of dust on roads and vehicle tailpipe emissions potentially resulting in nuisance and health effects on receptors located near to the proposed infrastructure areas	-	2	3	2	4	2	**18**	**Low**	The footprint of the proposed infrastructure area must be clearly demarcated to restrict vegetation clearing activities as far as practically possible Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area Moisture control will be necessary on large bare areas during dry season pre-construction and construction, in order to reduce the frequency and amount of dust suspended in the ambient air 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 Comply to the mine-set speed limits within the various proposed infrastructure areas to minimise the creation of fugitive dust within the project boundary Continue to implement the routine air quality monitoring program and assess air quality results routinely	2	3	1	4	1	**16**	**Low**	11.1
Soils, land use and land capability	Loss of vegetative cover and topsoil protection - Vegetation clearing within the proposed footprint areas as well as for associated roads as part of the site preparation prior to commencement of activities which may lead to soil erosion	-	4	5	2	6	1	**52**	**Moderate**	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 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 pre-construction and construction, in order to reduce the frequency and amount of dust suspended in the ambient air	1	4	3	6	1	**13**	**Low**	75.0

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
										Soils will be stripped and utilisable soils will be stockpiled separately from subsoils and soft overburden								
										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.								
										Soils from the infrastructure footprint must be stripped and stockpiled at a designated area								
										Soil stockpiles 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								
										Soil stockpiles will be kept alien vegetation free to prevent loss of soil quality								
										Implement the soils utilisation plan as detailed in Section 18.4.1								
										The existing topsoil stockpile located within the footprint where the proposed buffer dam will be located will be relocated to an appropriate designated area.								
										Strip soils with vegetative cover intact (inclusive of seed pool and organic matter), stockpile utilisable soils separately from soft overburden, restrict stockpiles and berms to less than 1,5m high where possible, or to 15m high where soils are to be stored for extended periods of time (>3 years)								
										A medicinal plant survey will be undertaken in consultation with the community to identify medicinal plants being used by community members. Once the survey has been completed a medicinal plant management plant could possibly be developed.								
Biodiversity	Vegetation clearing within the proposed expansion infrastructure and activities footprints as well as in areas planned for the construction of associated roads as part of the site preparation prior to commencement of activities which may lead to natural vegetation loss	-	4	2	1	8	5	**44**	**Moderate**	The construction footprint must be kept as small as possible in order to minimise impact on the surrounding environment	3	2	1	6	4	**27**	**Low**	38.6
										The footprint of the proposed infrastructure areas will be clearly demarcated to restrict vegetation clearing activities as far as practically possible								
										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 pre-construction and construction, in order to reduce the frequency and amount of dust suspended in the ambient air								
										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								

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation P	D	E	M	LoR	Significance		Mitigation Measures	Significance of potential impact AFTER mitigation P	D	E	M	LoR	Significance		Degree of mitigation (%)
										erosion and dust emission. This can be achieved by conducting a vegetation assessment.								
										Continue to implement the routine air quality monitoring program and assess air quality results routinely								
										Identified protected species located within the construction site must be individually identified and marked before clearing and relocated once permit has been obtained for removal and relocation								
										Proliferation of alien and invasive species is expected within disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the site boundary. Alien and invasive vegetation control should take place throughout all phases of the project.								
										Unnecessary barriers in migration corridors should be avoided where possible								
Surface water	Impact on water quality due to an increase in runoff from the cleared and stripped areas in close proximity to the watercourses	-	3	4	1	6	2	**33**	**Moderate**	The footprint of the proposed infrastructure area must be clearly demarcated to restrict vegetation clearing activities as far as practically possible	2	1	4	6	2	**22**	**Low**	33.3
										Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area								
										Vegetation clearance will be undertaken in a phased manner								
										Clean water diversion bunds will be constructed upstream of the construction site prior to clearing areas for new infrastructure								
										Areas disturbed by pre-construction activities, which will not be required for construction, will be rehabilitated immediately on completion of construction of each area								
										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								
										The groundwater and surface water quality monitoring programme will continue in line with requirements of the Water Use Licence								
										Sufficient on-site ablution, sanitation and waste management facilities will be provided								
Groundwater	Site clearing of vegetation and stockpiling of topsoil resulting in increased runoff and less recharge from rainfall to groundwater	-	4	2	2	4	2	**32**	**Moderate**	The footprint of the proposed infrastructure area must be clearly demarcated to restrict vegetation clearing activities as far as practically possible	2	1	1	2	1	**8**	**Low**	75.0
										Adequate storm water management associated with the proposed infrastructure should be implemented as detailed in Section 8.26								

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
										It is recommended that any additional groundwater monitoring points/boreholes required in the WUL (as part of the water monitoring network) should be installed before the starting of the construction activities on site, were practically possible								
Noise	Increase of ambient noise levels due to the commencement of groundworks for clearing and stripping of topsoil and vegetation and placement of the topsoil from footprint sites at the proposed expansion infrastructure/activity areas	-	3	2	1	4	2	**21**	**Low**	Pre-construction activities at the various proposed expansion sites are to be undertaken during the day and night time provided that the prevailing ambient noise levels at the boundary of the mine is not exceeded Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels The area where construction will take 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. The proposed noise management plan as detailed in Section 31.4.4 must be in place during the construction and operational phases so as to identify any noise increase on a pro-active basis.	2	2	1	4	2	**14**	**Low**	33.3
Heritage	The majority the sites identified during the fieldwork are located within the development footprint areas currently proposed. While it is known that these development footprint areas will still be amended pending the recommendations of the project specialists, for the purposes of this impact assessment all identified sites were assumed to be located within the development footprint areas with the result that they would be destroyed by the development if not mitigated. Heritage sites assessed to have a low heritage significance are not included in this impact assessment. The reason for this is that sites of low significance will not require mitigation. These sites are MMEP 1, MMEP 8, MMEP 15, MMEP 20, MMEP 25, MMEP 32, MMEP 37, MMEP 52, MMEP 56, MMEP 58, MMEP 60, MMEP 63, MMEP 65 and MMEP 67 (Refer to Figure 14-20)	-	4	5	4	8	3	**68**	**High**	Prior to the commencement of the pre-construction phase, an appropriately qualified archaeologist shall accompany the construction team and indicate where sensitive cultural heritage and archaeological sites are located A social consultation process to assess whether any local residents or the wider public is aware of the presence of graves at these sites must be undertaken . If graves are located at these sites then the following mitigations are applicable: • The procedure includes the following: 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. • Obtain 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	3	5	2	4	2	**33**	**Moderate**	54.2

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
										• The process must be done by a reputable company well versed in the mitigation of graves Consultation with members of Sekuruwe should be conducted before construction of the Blinkwater 2 TSF commences								
Social	Employee and community exposure to hazards and risks including hazardous materials and substances during preparation for construction of the proposed expansion activities as well as associated gravel roads and main access roads	-	3	4	2	4	2	**30**	**Moderate**	Inform affected community about potential risks and impacts from the project activities in a culturally appropriate manner, including collaborating with the community and government agencies in their efforts to respond effectively to emergency situations Where possible, AAP should avoid or minimise the potential for community exposure to hazardous materials and substances that may be released by the project (i.e. contaminated water). AAP should also avoid or minimise the potential for community exposure to water-borne, water-based, water-related, and vector-borne diseases, and communicable diseases that could result from project activities by developing action plans to address these risks. For example, AAP should endeavour to avoid or minimise transmission of communicable diseases that may be associated with the influx of temporary or permanent project labour and should develop an Influx Management Plan to reduce this. 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, environment and safety training on induction and thereafter on a regular basis Instruct contractors on how to work in line with the health, environmental and safety documents and site rules Development or updating of routine emissions and ambient air quality monitoring program to determine whether there are any significant increases in emissions and impacts at sensitive receptors	2	4	2	2	1	**16**	**Low**	46.7
	<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. 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	3	6	2	**33**	**Moderate**	AAP should consider undertaking a Community Health and Safety Impact Assessment in line with Anglo American Standards and Policies AAP should consider the establishment of a Community Management Forum (CMF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The CMF should include the following: • Enforcing local employment as far as practically possible • Avoid the establishment of camps, hostels or temporary accommodation for workers	2	2	2	4	1	**16**	**Low**	51.5

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
										• 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								
										AAP should consider updating its Contractor Social Management Procedure to align with this Project								
										Provide clear expectations in all platforms of communication of the number of jobs available and in what categories or fields of the mine. This would allow a clear indication of what types of jobs would be available.								
										Provide clear indications of the requirements and processes involved in recruitment processes								
	Social differentiation and inequality due to competition over scarce resources such as employment and procurement opportunities leading to social differentiation and conflict	-	4	4	3	10	4	68	**High**	AAP must ensure that management practises do not exploit or exacerbate the level of mistrust or conflict within the different community groups	4	3	2	8	4	52	**Moderate**	23.5
										AAP should ensure that employment and procurement policies are clearly communicated and implemented in a transparent manner								
										Communities must be engaged on fair and transparent terms whilst respecting traditionally and democratically appointed leadership within the community								
										Communities should furthermore be informed and educated about the various ways in which AAP contributes to socio-economic development, not only within their own communities, but also through contributions towards their SLP goals, CSI as well as taxation								
										Communities should be capacitated through inter alia Zimele programme to obtain training and entrepreneurial skills which will allow them to gain opportunities through AAP initiatives or procurement processes								
	Impacts on health and well-being - a lack of information is causing uncertainty and anxiety in terms of potential project impacts and benefits	-	4	3	3	8	4	56	**Moderate**	Ensure that current resourcing gaps within the SP team is assessed and sufficiently addressed to ensure appropriate engagement in line with impacts identified in the SIA including to ensure that all stakeholder concerns and inputs especially for vulnerable groups are taken into consideration	3	1	2	6	3	27	**Low**	51.8
										The SP team should receive additional training (i.e. International Association of Public Participation modules) to enhance communication techniques with the community. Where possible, members from the SP team should also be able to access								

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
										counselling or the input from a psychologist to assist with conflict management training								
	Lack of employment creation and increase in unemployment - limited employment creation/job qualifications. During the operational phase existing employment from MSC will be retained as the labour from the MSC will be transferred to the proposed M3C. It is not anticipated that the construction of the proposed additional activities at MM mine will create employment for a significant number of people however, some employment opportunity may be available for unskilled, semi-skilled and skilled labour during the construction phase.	-	2	2	2	4	4	**16**	**Low**	MM should consider reviewing their policies to ensure full compliance with Anglo American Standards and Policies. Specifically, consider updating its Contractor Social Management Procedure to align with this Project 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 SP Team at AAP can communicate with the leadership of each village in the surrounding villages and request that a database of services that they can provide be drawn up to submit to the mine. This can be relevant in the sourcing of skills from surrounding communities Sourcing these employees should be undertaken in a coherent fashion and the purpose of the labour desk should be clarified. The labour desk should either be given the mandate to source CVs from the local community, or MM must clearly communicate that they do not have the mandate, in which case the proper channel of submitting CVs should be communicated MM should continue to 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 AAP's recruitment policies which should promote the employment of local labour. The recruitment process must be transparent and communicated to stakeholders in order to limit opportunities for conflict situations. MM'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 prioritised, 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 Continued participation of labour unions in Work Place Skills Plans and Annual Training Reports should be encouraged, and feedback provided to employees at mass meetings	4	3	2	6	2	**44**	**Moderate**	175.0

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
	Lack in capacity building and perceived lack of support to local communities, especially women and youth to enable them to access opportunities at the mine	**+**	3	4	2	6	2	**36**	**Moderate**	AAP can consider providing proposal writing workshops as a part of the training and skills development programmes such that community members with small businesses can develop this skill, leading to a higher and more promising level of proposals received from the surrounding communities Skills development for employees and community members wishing to obtain employment through the project should, include more than technical skills (e.g. Life skills training and financial literacy) Skills development opportunities for new recruits should be prioritised Awareness should be created within the communities of the contribution that AAP makes to skills development and training opportunities Learnerships/internships at AAP should be considered for matriculants wishing to obtain work experience	4	4	3	8	1	**60**	**High**	66.7
	<u>Gender relations</u> - insufficient women in the workplace: 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. 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 mine.	**-**	3	4	2	6	2	**36**	**Moderate**	MM's HR policy should 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 should take place to increase their participation in the labour force Continue the implementation of the management measures to ensure equitable remuneration packages for women and their male counterparts. Institute a well-designed gender equality strategy for the project Inform community members as to the motivation for AAP's gender policy and the benefits of such a policy	4	4	3	6	1	**52**	**Moderate**	44.4

Table 18-4: Pre-construction impacts applicable to specific expansion activities including the 3rd Concentrator, Debottlenecking Plant, Blinkwater 2 TSF, Buffer Dam and North Waste Rock Dump

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
Pre-construction impacts applicable to the 3rd Concentrator																		
Surface water	Impact on water quality due to an increase in runoff from the cleared and stripped areas in close proximity to the watercourses (specifically the Mohlosane River)	-	3	4	2	6	2	**36**	**Moderate**	The footprint of the proposed infrastructure area must be clearly demarcated to restrict vegetation clearing activities as far as practically possible Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area Vegetation clearance will be undertaken in a phased manner Clean water diversion bunds will be constructed upstream of the construction site prior to clearing areas for new infrastructure Areas disturbed by pre-construction activities, which will not be required for construction, will be rehabilitated immediately on completion of construction of each area 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 The groundwater and surface water quality monitoring programme will continue in line with requirements of the Water Use Licence Sufficient on-site ablution, sanitation and waste management facilities will be provided	2	2	3	4	1	**18**	**Low**	50.0
	Increased erosion from areas of exposed soils during site clearing resulting in potential increase in sedimentation to surface water resources (specifically the Mohlosane)	-	4	3	2	6	3	**44**	**Moderate**	Where practical activities should be limited to months of low rainfall (dry season) to reduce probability of potential impact Areas disturbed by activities should be rehabilitated immediately on completion of each area Erosion control measures in the form of temporary erosion prevention berms should be implemented during construction.	3	1	2	4	2	**21**	**Low**	52.3
Pre-construction impacts applicable to the proposed construction of the Debottlenecking Plant at the South Concentrator																		
Surface water	Impact on water quality due to an increase in runoff from the cleared and stripped areas in close proximity to the watercourses	-	3	4	1	6	2	**33**	**Moderate**	The footprint of the proposed infrastructure area must be clearly demarcated to restrict vegetation clearing activities as far as practically possible Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area Vegetation clearance will be undertaken in a phased manner Clean water diversion bunds will be constructed upstream of the construction site prior to clearing areas for new infrastructure Areas disturbed by pre-construction activities, which will not be required for construction, will be rehabilitated immediately on completion of construction of each area 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 The groundwater and surface water quality monitoring programme will continue in line with requirements of the Water Use Licence through all phases of the project Sufficient on-site ablution, sanitation and waste management facilities will be provided	2	1	4	6	2	**22**	**Low**	33.3

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
Pre-construction impacts applicable to the proposed construction the Blinkwater 2 TSF																		
Biodiversity	The habitat in this area will be further modified due to the pre-construction activities which will include clearance of vegetation. Concern is with the encroachment of the granite outcrops – as was indicated in 2011 and 2015 studies, these areas are important biodiversity "hot spots" and islands where all biota find refuge	-	5	2	2	10	4	70	High	Where possible, rehabilitate exposed areas during construction to promote vegetation growth	5	2	2	8	4	60	High	14.3
	There will be some vegetation loss due to the clearance activities.	-	5	2	2	8	4	60	High	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	2	2	6	4	50	Moderate	16.7
										If possible, relocate protected species once a permit has been obtained for its removal								
Heritage	Relocation of identified burial grounds associated with the Blinkwater 2 TSF (refer to Section 14-9 for details relating to identified heritage sites). If constructed, these site will have to be relocated to a suitable area. Non-tangible heritage sites which may be located within the Blinkwater 2 TSF include a sacred tree and sacred water site located near Sekuruwe, and which may be located within the Blinkwater TSF footprint area.	-	4	5	4	8	3	68	High	All construction staff are to be made aware of the locations of the sensitive cultural and archaeological sites as specific management measures are required for these sites as detailed below. In order to mitigate the impact associated with relocation of the burial grounds and single graves, the procedure detailed in Section 24 will need to be followed. The procedure includes the following: • 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. • Obtain 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 • Consultation with members of Sekuruwe should be conducted before construction commences	2	5	4	6	2	30	Moderate	55.9
	Potential destruction of five of the twelve identified stone age sites within the north-western corner of the proposed Blinkwater 2 TSF	-	4	5	3	4	4	48	Moderate	Prior to the commencement of the pre-construction phase, an appropriately qualified archaeologist shall accompany the construction team and indicate where sensitive cultural heritage and archaeological sites are located	3	5	2	2	2	27	Low	43.8
										The engineering design of the TSF will be altered to avoid the majority of the stone ages sites identified. The remaining sites which will have to be mitigated must be assessed in the field by a suitably qualified Stone Age specialist prior to site clearance								
										Any recommendations made by the Stone Age specialist must be adhered to								
										Such recommendations may include the archaeological recording of a surface layout plan, surface collection of lithics, etc.								
										Consultation with members of Sekuruwe should be conducted before construction of the Blinkwater 2 TSF commences								
	Potential destruction of one Late Iron Age stonewalled site located to the west of the proposed Blinkwater 2 TSF	-	4	5	2	4	2	44	Moderate	Prior to the commencement of the pre-construction phase, an appropriately qualified archaeologist shall accompany the construction team and indicate where sensitive cultural heritage and archaeological sites are located	3	5	2	2	1	27	Low	38.6
										An archaeological site layout plan must be compiled using accepted archaeological techniques								

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
										During the recording of the archaeological site layout plan, an attempt must be made to identify any archaeological middens associated with this site.								
										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								
										Consultation with members of Sekuruwe should be conducted before construction of the Blinkwater 2 TSF commences								
	Destruction of a site containing a natural boulder with cupules and stonewalling for the development of the Blinkwater 2 TSF	-	4	5	3	6	3	**56**	**Moderate**	Prior to the commencement of the pre-construction phase, an appropriately qualified archaeologist shall accompany the construction team and indicate where sensitive cultural heritage and archaeological sites are located	3	5	2	4	2	**33**	**Moderate**	41.1
										A social consultation process to assess whether any local residents or the wider public is aware of the site and can provide information for the improved interpretation of the site must be implemented and recorded								
										The site must be archaeologically recorded by way of a site layout plan, site photographs and the recording of the arrangement and layout of the cupules and grinding surfaces on the boulder								
										A mitigation report must be compiled which includes the findings of the social consultation process as well as the records, plans and photographs resulting from the archaeological recording of the site								
										This report must also provide recommendations as to whether any additional mitigation would be required for the site to be destroyed as part of the development								
										Consultation with members of Sekuruwe should be conducted before construction of the Blinkwater 2 TSF commences								

Aspect	**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**	**LoR**	**Significance**			**P**	**D**	**E**	**M**	**LoR**	**Significance**		
	Potential destruction of a possible rain making site located in the north west corner of the Blinkwater 2 TSF	-	4	5	4	8	4	68	**High**	If any of the sites need to be relocated or destroyed, the following must be undertaken: • An archaeological site layout plan must be compiled using accepted archaeological techniques • A permit application must be submitted to SAHRA for archaeological mitigation to take place. Such mitigation may include test excavations and surface collection. Once the permit is received, the archaeological mitigation measures can be undertaken Such mitigation would be aimed at better understanding such rain-making sites • The archaeological research must be underpinned by a social consultation process to assess whether any local residents or the wider public is aware of the site and can provide information for the improved interpretation of the site • An archaeological mitigation report must be compiled. If no alternatives for the preservation of the site can be found, a destruction permit application must be lodged with (SAHRA) to allow for the destruction of the site. It is presently certain that such a permit application would succeed • Consultation with members of Sekuruwe should be conducted before construction commences	4	5	3	6	3	**56**	**Moderate**	17.6
	Potential destruction of a historic farmstead associated with a historic homestead and graves located	-	4	5	4	8	3	68	**High**	Prior to the commencement of the pre-construction phase, an appropriately qualified archaeologist shall accompany the construction team and indicate where sensitive cultural heritage and archaeological sites are located It has been strongly recommended by the specialist that the development footprint be modified to allow for the in situ preservation of this site It is also recommended that a concerted effort be made to adhere to this recommendation. The fact that the site is located on the far western boundary of the development footprint area, should make adherence to this mitigation measure feasible Consultation with members of Sekuruwe should be conducted before construction of the Blinkwater 2 TSF commences	2	5	3	6	3	**28**	**Low**	58.8
Social	Loss of cultural heritage due to clearance of vegetation and soil in preparation for construction	-	4	4	2	8	4	**56**	**Moderate**	Local residents should be consulted to inform mitigation measures when addressing any potential impact on cultural heritage sites or graves, including intangible heritage such as cultural rites, initiation or circumcision Mitigation measures recommended in the Heritage Impact Assessment Study to be implemented Implement the existing chance finds procedure to deal with how to protect graves and heritage sites accidentally unearthed during construction	3	2	2	4	3	**24**	**Low**	57.1
Pre-construction impacts applicable to the proposed construction of the Buffer Dam																		
Soils, land use and land capability	Loss of soil resource and utilisation potential due to loss of existing topsoil stockpile located near to the proposed buffer dam	-	5	3	2	6	5	**55**	**Moderate**	The existing topsoil stockpile located within the footprint where the proposed buffer dam will be located will be relocated to an appropriate designated area. Restrict stockpiles height, vegetate and manage ingress of dirty water and erosion	4	3	2	2	3	**28**	**Low**	49.1
Pre-construction impacts applicable to the proposed construction of the North Waste Rock Dump																		
Heritage	Relocation of identified burial grounds associated with the North Waste Rock Dump (refer to Section 14-9 for details relating to identified heritage sites) . If constructed, these site will have to be relocated to a suitable area.	-	4	5	4	8	3	68	High	All construction staff are to be made aware of the locations of the sensitive cultural and archaeological sites as specific management measures are required for these sites as detailed below. In order to mitigate the impact associated with relocation of the burial	2	5	4	6	2	30	Moderate	55.9

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
										grounds and single graves, the procedure detailed in Section 24 will need to be followed. The procedure includes the following: • 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.								
	Possible grave sites have been identified as part of the heritage specialist assessment which may need to be relocated depending on confirmation of the burial sites.	-	3	5	3	8	3	48	Moderate	Prior to the commencement of the pre-construction phase, an appropriately qualified archaeologist shall accompany the construction team and indicate where sensitive cultural heritage and archaeological sites are located A social consultation process to assess whether any local residents or the wider public is aware of the presence of graves at these sites. If graves are located at these sites then the following mitigations are applicable: • A grave relocation process must be undertaken • 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 • Obtain 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 and the process must be done by a reputable company well versed in the mitigation of graves	2	5	2	4	2	22	Low	54.2
	Complete destruction of a rubbing post located within the proposed ore stockpile area associated with the NWRD.	-	3	5	3	6	3	42	Moderate	Prior to the commencement of the pre-construction phase, an appropriately qualified archaeologist shall accompany the construction team and indicate where sensitive cultural heritage and archaeological sites are located The site must be re-visited and archaeologically recorded by way of photographs and rubbings of the rubbing stone Intensive archaeological walkthroughs must also be undertaken of the immediate surroundings of the site, to confirm the current assessment that no engravings or Stone Age sites are associated with the rubbing post A mitigation report must be compiled which includes the findings of the social consultation process as well as the records, plans and photographs resulting from the archaeological recording of the site. This report must also provide recommendations as to whether any additional mitigation would be required for the site to be destroyed as part of the development	3	5	2	2	2	27	Low	35.7
Surface water	Sedimentation of Witrivier due to a potential increase of solids that can be transported via surface runoff due to site clearing	-	3	4	3	6	2	**39**	**Moderate**	Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area	1	4	3	6	1	**13**	**Low**	66.7
Social	Loss of cultural heritage due to clearance of vegetation and soil in preparation for construction	-	4	4	2	8	4	**56**	**Moderate**	Local residents should be consulted to inform mitigation measures when addressing any potential impact on cultural heritage sites or graves, including intangible heritage such as cultural rites, initiation or circumcision	3	2	2	4	3	**24**	**Low**	57.1

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
										Mitigation measures recommended in the Heritage Impact Assessment Study to be implemented								
										Implement the existing chance finds procedure to deal with how to protect graves and heritage sites accidentally unearthed during construction								
Pre-construction impacts applicable to the proposed construction of the Groot Sandsloot River diversion																		
Surface water	Impact on water quality due to an increase in runoff from the cleared and stripped areas in close proximity to the watercourses (specifically the Sandsloot (Pholotsi) river) during preparation for river diversion	-	3	4	2	6	2	**36**	**Moderate**	The footprint of the proposed infrastructure area must be clearly demarcated to restrict vegetation clearing activities as far as practically possible	2	2	3	4	1	**18**	**Low**	50.0
										Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area								
										Vegetation clearance will be undertaken in a phased manner								
										Clean water diversion bunds will be constructed upstream of the construction site prior to clearing areas for new infrastructure								
										Areas disturbed by pre-construction activities, which will not be required for construction, will be rehabilitated immediately on completion of construction of each area								
										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								
										The groundwater and surface water quality monitoring programme will continue in line with requirements of the Water Use Licence								
										Sufficient on-site ablution, sanitation and waste management facilities will be provided								

The table below list the main project related activities that will be undertaken during the construction phase of the proposed project.

Construction	Construction of the infrastructure as part of the Expansion Project including associated infrastructure such as crossings, water management, containment and protection infrastructure, including protection measures associated with the wetland, and reticulation of electricity to new infrastructures that require power to operate
	Construction of the pipeline systems associated with the proposed infrastructure including treated sewage effluent, water supply, return water, process water pipelines and associated booster pump stations. Including connecting the buffer dam with the M3C, RWDs of the Vaalkop TSF and Dam 1160.
	Diverting the Groot Sandsloot River.

Table 18-5: Construction impacts applicable to all the proposed expansion activities

Aspect	**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**	**LoR**	**Significance**			**P**	**D**	**E**	**M**	**LoR**	**Significance**		
Palaeontology	The study area where the proposed infrastructure associated with the proposed Expansion Project will be located partially incorporates outcrop area of the Chuniespoort Group of the early Proterozoic Transvaal Supergroup, which includes Malmani Subgroup dolomites and limestones that are considered to be of high palaeontological sensitivity. There is a high likelihood that stromatolitic fossil assemblages may be present in most of the outcrop areas. Consequently, the following infrastructure and associated activities may be affected: • Proposed Third Concentrator Site • Buffer Dam • Contractors Laydown Area • Upgrading of a section of an existing mine road • Upgrade of the South Concentrator									Although the proposed study area is exempted from further paleontological assessment, areas where the footprint is underlain by Malmani Subgroup sediments and excavations more than 1 meter deep into the Malmani Subgroup bedrock needs to be monitored by a professional paleontologist as part of a Phase 1 assessment in case of chance exposure of stromatolite fossil remains, while such excavations are still open								
Air Quality	During the construction phase the activities will comprise a series of different activities 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.	-	2	3	2	4	2	**18**	**Low**	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. Apply dust suppressants or vegetate bare areas not being used for construction Comply to the mine-set speed limits area to minimise the creation of fugitive dust within the project boundary Continue to implement the routine air quality monitoring program and assess air quality results routinely	2	3	1	4	1	**16**	**Low**	12.5
Noise	Increase in ambient noise generated by machinery due to the construction of the proposed expansion infrastructure/activities	-	3	2	1	4	2	**21**	**Low**	Construction activities may be carried out during the day and night time provided that the prevailing ambient noise levels at the boundary of the mine is not exceeded When the prevailing ambient noise is exceeded such activities will have to be acoustically screened off Machinery with low noise levels to be used	2	2	1	4	2	**14**	**Low**	33.3
Groundwater	Potential contamination of groundwater resources due to potential accidental spillages of hazardous substances from the vehicles and equipment used for construction activities	-	3	3	3	4	3	**30**	**Moderate**	Prevention of contamination through hazardous material spills and leaks through the implementation of vehicle maintenance plans Undertake effective, timeous spills management and clean-up Implement a staff and contractor awareness training programme Undertake effective mechanical maintenance on all critical equipment to prevent leaks, abnormalities and risk of failure Provide adequate secondary containment measures associated with pollution point sources	2	2	1	2	1	**10**	**Low**	66.7
	Site clearing of vegetation and stockpile of topsoil resulting in increased runoff and less recharge from rainfall to groundwater	-	4	2	2	4	2	**32**	**Moderate**	The footprint of the proposed infrastructure area must be clearly demarcated to restrict vegetation clearing activities as far as practically possible Adequate storm water management associated with the proposed infrastructure should be implemented as detailed in Section 8.26 and the Stormwater Management Plan submitted as part of the WULA	2	1	1	2	1	**8**	**Low**	75.0

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
Soils, Land Use and Land Capability	Impact due to the loss of vegetative cover and topsoil protection in the proposed expansion infrastructure/activity areas. Possible erosion and the permanent loss of resource downslope/downstream and impact of sedimentary load on streams and river systems could occur. 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 could also occur	-	5	5	3	8	5	80	High	Footprint impact should be mimimsed All utilisable soil must be removed and stockpiled and the re-vegetation and/or rock cladding /cover to all stored materials (more than three years) should be considered Suitable indigenous grass should be used as an erosion prevention medium ahead of clearing where erosion is a considered risk. Comply to the waste management plan which has been developed for MM Waste storage areas 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 should be disposed of at a registered waste facility No waste or 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 and managed through the mines existing waste program. Sufficient on-site ablution, sanitation and waste management facilities will be provided Implement the soils utilisation plan as detailed in section 18.4.1	4	3	2	4	3	36	Moderate	55.0
	Loss of soil resource and utilisation potential due to contamination by hydrocarbon/reagent spills and/or dirty water runoff	-	5	3	2	6	5	55	Moderate	Movement and servicing of vehicles should be restricted or minimised to identified areas. Spillage from haulage systems and vehicles should be restricted and if it does happen be cleaned according to the mines existing procedure All services areas should be bunded.	4	3	2	2	3	28	Low	49.1
	Loss of resource and its utilisation potential due to compaction by heavy construction vehicles used over unprotected ground/soils in the proposed expansion infrastructure/activity areas	-	5	5	2	4	4	55	Moderate	Minimise the footprint of impact Restrict vehicle movement over unprotected soils and to areas of need Remove all (to depth) utilisable soil, stockpile and store prior to construction of facilities/structures Implement concurrent rehabilitation of all areas once usefulness is completed	4	3	2	2	3	28	Low	49.1
	Loss of soil utilisation potential and sterilisation due to emplacement/construction of permanent structures in the proposed expansion infrastructure/activity areas	-	5	5	2	10	5	85	High	Removal/stripping of all utilisable soil from footprint of permanent structures and the stockpiling/storage of the resource. Protect from erosion, compaction and contamination (dirty water) Stockpile soils upslope of dirty water runoff and use vegetative cover (indigenous grass etc.) to protect soils	5	5	2	4	5	55	Moderate	35.3
	Loss of soil utilisation potential and land capability due to leaching and de-nutrification of stripped and stockpiled soils on in the proposed expansion infrastructure/activity areas	-	5	5	2	4	5	55	Moderate	Strip soils with vegetative cover intact (inclusive of seed pool and organic matter), stockpile utilisable soils separately from soft overburden, restrict stockpiles and berms to less than 1,5m high where possible, or to 15m high where soils are to be stored for extended periods of time (>3 years) Vegetate and/or rock clad stores of soil and overburden and manage the ingress of dirty water and erosion	4	3	2	4	2	36	Moderate	34.5

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
Surface water	Deterioration of surface water quality due to erosion, spillages and accidental discharges at the crossings	-	4	2	1	6	3	**36**	**Moderate**	Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event and emergency action plans should be drawn up to deal with spillages	2	2	4	4	2	**20**	**Low**	44.4
	Increased erosion from areas of exposed soils during site clearing resulting in loose materials being washed into the surface water resources	-	4	2	1	6	3	**36**	**Moderate**	Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area	3	2	1	4	2	**21**	**Low**	41.7
	Reduction in water quality due to an increase in turbidity as a result of an increase in erosion form the clearing of areas in close proximity to the watercourses	-	3	4	1	6	2	**33**	**Moderate**	The footprint of the proposed infrastructure area must be clearly demarcated to restrict vegetation clearing activities as far as practically possible Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area Vegetation clearance will be undertaken in a phased manner Clean water diversion bunds will be constructed upstream of the construction site prior to clearing areas for new infrastructure Areas disturbed by pre-construction activities, which will not be required for construction, will be rehabilitated immediately on completion of construction of each area 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 The groundwater and surface water quality monitoring programme will continue in line with requirements of the Water Use Licence Sufficient on-site ablution, sanitation and waste management facilities will be provided	2	1	4	6	2	**22**	**Low**	33.3
	Increased potential for damming and flooding and subsequent damage to property and infrastructure due to hardstanding	-	3	2	1	2	1	**15**	**Low**	Areas should be appropriately graded to prevent ponding. Stormwater measures should be appropriately designed to allow for free flow of water as per the Stormwater Management Plan for MM.	2	2	1	2	1	**10**	**Low**	33.3
Biodiversity	Areas with spoils will allow penetration of water into the groundwater which could result in pollution to groundwater	-	4	2	3	8	3	**52**	**Moderate**	Vegetate and/or rock clad stores of soil and spoils and manage the ingress of dirty water and erosion.	2	2	3	4	2	**18**	**Low**	65.4
	Further loss of faunal SCC through niche habitat and food resource destruction	-	4	2	2	4	4	**32**	**Moderate**	The footprint and daily operation of the proposed infrastructure must be strictly monitored to ensure that footprint creep and edge effects does not affect the surrounding sensitive faunal habitat Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development No indiscriminate driving through the veld and undisturbed areas should be 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 regular basis in order to locate and remove snares and traps	2	2	2	4	4	**16**	**Low**	50.0

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
Visual	Visual impact associated with constructing the proposed expansion infrastructure/activities: 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 area	-	2	3	2	2	1	**14**	**Low**	Adhere to the air quality management measures provided in the air quality section Plant vegetation such as trees and shrubs on periphery of villages directly next to the mine to provide a screen/buffer of direct views towards the plants Point lighting inwards and not to villages to avoid nocturnal impacts Natural vegetation, wherever possible, should be retained on and around the mine property as well as along the boundary of the mine	2	2	2	2	1	**12**	**Low**	16.7
Social	Insufficient essential services throughout the project life cycle: The mine together with local government need to agree on an approach to respond or assist with developing areas of need such as the requirement for more schools/training facilities and health care facilities and assistance in decreasing the HIV/AIDs rate in the community.	-	4	4	3	6	4	**52**	**Moderate**	Consult with provincial and national departments on sector specific programs for alignment. The MLM IDP (2019) highlights the need for roads and stormwater management as well as water and sanitation Provision is made for infrastructure development projects in the SLP (2016-2020) with the aim of handing over these facilities to the MLM	3	3	2	4	3	**27**	**Low**	48.1
	Community and employee exposure to hazards and risks, including hazardous materials and substances	-	3	4	2	4	2	**30**	**Moderate**	Inform affected community about potential risks and impacts from the project activities in a culturally appropriate manner, including collaborating with the community and government agencies in their efforts to respond effectively to emergency situations Where possible, AAP should avoid or minimise the potential for community exposure to hazardous materials and substances that may be released by the project (i.e. contaminated water). AAP should also avoid or minimise the potential for community exposure to water-borne, water-based, water-related, and vector-borne diseases, and communicable diseases that could result from project activities by developing action plans to address these risks. For example, AAP should endeavor to avoid or minimise transmission of communicable diseases that may be associated with the influx of temporary or permanent project labour and should develop an Influx Management Plan to reduce this. 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, environment and safety training on induction and thereafter on a regular basis Instruct contractors on how to work in line with the health, environmental and safety documents and site rules Development or updating of routine emissions and ambient air quality monitoring program to determine whether there are any significant increases in emissions and impacts at sensitive receptors	2	4	2	2	1	**16**	**Low**	46.7
	Social networks There is a likelihood that job seekers will move into the study area and seek accommodation in the villages located near the mine. 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	3	6	2	**33**	**Moderate**	AAP should consider undertaking a Community Health and Safety Impact Assessment in line with Anglo American Standards and Policies AAP should consider the establishment of a CMF in order to monitor the construction phase and the implementation of the recommended mitigation measures. The CMF should include the following: • Enforcing local employment as far as practically possible • Avoid the establishment of camps, hostels or temporary accommodation for workers	2	2	2	4	1	**16**	**Low**	51.5

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
										• 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								
										AAP should consider updating its Contractor Social Management Procedure to align with this Project								
										Provide clear expectations in all platforms of communication of the number of jobs available and in what categories or fields of the mine. This would allow a clear indication of what types of jobs would be available.								
										Provide clear indications of the requirements and processes involved in recruitment processes								
	<u>Feelings in relation to the project</u> A lack of information from the mine is causing uncertainty and anxiety in terms of potential project impacts and benefits.	-	4	3	3	8	4	**56**	**Moderate**	Ensure that current resourcing gaps within the SP team is assessed and sufficiently addressed to ensure appropriate engagement in line with impacts identified in the SIA including to ensure that all stakeholder concerns and inputs especially for vulnerable groups are taken into consideration	3	1	2	6	3	**27**	**Low**	51.8
										The SP team should receive additional training (i.e. International Association of Public Participation modules) to enhance communication techniques with the community. Where possible, members from the SP team should also be able to access counselling or the input from a psychologist to assist with conflict management training								
	<u>Waged labour or employment creation:</u> During the operational phase existing employment from MSC will be retained as the labour from the MSC will be transferred to the proposed M3C. It is not anticipated that the construction of the proposed additional activities at MM mine will create employment for a significant number of people however, some employment opportunity may be available for unskilled, semi-skilled and skilled labour during the construction phase	-	2	2	2	4	4	**16**	**Low**	MM should consider reviewing their policies to ensure full compliance with Anglo American Standards and Policies. Specifically, consider updating its Contractor Social Management Procedure to align with this Project	4	3	2	6	2	**44**	**Moderate**	175.0
										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 SP Team at AAP can communicate with the leadership of each village in the surrounding villages and request that a database of services that they can provide be drawn up to submit to the mine. This can be relevant in the sourcing of skills from surrounding communities								
										Sourcing these employees should be undertaken in a coherent fashion and the purpose of the labour desk should be clarified. The labour desk should either be given the mandate to source CVs from the local community, or MM must clearly communicate that they do not have the mandate, in which case the proper channel of submitting CVs should be communicated								
										MM should continue to 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 AAP's recruitment policies which should promote the employment of local labour.								
										The recruitment process must be transparent and communicated to stakeholders in order to limit opportunities for conflict situations. MM's contractor management plan also needs to be implemented to ensure that appointed contractors also employ locally as far as practically possible.								

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
										Support for local businesses through SMME development should be prioritised, 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								
										Continued participation of labour unions in Work Place Skills Plans and Annual Training Reports should be encouraged, and feedback provided to employees at mass meetings								
	Capacity building and skills transfer Lack in capacity building and perceived lack of support to local communities, especially women and youth to enable them to access opportunities at the mine	+	3	4	2	6	2	36	Moderate	AAP can consider providing proposal writing workshops as a part of the training and skills development programmes such that community members with small businesses can develop this skill, leading to a higher and more promising level of proposals received from the surrounding communities	4	4	3	8	1	60	High	66.7
										Skills development for employees and community members wishing to obtain employment through the project should, include more than technical skills (e.g. Life skills training and financial literacy) Skills development opportunities for new recruits should be prioritised								
										Awareness should be created within the communities of the contribution that AAP makes to skills development and training opportunities								
										Learnerships/internships at AAP should be considered for matriculants wishing to obtain work experience								
	Gender relations - insufficient women in the workplace: 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. 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 mine.	-	3	4	2	6	2	36	Moderate	MM's HR policy should 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 should take place to increase their participation in the labour force	4	4	3	6	1	52	Moderate	44.4
										Continue the implementation of the management measures to ensure equitable remuneration packages for women and their male counterparts. Institute a well-designed gender equality strategy for the project Inform community members as to the motivation for AAP's gender policy and the benefits of such a policy								
	Social differentiation and inequality Competition over scarce resources such as employment and procurement opportunities leading to social differentiation and conflict	-	4	4	3	10	4	68	High	AAP should ensure that management practises do not exploit or exacerbate the level of mistrust or conflict within the different community groups	4	3	2	8	4	52	Moderate	23.5
										AAP should ensure that employment and procurement policies are clearly communicated and implemented in a transparent manner								
										Communities must be engaged on fair and transparent terms whilst respecting traditionally and democratically appointed leadership within the community								
										Communities should furthermore be informed and educated about the various ways in which AAP contributes to socio-economic development, not only within their own communities, but also through contributions towards their SLP goals, CSI as well as taxation								
										Communities should be capacitated through inter alia Zimele programme to obtain training and entrepreneurial skills which will allow them to gain opportunities through AAP initiatives or procurement processes								

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
	Reduced access to ecosystem services due to conversion of land use	-	4	4	2	8	4	**56**	**Moderate**	Develop a management plan to address situations where land currently used by communities, within the mining and surface lease areas, will be lost due to the proposed project activities. The management plan should ensure that there is no net negative impact on the land user Facilitate informed participation of all affected persons. Consultation to continue through the implementation, monitoring and evaluation phases APP must communicate their grievance mechanism to the affected persons in order to address concerns raised by affected parties Take into account surrounding land uses and design post-mining land use options to support and enhance long-term development options	4	4	2	6	3	**48**	**Moderate**	14.3
	Dust exposure Tipping and hauling of waste rock to the northern waste rock dump | Crushing activities at the Primary crusher | Additional traffic and hauling vehicle traffic *Increase in dust in the immediate vicinity of the mining activities*	-	4	4	3	8	4	**60**	**High**	Maintain the existing dust management/mitigation measures on-site. Should dust levels increase the management/mitigation measures should be reviewed to ensure dust levels remain below the respective standards Adhere to the air quality management measures provided in the air quality section Implement MM's social incident management procedure for the Project including the existing grievance procedures to capture community and stakeholder concerns and grievances regarding environmental impacts 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	4	4	2	6	3	**48**	**Moderate**	20.0
	Noise exposure Tipping and hauling of waste rock to the northern waste rock dump; 3rd Concentrator plant activities; Crushing activities at the Primary crusher; De-bottlenecking plant; Additional traffic and hauling vehicle traffic; Blasting activities *Increase in noise in the immediate vicinity of the mining activities*	-	4	4	2	8	4	**56**	**Moderate**	Implement the Environmental, Health and Safety Guidelines prescribed Noise Impact Management Plan	3	4	2	6	3	**36**	**Moderate**	35.7

Table 18-6: Construction impacts applicable to the specific expansion activities

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
Construction impacts applicable to the proposed construction of the 3rd Concentrator and Bulk Ore Sorter																		
Noise	Impacts associated with the construction activities at the upgrade of the access road from the Bakenberg Road turnoff (going toward the MNC) to the M3C area to manage traffic congestion during the construction	-	3	2	1	4	2	21	Low	Construction activities at the upgrade of the access road may be carried out during the day and night time provided that the prevailing ambient noise levels at the boundary of the mine is not exceeded	2	3	2	4	2	18	Low	14.3
										When the prevailing ambient noise is exceeded such activities will have to be acoustically screened off.								
	Noise generated due to construction activities at the additional primary crusher	-	3	2	1	4	2	21	Low	Construction activities at the additional primary crusher may be carried out during the day and night time provided that the prevailing ambient noise levels at the boundary of the mine is not exceeded	2	2	1	4	2	14	Low	33.3
Social	Availability and access to water: Due to the construction of the 3rd Construction, contamination of the Mohlosane River from potential hydrocarbon spills from construction machinery Reduced availability of water to downstream water users due to dirty runoff from site reporting into Mohlosane River	-	4	4	3	10	5	68	High	During normal operation dirty water should be contained as specified in the design report and as per the requirements of the WUL	4	4	2	6	3	48	Moderate	29.4
										Paddocks should be constructed to minimise uncontrolled runoff from the site entering the clean water system								
										Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact								
										Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event								
										Emergency action plans should be developed to deal with spillages								
										Contractors should be made aware of the WUL conditions that apply during construction and made liable for environmental damages caused by spillages								
										Contaminated runoff should be contained and reused as necessary								
Surface water	Contamination of the Mohlosane River from potential hydrocarbon spills from construction machinery and spillage from the conveyor and road crossings over the Mohlosane River	-	2	1	2	4	2	14	Low	Contaminated runoff should be contained and reused as necessary e.g. for dust suppression	2	2	2	2	2	12	Low	14.3
										Hazardous substances and potentially polluting materials should be stored in appropriately bunded areas located outside of the riparian zone								
										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 developed to deal with spillages								
										Avoid spillage from conveyors across the Mohlosane River								
Heritage	Impact on possible heritages sites	-	3	5	3	8	3	48	Moderate	Prior to the commencement of the construction phase, an appropriately qualified archaeologist must undertake a heritage assessment at the site where the bulk ore sorter will be situated.	2	5	2	4	2	22	Low	54.2
										If any heritage sites are identified it must be managed according to the specific requirements detailed in the management measures								
Biodiversity	The project will have no major impact on the natural vegetation on a regional level. Impacts to surface water resources are expected with regard to increased run-	-	4	2	2	4	1	32	Moderate	Encroachment into the Mohlosane river should be avoided	2	2	1	2	1	10	Low	68.8
										Sheet runoff from access roads should be slowed down by the strategic placement of berms								

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
	off on hard surfaces, possible erosion and pollution which may result in habitat changes to the drainage lines									Soils must be managed according to the management measures detailed under soils land use and land capability and should include erosion / run-off control for construction phase Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact Monitor all areas outside of the development footprints for erosion and incision								
	Pollution of water resources due to increased run off from hard polluted surfaces: Surface impacts (such as excavation for foundations of the M3C) 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 (specifically the Mohlosane River).	-	4	2	2	8	3	**48**	**Moderate**	Sheet runoff from access roads should be slowed down by the strategic placement of berms Soils must be managed according to the management measures detailed under soils land use and land capability and should include erosion / run-off control for construction phase Monitor all areas outside of the development footprints for erosion and incision	2	2	2	4	2	**16**	**Low**	66.7
Construction impacts applicable to the proposed construction of the Debottlenecking Plant at the South Concentrator																		
Surface water	Contamination of the Groot Sandsloot River due to erosion, spillages and accidental discharges at the crossings	-	4	2	1	6	3	**36**	**Moderate**	Monitor all areas outside of the development footprints for erosion and incision Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event Emergency action plans should be developed to deal with spillages Adhere to the applicable requirements and conditions specified in the WUL	2	2	4	4	2	**20**	**Low**	44.4
Biodiversity	The habitat at the site is already modified and therefore the upgrade of the MSC is not anticipated to have a significant impact on the habitat in the area	-	4	2	1	2	1	**20**	**Low**	Where possible, rehabilitate exposed areas during construction to promote vegetation growth Removal of alien and weed species must take place in accordance with existing legislation process and procedures	2	2	1	2	1	**10**	**Low**	50.0
	Vegetation is severely modified in this area and therefore very little impact is expected on the natural vegetation.	-	4	2	1	6	4	**36**	**Moderate**	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees Removal of alien and weed species must take place in accordance with existing legislation process and procedures	3	2	1	4	2	**21**	**Low**	41.7
	Due to the loss of vegetative cover and topsoil protection in MSC areas, possible erosion, the permanent loss of resource downslope/downstream and impact of sedimentary load on streams and river systems could occur. 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**	All development footprint areas and areas affected by the proposed development should remain as small as possible Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact The mines existing procedures must be followed for the management of oil/diesel leaks	2	2	1	4	1	**14**	**Low**	61.1
Construction impacts applicable to the proposed construction the Blinkwater 2 TSF																		
Groundwater	Construction of Blinkwater 2 TSF - shallow contaminated seepage from unlined Blinkwater TSF with trafficability/construction problems	-	3	2	2	4	2	**24**	**Low**	Development and implementation of scavenger wells planned around the TSF Develop and implement appropriate groundwater monitoring programme monitoring the effectiveness of scavenger wells and if not effective evaluate other alternatives.	3	1	1	2	1	**12**	**Low**	50.0

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
	Construction of Blinkwater 2 TSF - Loss of shallow groundwater resources along Mohlosane River bed and BWSD pond	-	4	5	2	4	4	**44**	**Moderate**	Design of Blinkwater 2 TSF must investigate the diversion of the Mohlosane River channel around the footprint of Blinkwater 2 TSF to effectively separate clean and dirty water Consideration to be given to the feasibility of a sub-surface drain below the liner/barrier system to capture clean groundwater and prevent it from being contaminated from the unlined Blinkwater TSF	2	5	2	2	1	**18**	**Low**	59.1
Noise	Construction activities resulting in noise generation from machinery and construction staff	-	3	2	1	4	2	**21**	**Low**	Construction activities may be carried out during the day and night time provided that the prevailing ambient noise levels at the boundary of the mine is not exceeded When the prevailing ambient noise is exceeded such activities will have to be acoustically screened off.	2	3	2	4	2	**18**	**Low**	14.3
Surface water	Impact on the Mohlosane river due to increased erosion from areas of exposed soils which could potentially flow into the Mohlosane river to the south of the Blinkwater 2 TSF	-	4	1	2	6	3	**36**	**Moderate**	Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area Where practical activities should be limited to months of low rainfall (dry season) to reduce probability of potential impact Erosion control measures in the form of temporary erosion prevention berms should be implemented during construction. Areas disturbed by construction activities should be rehabilitated immediately on completion of construction of each area	2	4	2	2	2	**16**	**Low**	55.6
	Contamination of the Mohlosane River from potential hydrocarbon spills from construction machinery	-	4	1	3	6	2	**40**	**Moderate**	Contaminated runoff should be contained and reused as necessary e.g. for dust suppression Emergency action plans should be developed to deal with spillages Contractors should be made aware of the WUL conditions that apply during construction and made liable for environmental damages caused by spillages	2	2	4	4	2	**20**	**Low**	50.0
Biodiversity	In general, the habitat is under threat, especially where the road and berm act as a cut-off of surface flow to the wetland – this include the impacts to water resources east of the N11 that have a direct impact on flow to the areas downstream of the road	-	5	2	3	8	4	**65**	**High**	All development footprint areas and areas affected by the proposed development should remain as small as possible and should not encroach onto surrounding sensitive areas and the associated buffer zones (Refer to Section 29.1.3) The boundaries of the development footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas All sensitive areas outside the construction area must be kept off-limits to construction vehicles and personnel Future mine planning should ensure that mining activities do not lead to a reduction of stream flow or dewatering of any riparian features and connectivity of the riparian features in the vicinity of the mining activities should be maintained	5	2	3	6	4	**55**	**Moderate**	15.4
	Pollution of water resources due to increased run off from hard polluted surfaces: Surface impacts due to the construction of the Blinkwater 2 TSF has the potential to lead to contamination of freshwater resources due to chemicals/ hydrocarbons contamination and/or increased sedimentation.	-	5	2	3	8	4	**65**	**High**	Sheet runoff from access roads should be slowed down by the strategic placement of berms; Implement the soils utilisation plan as detailed in section 18.4.1 Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact Monitor all areas outside of the development footprint for erosion and incision.	5	2	3	6	2	**55**	**Moderate**	15.4
	The wetland in this area is under continuous pressure from flow modification, habitat modification and pollution		5	2	1	10	4	**65**	**High**	The boundaries of the development footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas Implement wetland protection measures included in the WUL	5	2	4	6	4	**60**	**High**	7.7

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
Social	Loss of natural and cultural heritage Loss of cultural heritage due to the construction of the Blinkwater 2 TSF	-	4	4	2	8	4	56	Moderate	Local residents should be consulted to inform mitigation measures when addressing any potential impact on cultural heritage sites or graves, including intangible heritage such as cultural rites, initiation or circumcision Mitigation measures recommended in the Heritage Impact Assessment Study to be implemented Implement the existing chance finds procedure to deal with how to protect graves and heritage sites accidentally unearthed during construction	3	2	2	4	3	24	Low	57.1
Construction impacts applicable to the proposed construction of the Buffer Dam																		
Groundwater	Construction of new Buffer Dam may result in possible long term impacts to groundwater from seepage	-	3	3	3	4	3	30	Moderate	Undertake necessary classification of the cumulative waste streams that will be stored in buffer dam Design and implement appropriate barrier system pending classification (Refer to Section 6.2.1 for details regarding the barrier system) Implement scavenger well design to include wells to capture seepage in case of leakage, downgradient of Buffer Dam Implement ground water monitoring programme as per the requirements of the WUL	2	3	2	2	1	14	Low	53.3
Biodiversity	The habitat and natural habitat at this where the buffer dam will be located is modified due to current mining activities, roads, dumping of refuse and the extensive top soil stockpile area. The natural vegetation is modified and although good basal cover is noted to the west of the site, it is dominated by pioneer species in the basal and woody layers, including some alien invasive species . Construction activities will have an impact on the vegetation	-	5	2	1	8	4	55	Moderate	Where possible, rehabilitate exposed areas during construction to promote vegetation growth Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	2	1	6	3	45	Moderate	18.2
	The water resources may be impacted as a result of potential seepage and increased runoff from hard surfaces	-	5	2	2	6	4	50	Moderate	Where practical activities should be limited to months of low rainfall (dry season) to reduce probability of potential impact Limit the footprint area of the proposed infrastructure to as small as possible.	5	2	2	4	4	40	Moderate	20.0
	Potential impact on water quality impact may be on a local and regional level for both the surface and groundwater resources	-	5	2	3	6	4	55	Moderate	Construct paddocks downstream of the working activities to minimise uncontrolled runoff from the site Minimise the area that are to be stripped of vegetation and construct upstream bunds upstream of the construction site. The mines existing procedures must be followed for the management of oil/diesel leaks	5	2	3	4	3	45	Moderate	18.2
Construction impacts applicable to the proposed construction of the North Waste Rock Dump and ore stockpiles																		
Groundwater	Construction of NWRD may lead to possible long term impacts due to presence of possible permeable structures within proposed footprint	-	5	5	3	8	4	80	High	Prior to final technical design and construction of Waste Rock Dump, investigate the extent, depth and permeability of the NM and Drenthe Faults (geophysics and drilling) which have been delineated within the proposed footprint and extrapolated link to the Witrivier Pending the outcome of this investigation, finalise technical design and specifications. Should the design specification change significantly, obtain approval from DWS - Civil Design Implement clean water/dirty water infrastructure to contain dirty water runoff from the waste rock dump in appropriately	5	2	2	2	1	30	Moderate	62.5

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation P	D	E	M	LoR	Significance		Mitigation Measures	Significance of potential impact AFTER mitigation P	D	E	M	LoR	Significance		Degree of mitigation (%)
										designed facility as detailed in the NWRD design report and according the requirements of the WUL								
										Implement ground water monitoring programme as per the requirements of the WUL								
										Optimise blasting procedures to minimise explosive residues								
Surface water	Contamination of the Witrivier from potential hydrocarbon spills from construction machinery	-	2	2	1	2	2	**10**	**Low**	Contaminated runoff should be contained and reused as necessary e.g. for dust suppression	2	2	4	4	2	**20**	**Low**	50.0
										Hazardous substances and potentially polluting materials should be stored in appropriately bunded areas located outside of the riparian zone								
Biodiversity	Changes to habitat due to construction activities resulting in loss of vegetation and increased runoff and erosion	-	5	2	1	8	3	**55**	**Moderate**	Where possible, rehabilitate exposed areas during construction to promote vegetation growth	5	2	1	6	3	**45**	**Moderate**	18.2
	Loss of natural vegetation due to clearance during construction	-	5	2	1	8	4	**55**	**Moderate**	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	2	1	6	3	**45**	**Moderate**	18.2
	Impacts to water resources due to increased runoff, siltation and erosion.	-	5	2	2	6	4	**50**	**Moderate**	Construct paddocks downstream of the working activities to minimise uncontrolled runoff from the site	5	2	2	4	4	**40**	**Moderate**	20.0
										Minimise the area that are to be stripped of vegetation and construct upstream bunds upstream of the construction site.								
										The mines existing procedures must be followed for the management of oil/diesel leaks								
Social	Reduction in the environmental amenity value - reduced access to cultural ecosystem services due to conversion of land use and additional visual impact due to the construction of the NWRD.	-	4	5	2	8	4	**60**	**High**	Develop a management plan to address situations where land currently used by communities, within the mining and surface lease areas, will be lost due to the proposed project activities. The management plan should ensure that there is no net negative impact on the land user	4	5	2	6	4	**52**	**Moderate**	13.3
										Facilitate informed participation of all affected persons. Consultation to continue through the implementation, monitoring and evaluation phases								
										AAP must communicate their grievance mechanism to the affected persons in order to address concerns raised by affected parties								
										Take into account surrounding land uses and design post-mining land use options to support and enhance long-term development options								
	Availability and access to water: Due to the construction of the NWRD, contamination of the Witriver from potential hydrocarbon spills from construction machinery Reduced availability of water to downstream water users due to changes in water quality and mean annual rainfall	-	4	4	3	10	5	**68**	**High**	Hydrocarbon spills from vehicles must be cleaned immediately	4	4	2	6	3	**48**	**Moderate**	29.4
										Hazardous substances and potentially polluting materials should be stored in appropriately bunded areas located outside of the riparian zone								
										During normal operation dirty water should be contained as specified in the design report and as per the requirements of the WUL								
										Paddocks should be constructed to minimise uncontrolled runoff from the site entering the clean water system								
										Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact								
										Emergency action plans should be developed to deal with spillages								

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
										Contractors should be made aware of the WUL conditions that apply during construction and made liable for environmental damages caused by spillages								
										Contaminated runoff should be contained and reused as necessary e.g. for dust suppression								
										Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area								
Construction impacts applicable to the proposed construction of the Contractors Camp																		
Heritage	Impact on possible heritages sites	-	3	5	3	8	3	**48**	**Moderate**	Prior to the commencement of the construction phase, an appropriately qualified archaeologist must undertake a heritage assessment at the site where the contractors camp will be situated.	2	5	2	4	2	**22**	**Low**	54.2
										If any heritage sites are identified it must be managed according to the specific requirements detailed in the management measures								
Biodiversity	Impact on habitat during the construction of the temporary contractors camp	-	5	2	1	4	3	**35**	**Moderate**	Where possible, rehabilitate exposed areas during construction to promote vegetation growth	5	2	1	2	3	**25**	**Low**	28.6
	Impact on habitat during the construction of the temporary contractors camp	-	5	2	1	4	4	**35**	**Moderate**	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	2	1	4	3	**35**	**Moderate**	0.0
	Impacts on water resources moderate to high – runoff and pollution if not captured and recycled	-	5	2	2	4	4	**40**	**Moderate**	Construct paddocks downstream of the working activities to minimise uncontrolled runoff from the site	5	2	2	2	4	**30**	**Moderate**	25.0
										Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact								
										The mines existing procedures must be followed for the management of oil/diesel leaks								
										A biodiversity specialist must assess the area of the final location of the temporary contractors camp prior to the commencement of the construction								
Construction impacts applicable to the proposed construction of the Contractors' Laydown Area																		
Biodiversity	Habitat is severely modified over the larger area – current activities and changes for the proposed activities	-	5	2	1	4	3	**35**	**Moderate**	Where possible, rehabilitate exposed areas during construction to promote vegetation growth	5	2	1	2	3	**25**	**Low**	28.6
	The natural vegetation is modified, although some basal and woody cover to the south is present – mostly pioneers species with low diversity and numbers of the climax species	-	5	2	1	6	4	**45**	**Moderate**	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	2	1	4	3	**35**	**Moderate**	22.2
	The water resources will be impacted by the runoff water – potentially high pollution from soils, sediments, fuels and oil	-	5	2	2	6	4	**50**	**Moderate**	Construct paddocks downstream of the working activities to minimise uncontrolled runoff from the site	5	2	2	4	4	**40**	**Moderate**	20.0
										Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact								
	Impact on the water quality due to increase in water runoff potentially containing soils, sediments, fuels and oil	-	5	2	3	8	4	**65**	**High**	The mines existing procedures must be followed for the management of oil/diesel leaks	5	2	3	6	3	**55**	**Moderate**	15.4
Construction impacts applicable to the proposed construction of the Workshop Expansion and Change house																		
Biodiversity	The expansion will have limited impact on the general habitat in the area but clearance activities for construction will impact on whatever remaining habitats occur at this site	-	5	2	1	8	3	**55**	**Moderate**	Where possible, rehabilitate exposed areas during construction to promote vegetation growth	5	2	1	8	3	**55**	**Moderate**	0.0

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
	Very little natural vegetation remains however clearance for construction will impact on whatever remaining vegetation exists	-	5	2	1	4	5	35	Moderate	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	2	1	4	3	35	Moderate	0.0
	Main threat to water resources – runoff off from potentially polluted areas due to hydrocarbon spillages from construction machinery	-	5	2	3	8	4	65	High	Construct paddocks downstream of the working activities to minimise uncontrolled runoff from the site Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact The mines existing procedures must be followed for the management of oil/diesel leaks	5	2	2	6	4	50	Moderate	23.1
	Impact on water quality from runoff off from potentially polluted areas due to hydrocarbon spillages from construction machinery	-	5	2	3	10	5	75	High		5	2	3	8	3	65	High	13.3
<u>Construction impacts applicable to the proposed construction of the Groot Sandsloot River diversion</u>																		
Surface water	Deterioration in surface water quality due to spillages and accidental discharges into the Sandsloot (Pholotsi) from vehicles	-	2	3	2	4	3	18	Low	Contractors should be made aware of the WUL conditions that apply during construction and made liable for environmental damages caused by spillages	2	4	2	2	2	16	Low	-12.5
	Increased erosion from areas of exposed soils in the Sandsloot diversion	-	4	2	1	6	3	36	Moderate	Vegetation clearing activities will be restricted to the demarcated infrastructure footprint area Erosion control measures in the form of temporary erosion prevention berms should be implemented during construction. Areas disturbed by construction activities should be rehabilitated immediately on completion of construction of each area Where practical activities should be limited to months of low rainfall (dry season) to reduce probability of potential impact All machinery and substances used on the site will be checked for leaks and otherwise properly maintained. Where leaks are found immediate action must be taken to stop the leaks. All contamination from leaks will be immediately removed and remediated. The river diversion will be developed in accordance with the design report submitted as part of the WUL The River diversion will be properly constructed and water will be returned to the natural course of the river immediately downstream of the construction site Paddocks should be constructed to minimise uncontrolled runoff from the site entering the clean water system The groundwater and surface water quality monitoring programme will continue in line with requirements of the Water Use Licence	3	2	1	4	2	21	Low	41.7
Biodiversity	The habitat is modified by the proximity of the mine pit and rock dump on the banks of the river and diversion of the river will further impact on the habitat. To an extent the whole river channel and associated flood plain will be lost with the development of the diversion	-	5	2	2	10	4	70	High	Where possible, rehabilitate exposed areas during construction to promote vegetation growth	5	2	2	8	3	60	High	14.3
	The development of the river diversion will have a negative impact on the river habitat and to an extent on the vegetation. The erosion of sediments (alluvial clay material) from the rock dump has modified the soils on the right-hand bank. These deposits have changed the vegetation composition and the *Grewia vernicosa* dominate of this material	-	5	2	2	8	5	60	High	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees If possible, relocate protected species once a permit has been obtained for its removal	5	2	2	6	3	50	Moderate	16.7

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
	Impact to Water resources - construction activities can lead to erosion and compacted areas will lead to increased runoff	-	5	2	3	8	4	65	High	Hydrocarbon spills from vehicles must be cleaned immediately Minimise the area that are to be stripped of vegetation and construct upstream bunds upstream of the construction site. The mines existing procedures must be followed for the management of oil/diesel leaks	5	2	3	6	4	55	Moderate	15.4
	Impact to Water quality - construction activities can lead to erosion and compacted areas will lead to increased runoff	-	5	2	3	10	5	75	High	Hazardous substances and potentially polluting materials should be stored in appropriately bunded areas located outside of the riparian zone	5	2	3	8	3	65	High	13.3
Social	Availability and access to water: Due to the construction of diversion. Reduced availability of water to downstream water users due to changes in water quality and mean annual rainfall Deterioration of surface water quality due to erosion, spillages and accidental discharges at the crossings Potential flooding of existing crossing especially culverts Deterioration in surface water quality due to spillages and accidental discharges	-	4	4	3	10	5	68	High	During normal operation dirty water should be contained as specified in the design report and as per the requirements of the WUL Paddocks should be constructed to minimise uncontrolled runoff from the site entering the clean water system Where practical construction should take place in the low flow period (dry season) to reduce probability of potential impact Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event Emergency action plans should be developed to deal with spillages Contractors should be made aware of the WUL conditions that apply during construction and made liable for environmental damages caused by spillages Contaminated runoff should be contained and reused as necessary	4	4	2	6	3	48	Moderate	29.4

The table below list the main project related activities that will be undertaken during the operational phase of the proposed project.

Operation	Operation of the infrastructure associated with the Expansion Project and general project related infrastructure, 24 hours, 7 days per week provided that the prevailing ambient noise levels at the boundary of the mine is not exceeded
	Deposition of tailings onto the Blinkwater 2 TSF:
	Deposition of waste rock on the NWRD:
	Storage of water, in the buffer dam, from the open pit, treated sewage effluent from the Polokwane and Mokopane Sewage Treatment Plants, via an extension to the existing pipeline system, return water from the Mogalakwena Mine TSF's including the proposed Blinkwater 2 TSF and runoff water collected within the plant and mining areas.

Table 18-7: Operational impacts applicable to all the proposed expansion activities

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
Air Quality	Dust generation potentially resulting in nuisance and health effects on nearby receptors due to materials handling, vehicle entrainment of dust on the haul roads and windblown dust.	-	3	4	2	4	2	30	**Moderate**	Treat road surfaces within the mine boundary to suppress dust entrained by vehicles. Surface treatment of roads should also be considered before and after a sensitive receptor	2	4	1	2	1	14	**Low**	53.3
										Use dust suppression techniques such as wet suppression or chemical suppression (must be environmentally friendly and non-polluting) to reduce dust on roads that exhibit an increase of dust emitted from the entrainment of dust								
										Ensure that the minimum moisture content is maintained through process to lower dust emissions								
										Design road alignments to minimise travel distances and eliminate unnecessary traffic;								
										Speed limits within the mine should be adhered to for both treated haul roads and unpaved roads								
										Where necessary rock cladding on the boundary of the WRD to lower the possibility of wind erosion								
										Attend to dust control when off-loading trucks at the crusher by minimising drop heights and prevention of over loading								
										Limit load size to reduce spillage and cover final product loads with tarpaulins where needed;								
										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								
										Continuation of routine emissions and ambient air quality monitoring program to determine whether there are any significant increases in emissions and impacts at sensitive receptors								
Groundwater	Reduction in groundwater quantity (real or perceived) due to increased ingresses and the dewatering (active and passive) of the mining pit area voids which will be deeper and larger	-	5	4	3	6	3	65	**High**	Undertake door to door hydro census annually within 1 km radius to identify and quantify groundwater users in close proximity to the mine	5	4	3	4	3	55	**Moderate**	15.4
										Consider installing monitoring boreholes within communities with real time data loggers to quantify localised drawdown due to increasing usage from community boreholes								
										Develop a dewatering strategy to harvest the clean water around the pit area prior to mining to prevent the groundwater from becoming contaminated should it end up as fissure water in the pit								
										Update numerical flow model with data and update dewatering strategy to correlate with the mine plans and schedule								
										The monitoring network must be consistent with mine development and as monitoring boreholes are mined out they must be replaced to ensure that there are always monitoring points between the mine pits and potential groundwater users in the communities								

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
	Pollution to groundwater as a result of the use, handling, transport and storage of hazardous materials (hydrocarbons & chemicals)	-	3	4	2	4	2	30	Moderate	Prevent spillages of any hazardous materials during the use, handling, transportation and storage thereof during all activities Implementation and maintenance of awareness and training programme	3	2	2	2	1	18	Low	40.0
	Deterioration of groundwater quality and quantity due to densification of informal settlements surrounding mine.	-	5	5	4	8	4	85	High	Maintain an effective groundwater monitoring programme Update of groundwater flow and transport model Maintain and update scavenger well plan Maintain and update dewatering plan Maintain and update the stormwater management plan Undertake an annual hydro census within 1 km radius to quantify impacts of densification on groundwater resources	4	5	3	6	3	56	Moderate	34.1
Noise	Increase traffic along the access roads to the mine		3	4	2	2	2	24	Low	Traffic noise limit at the mine to be adhered to at all times.	2	5	2	4	2	22	Low	8.3
	Noise generated by the operational activities associated with and the operation of the various Expansion activities		3	4	2	6	2	36	Moderate	All noise sources exceeding 85.0dBA to be identified and if practical to be acoustically screened off Noise survey to be done on a quarterly basis and after one year to change to an annual basis if the prevailing ambient noise level at the boundaries of the debottlenecking plant is within the threshold value of 70.0dBA.	3	4	2	4	2	30	Moderate	16.7
Visual	Visual impact associated with operating of the Proposed Expansion Project infrastructure and activities	-	2	3	2	2	1	14	Low	Adhere to the air quality management measures provided in the air quality section Plant vegetation such as trees and shrubs on periphery of villages directly next to the mine to provide a screen/buffer of direct views towards the plants Point lighting inwards and not to villages to avoid nocturnal impacts Natural vegetation, wherever possible, should be retained on and around the mine property as well as along the boundary of the mine	2	2	2	2	1	12	Low	14.3
Soils, Land Use and Land Capability	Continued loss of soil resource and its utilisation potential for all areas covered by infrastructure and operational areas	-	5	5	2	10	5	85	High	Minimise footprint and restrict area of impact to as small an area as practical and manage all stockpiles of stripped soil for erosion and contamination Maintain management measures for the identified impacts of dirty water and dust generation Implement the soils utilisation plan as detailed in section 18.4.1	5	5	2	8	5	75	High	11.8
	Loss of resource due to unprotected overland flow of dirty water (suspended solids and possible hydrocarbons/reagents) and erosion of soils by water and/or wind - potential for off site (downstream and downwind) contamination/impacts by dust and dirty water.	-	5	5	3	8	5	80	High	Manage stockpiles and berms for vegetative cover to restrict erosion, and maintain and manage stormwater control systems to prevent erosion and ingress of dirty water	5	4	2	4	3	50	Moderate	37.5
	On-going loss of soil utilisation potential from unprotected stockpiles and in-situ sites due to leaching of nutrient stores (inclusive of organic carbon stores).	-	5	4	2	8	4	70	High	On-going monitoring and maintenance of vegetative cover/rock cladding to all material stockpiles and berms, concurrent rehabilitation of all non-essential or disused areas, and the maintenance of stormwater control systems	3	4	2	4	2	30	Moderate	57.1
	Continued loss of soil utilisation due to contamination from spillage of raw product or reagents from vehicles and conveyancing systems, mechanical infrastructure	-	5	4	2	8	4	70	High	On-going management and control (auditing and monitoring) of vehicle maintenance, movement (access and haulage ways) and the covering to loads of raw materials and by-product during transportation	3	4	2	4	2	30	Moderate	57.1

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
										Minimisation or prevention of spillage from waste delivery, pipelines and conveyancing systems and haulage, and controlled maintenance of vehicles								
Surface water	Reduced availability of water to downstream water users due to changes in water quality	-	3	4	3	6	2	39	Moderate	During normal operations dirty water should be contained in (pollution control dams) PCDs designed to handle the 1:50 year event and enable settlement of solids in the contained water prior to reuse Dirty water should be contained in pollution control or return water dams designed to enable settlement of solids and handle the 1:50 year event with a minimum freeboard of 0.8 metres above full supply level. Stockpile areas are also lined with concrete to reduce seepage to the groundwater and have channels associated with them to divert dirty water to the new PCD for the M3C	2	4	4	4	2	24	Low	38.5
	Potential flooding of existing crossing especially culverts	-	3	3	2	6	2	33	Moderate	Maintain stormwater culverts at watercourse crossings	2	3	2	4	2	18	Low	45.5
Biodiversity	Pollution of water resources due to increased run off from hard polluted surfaces: Surface impacts (permanent placement of infrastructure) 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.	-	4	4	1	6	1	44	Moderate	Maintenance of berms to managed runoff from access roads Implement the soils utilisation plan as detailed in section18.4.1 Monitor areas outside of the development footprints for erosion and incision	2	4	1	4	1	18	Low	59.1
	Impact to water quality due to increased runoff from hard unvegetated areas in and around the infrastructure areas	-	4	4	2	8	4	56	Moderate	Implement the soils utilisation plan as detailed in section 18.4.1	3	4	2	6	2	36	Moderate	35.7
	Lack of the presence of vegetation during the operational phase as a result of the placement of the Expansion project infrastructure	-	3	4	1	8	3	39	Moderate	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	3	4	1	6	3	33	Moderate	15.4
	Habitats will continue to be modified/lost during the operational phase as a result of the placement of the infrastructure	-	4	4	1	6	3	44	Moderate	Ensure that the footprint areas of the water management infrastructure are kept as small as possible and does not encroach further upon the wetland zone or associated buffer zones, where possible.	4	4	1	4	3	36	Moderate	18.2
	Areas with spoils will allow penetration of water into the groundwater which could result in pollution to groundwater	-	4	4	3	8	4	60	High	The footprint and daily operation of the proposed infrastructure must be strictly monitored to ensure that footprint creep and edge effects does not affect the surrounding natural habitat	3	4	3	4	2	33	Moderate	45.0
	Impact on the faunal diversity due to the permanent placement of the Expansion project infrastructure	-	4	4	2	4	4	40	Moderate	Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development No indiscriminate driving through the veld and undisturbed areas should be 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 regular basis in order to locate and remove snares and traps Where practical allow for faunal species to move through fences	3	4	2	4	2	30	Moderate	25.0
Social	<u>Insufficient essential services throughout the project life cycle:</u> The mine together with local government need to agree on an approach to respond or assist with developing areas of need such as the requirement for more schools/training facilities and health care facilities and	-	4	4	3	6	4	52	Moderate	Where possible, AAP should endeavor to avoid or minimise transmission of communicable diseases that may be associated with the influx of temporary or permanent project labour and should develop an Influx Management Plan to reduce this. The necessary safety precautions should be taken, and first aid supplies should be made available on site	3	3	2	4	3	27	Low	48.1

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
	assistance in decreasing the HIV/AIDs rate in the community.									All project employees (including contractors) should undergo health, environment and safety training on induction and thereafter on a regular basis								
	<u>Social networks</u> There is a likelihood that job seekers will move into the study area and seek accommodation in the villages located near the mine. 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	3	6	2	33	Moderate	AAP should consider undertaking a Community Health and Safety Impact Assessment in line with Anglo American Standards and Policies	2	2	2	4	1	16	Low	51.5
										Provide clear expectations in all platforms of communication of the number of jobs available and in what categories or fields of the mine. This would allow a clear indication of what types of jobs would be available.								
										Provide clear indications of the requirements and processes involved in recruitment processes								
	<u>Social differentiation and inequality</u> Infrastructure and expansions Competition over scarce resources such as employment and procurement opportunities leading to social differentiation and conflict	-	4	4	3	10	4	68	High	AAP must ensure that management practises do not exploit or exacerbate the level of mistrust or conflict within the different community groups	4	3	2	8	4	52	Moderate	23.5
										AAP should ensure that employment and procurement policies are clearly communicated and implemented in a transparent manner								
										Communities must be engaged on fair and transparent terms whilst respecting traditionally and democratically appointed leadership within the community								
										Communities should furthermore be informed and educated about the various ways in which AAP contributes to socio-economic development, not only within their own communities, but also through contributions towards their SLP goals, CSI as well as taxation								
										Communities should be capacitated through inter alia Zimele programme to obtain training and entrepreneurial skills which will allow them to gain opportunities through AAP initiatives or procurement processes								
	<u>Feelings in relation to the project</u> Infrastructure and expansions A lack of information is causing uncertainty and anxiety in terms of potential project impacts and benefits	-	4	3	3	8	4	56	Moderate	Ensure that current resourcing gaps within the SP team is assessed and sufficiently addressed to ensure appropriate engagement in line with impacts identified in the SIA including to ensure that all stakeholder concerns and inputs especially for vulnerable groups are taken into consideration	3	1	2	6	3	27	Low	51.8
										The SP team should receive additional training (i.e. International Association of Public Participation modules) to enhance communication techniques with the community. Where possible, members from the SP team should also be able to access counselling or the input from a psychologist to assist with conflict management training								
	<u>Waged labour or employment creation:</u> Infrastructure and expansions Limited employment creation | Job qualifications | Working conditions	-	2	2	2	4	4	16	Low	MM should consider reviewing their policies to ensure full compliance with Anglo American Standards and Policies. Specifically, consider updating its Contractor Social Management Procedure to align with this Project	4	3	2	6	2	44	Moderate	175.0
										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 SP Team at AAP can communicate with the leadership of each village in the surrounding villages and request that a database of services that they can provide be drawn up to submit to the mine. This can be relevant in the sourcing of skills from surrounding communities								
										Sourcing these employees should be undertaken in a coherent fashion and the purpose of the labour desk should be clarified.								

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
										The labour desk should either be given the mandate to source CVs from the local community, or MM must clearly communicate that they do not have the mandate, in which case the proper channel of submitting CVs should be communicated MM should continue to 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 AAP's recruitment policies which should promote the employment of local labour. Skills development for employees and community members wishing to obtain employment through the project should, include more than technical skills (e.g. Life skills training and financial literacy) Skills development opportunities for new recruits should be prioritised Support for local businesses through SMME development should be prioritised, 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 Continued participation of labour unions in Work Place Skills Plans and Annual Training Reports should be encouraged, and feedback provided to employees at mass meetings								
	Capacity building and skills transfer Infrastructure and expansions Lack in capacity building and perceived lack of support to local communities, especially women and youth to enable them to access opportunities at the mine	+	3	4	2	6	2	36	Moderate	AAP can consider providing proposal writing workshops as a part of the training and skills development programmes such that community members with small businesses can develop this skill, leading to a higher and more promising level of proposals received from the surrounding communities Skills development for employees and community members wishing to obtain employment through the project should, include more than technical skills (e.g. Life skills training and financial literacy) Skills development opportunities for new recruits should be prioritised Awareness should be created within the communities of the contribution that AAP makes to skills development and training opportunities Learnerships/internships at AAP should be considered for matriculants wishing to obtain work experience	4	4	3	8	1	60	High	-66.7
	Gender relations - insufficient women in the workplace: 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. 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 mine.	-	3	4	2	6	2	36	Moderate	MM's HR policy should 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 should take place to increase their participation in the labour force Continue the implementation of the management measures to ensure equitable remuneration packages for women and their male counterparts. Institute a well-designed gender equality strategy for the project Inform community members as to the motivation for AAP's gender policy and the benefits of such a policy	4	4	3	6	1	52	Moderate	-44.4
	Employee and community exposure to hazards and risks including hazardous materials and substances during the operation of the M3C and bulk ore sorter as well as associated gravel roads and main access roads	-	3	4	2	4	2	30	Moderate	Inform affected community about potential risks and impacts from the project activities in a culturally appropriate manner, including collaborating with the community and government agencies in their efforts	2	4	2	2	1	16	Low	46.7

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation P	D	E	M	LoR	Significance		Mitigation Measures	Significance of potential impact AFTER mitigation P	D	E	M	LoR	Significance		Degree of mitigation (%)
										Where possible, AAP should avoid or minimise the potential for community exposure to hazardous materials and substances that may be released by the project (i.e. contaminated water). AAP should also avoid or minimise the potential for community exposure to water-borne, water-based, water-related, and vector-borne diseases, and communicable diseases that could result from project activities by developing action plans to address these risks. For example, AAP should endeavor to avoid or minimise transmission of communicable diseases that may be associated with the influx of temporary or permanent project labour and should develop an Influx Management Plan to reduce this.								
										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, environment and safety training on induction and thereafter on a regular basis								
										Continuation of routine emissions and ambient air quality monitoring program to determine whether there are any significant increases in emissions and impacts at sensitive receptors								
	Increase in dust in the immediate vicinity of the mining activities Dust generated due to crushing activities at the Primary crusher and additional traffic and hauling vehicle traffic	-	4	4	3	8	4	60	**High**	Maintain the existing dust management/mitigation measures on-site. Should dust levels increase the management/mitigation measures should be reviewed to ensure dust levels remain below the respective standards	4	4	2	6	3	48	**Moderate**	20.0
										Adhere to the air quality management measures provided in the air quality section								
										Implement MM's social incident management procedure for the Project including the existing grievance procedures to capture community and stakeholder concerns and grievances regarding environmental impacts								
										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								
	Availability and access to water Establishment of the NWRD | Groot Sandsloot (Pholotsi) River diversion | North Concentrator and Sewage Treatment Plant | Blinkwater TSF Contamination of the Wit River from potential hydrocarbon spills from construction machinery | Reduced availability of water to downstream water users due to changes in water quality and mean annual rainfall | Deterioration of surface water quality due to erosion, spillages and accidental discharges at the crossings | Potential flooding of existing crossing especially culverts | Increased erosion from areas of exposed soils in the Groot Sandsloot River diversion | Deterioration in surface water quality due to spillages and accidental discharges | Reduced availability of water to downstream water users due to changes in water quality | Contamination of the Mohlosane River from potential hydrocarbon spills from construction machinery | Reduced availability of water to downstream water users due to dirty runoff from site reporting into Mohlosane River	-	4	4	3	10	5	68	**High**	Hydrocarbon spills from vehicles must be cleaned immediately	4	4	2	6	3	48	**Moderate**	29.4
										Hazardous substances and potentially polluting materials should be stored in appropriately bunded areas located outside of the riparian zone								
										During normal operation dirty water should be contained as specified in the design report and as per the requirements of the WUL								
										Paddocks should be constructed to minimise uncontrolled runoff from the site entering the clean water system								
										Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event								
										Emergency action plans should be developed to deal with spillages								
										Contaminated runoff should be contained and reused as necessary								
										Areas disturbed by activities should be rehabilitated immediately on completion of each area								

Aspect	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	LoR	Significance		P	D	E	M	LoR	Significance	
								AAP must communicate their grievance mechanism to the affected persons in order to address concerns raised by affected parties							
								Take into account surrounding land uses and design post-mining land use options to support and enhance long-term development options							

Table 18-8: Operational impacts applicable to the specific expansion activities

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
Operation phase impacts applicable to the proposed 3rd Concentrator																		
Groundwater	Potential contamination of shallow groundwater resources from the new PCD at concentrator due to long term liner integrity	-	5	4	2	6	2	60	**High**	Maintain groundwater monitoring program Update contaminant flow and transport model with monitoring data Pending spatial and temporal trend analysis, investigate and implement alternative mitigation measures if and when required	2	3	1	4	2	16	**Low**	73.3
Noise	Operational activities at the M3C and bulk ore sorter could increase the ambient noise levels	+	3	4	2	6	2	36	**Moderate**	All noise sources exceeding 85.0dBA to be identified and if practical to be acoustically screened off	3	4	2	4	2	30	**Moderate**	16.7
	Primary crushing activities could increase the noise levels at the noise receptors in close proximity to the M3C	-	3	4	2	6	2	36	**Moderate**	Noise survey to be done on a quarterly basis and after one year to change to an annual basis if the prevailing ambient noise level at the boundaries of the debottlenecking plant is within the threshold value of 70.0dBA.	3	4	2	4	2	30	**Moderate**	16.7
	Pumping activities associated with the water reticulation system could increase noise levels	-	3	4	2	2	2	24	**Low**	The activities to be managed and the noise from the pumps may not exceed the threshold value of 70.0dBA at the boundary of the mine.	2	4	2	2	2	16	**Low**	33.3
Biodiversity	The operation of the M3C, bulk ore sorter and sewage plant will lead to continued loss of floral diversity and floral endemics as a result of long-term habitat loss.	-	3	4	2	4	2	30	**Moderate**	Ensure that the footprint area of the expansion infrastructure is kept as small as possible Rehabilitate any open spaces in the footprint area and re-vegetate with indigenous grass and indigenous trees	2	2	1	2	1	10	**Low**	66.7
Operation phase impacts applicable to the proposed Debottlenecking Plant at the South Concentrator																		
Biodiversity	Habitats will continue to be modified during the operational phase	-	4	4	1	6	3	44	**Moderate**	Rehabilitate any open spaces in the footprint area and re-vegetate with grass and indigenous trees	4	4	1	4	3	36	**Moderate**	18.2
	Lack in the presence of natural vegetation will continue in the operational phase	-	3	4	1	8	3	39	**Moderate**	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	3	4	1	6	3	33	**Moderate**	15.4
	Impact on water resources due to runoff from disturbed areas	-	4	4	2	6	2	48	**Moderate**		3	4	2	4	2	30	**Moderate**	37.5
	Impacts on water quality of surrounding resources due to potential polluted run-off from operational areas	-	4	4	2	8	4	56	**Moderate**	Ensure that the footprint areas of the water management infrastructure are kept as small as possible and does not encroach further upon the wetland zone or associated buffer zones, where possible.	3	4	2	6	3	36	**Moderate**	35.7
	Impacts on groundwater are high due to areas where spoils are present, which will promote penetration	-	4	4	3	8	4	60	**High**	Maintain groundwater monitoring program	3	4	3	4	3	33	**Moderate**	45.0
Operation phase impacts applicable to the proposed Blinkwater 2 TSF																		
Groundwater	Potential contamination of shallow groundwater resources from extension of Blinkwater TSF, buffer dam and new PCD at the 3rd Concentrator due to long term liner integrity, as well as the effectiveness of the preparation of the base of the North Waste Rock Dump	-	5	4	2	6	2	60	**High**	Maintain groundwater monitoring program Update contaminant flow and transport model with monitoring data Pending spatial and temporal trend analysis, investigate and implement alternative mitigation measures if and when required Concurrent rehabilitation and intra-benching of the TSF as to reduce run-off	2	3	1	4	2	16	**Low**	73.3
	Contamination of groundwater due to seepage	-	3	4	3	6	2	39	**Moderate**	Develop a scavenger well management plan including borehole logs Quantify the effectiveness of scavenger wells in abstracting the seepage component using hydrochemistry with isotopes in a mass balance approach	1	4	3	4	1	11	**Low**	71.8

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
										Include boreholes in WUL if shown to be abstracting groundwater resources as well as seepage								
Noise	Operational activities at the Blinkwater 2 TSF and associated infrastructure could increase the ambient noise levels	-	3	4	2	6	2	36	**Moderate**	All noise sources exceeding 85.0dBA (pump/s along the pipeline) to be identified and if practical to be acoustically screened off. Noise survey to be done on a quarterly basis and after one year to change to an annual basis if the prevailing ambient noise level at the footprint boundaries are in line with the 70.0dBA threshold value	3	4	2	4	2	30	**Moderate**	16.7
Soils, Land Use and Land Capability	Continued loss of soil utilisation due to contamination from spillage of raw product, by-products (Tailings and waste rock) from pipelines and pumps, hydrocarbons and/or reagents from vehicles and conveyancing systems, mechanical infrastructure	-	5	4	2	8	4	70	**High**	On-going management and control (auditing and monitoring) of vehicle maintenance, movement (access and haulage ways) and the covering to loads of raw materials and by-product during transportation Minimisation or prevent of spillage from haulage, and controlled maintenance of vehicles Implement the soils utilisation plan as detailed in Section 18.4.1	3	4	2	4	2	30	**Moderate**	57.1
Surface water	Reduced availability of water to downstream water users due to dirty runoff from site reporting into Mohlosane River	-	3	4	3	6	2	39	**Moderate**	During normal operations dirty water should be contained in (pollution control dams) PCDs designed to handle the 1:50 year event and enable settlement of solids in the contained water prior to reuse Clean water diversions, designed to handle the 1:50 year storm event, should be constructed to divert water away from TSF and Workshop area and return it to the natural environment	2	4	4	4	2	24	**Low**	38.5
Biodiversity	Encroachment of the granite outcrops – as was indicated in 2011 and 2015 studies, these areas are important biodiversity "hot spots" and islands where all biota find refuge	-	5	4	3	8	4	75	**High**	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	4	4	3	6	4	52	**Moderate**	30.7
	Permanent vegetation loss due to clearing of the footprint for the TSF	-	5	4	3	8	4	75	**High**		4	4	3	6	4	52	**Moderate**	30.7
	In general, the habitat is under threat, especially where the road and berm act as a cut-off of surface flow to the wetland – this include the severe impacts to water resources east of the N11 that have a direct impact on flow to the areas downstream of the road	-	5	4	3	10	3	85	**High**	Implement wetland protection measures detailed in section 14.10.1 and the WUL and implement remedial measures in areas within the mining right where erosion is occurring.	4	4	3	8	4	60	**High**	29.4
	Reduction in water quality due runoff and pollution to the wetland	-	5	4	2	8	4	70	**High**	Rehabilitate any open spaces in the footprint area, re-vegetate with indigenous grass and indigenous trees	4	4	2	6	4	48	**Moderate**	31.4
	The development will expose more open soils and create hard surfaces that will result in increased runoff and therefore a decrease in localised infiltration of water.	-	5	4	2	8	4	70	**High**	Rehabilitate flows to the site, manage areas of identified erosion, and vegetate exposed soils within the footprint area	4	4	2	6	4	48	**Moderate**	31.4
	The wetland in this area is under continuous pressure from flow modification, habitat modification and pollution		5	4	1	10	5	75	**High**		4	4	1	6	4	44	**Moderate**	41.3
Visual	Visual impact associated with the operation of the TSF	-	5	4	2	4	2	50	**Moderate**	Undertake progressive rehabilitation of the TSF if practically possible Plant vegetation such as trees and shrubs on periphery of villages directly next to the proposed Blinkwater 2 TSF to provide a screen/buffer of direct views towards the proposed Blinkwater 2 TSF.	4	2	2	4	1	32	**Moderate**	36.0
Operation phase impacts applicable to the proposed Buffer Dam																		
Groundwater	Potential contamination of shallow groundwater resources from extension of Blinkwater TSF, buffer dam and new PCD at concentrator due to long term liner integrity, as well as the effectiveness of the	-	5	4	2	6	2	60	**High**	Maintain groundwater monitoring program and update contaminant flow and transport model with monitoring data Pending spatial and temporal trend analysis, investigate and implement alternative mitigation measures if and when required	2	3	1	4	2	16	**Low**	73.3

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
	preparation of the base of the North Waste Rock Dump																	
Noise	Increase in noise during the operation of the Buffer dam		3	4	2	2	2	24	Low	The activities (pumping of water) to be managed and the noise from the water pumps may not exceed the threshold value of 70.0dBA at the boundary of the mine.	2	4	2	2	2	16	Low	33.3
Surface water	Increased risk of flooding due to failure of the dam as a result of dam break	-	4	4	2	6	2	48	Moderate	The buffer dam has been designed to accommodate 1:50 year capacity with freeboard of 0.8 m. Operation of the dam must be in line with the design levels	1	4	2	4	1	10	Low	79.2
Biodiversity	The habitat at this site is modified due to current mining activities, roads, dumping of refuse and the extensive soil dump	-	5	4	2	8	3	70	High	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	4	2	6	3	60	High	14.3
	No natural vegetation will be present due to the operation of the buffer dam where the footprint was cleared for the construction of the buffer dam	-	5	4	1	6	3	55	Moderate	Manage areas of identified erosion, and vegetate exposed soils within the footprint area	5	4	1	4	3	45	Moderate	18.2
	The water resources will be impacted – potential seepage and increased runoff from hard surfaces	-	5	4	2	6	3	60	High	Rehabilitate any open spaces in the footprint area and re-vegetate with indigenous grass and indigenous trees	5	4	2	4	2	50	Moderate	16.7
	Water quality impact on a local and regional level for both the surface and groundwater resources	-	5	4	3	8	3	75	High		5	4	3	4	3	55	Moderate	26.7
	The development will expose more open soils and create hard surfaces that will result in increased runoff and therefore a decrease in localised infiltration of water.	-	5	4	3	8	3	75	High	Ensure that the footprint area of the expansion section is as small as possible	5	4	2	6	3	60	High	20.0
Operation phase impacts applicable to the proposed North Waste Rock Dump																		
Groundwater	Potential contamination of shallow groundwater resources from as well as the effectiveness of the preparation of the base of the North Waste Rock Dump	-	5	4	2	6	2	60	High	Maintain groundwater monitoring program	2	3	1	4	2	16	Low	73.3
										Update contaminant flow and transport model with monitoring data								
										Pending spatial and temporal trend analysis, investigate and implement alternative mitigation measures if and when required								
										Concurrent rehabilitation and intra-benching of the WRD as to reduce run-off								
Noise	Noise generation due to the dumping of waste rock at the North waste rock dump		3	4	2	6	2	36	Moderate	The dumping of waste rock to be managed and the distance between the waste rock tipping area to be calculated for the prevailing ambient noise level at the residential areas not to be exceeded. 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 residential areas will not be exceeded	3	4	2	4	2	30	Moderate	16.7
Surface water	Reduced availability of water to downstream water users due to changes in water quality	-	3	3	2	4	3	27	Low	Paddocks should be constructed to minimise uncontrolled runoff from the site entering the clean water system	2	2	2	6	2	20	Low	25.9
	Sedimentation of paddocks and thereby reducing their capacity	-	3	2	2	6	2	30	Moderate	Paddocks must be monitored and cleared as needed	3	2	1	4	1	21	Low	30.0
	Increased risk of contamination due to WRD failure	-	3	1	2	8	1	33	Moderate	The facility must be designed to accommodate 1:50 year storm event.	1	5	1	4	1	10	Low	69.7
	Reduced availability of water to downstream water users due to changes in MAR	-	3	4	1	4	2	27	Low	Reduction of unoccupied footprint area which may alter catchment hydrology	1	4	2	4	1	10	Low	63.0
Biodiversity	The impacts to water resources will be moderate during operation – with regard to runoff, siltation and erosion	-	5	4	2	6	3	60	High	Rehabilitate any open spaces in the footprint area and re-vegetate with indigenous grass and indigenous trees	5	4	2	4	2	50	Moderate	16.7
	The impacts to water resources will be moderate during high – with regard to quality	-	5	4	3	8	3	75	High	Ensure that the footprint area of the expansion section is as small as possible	5	4	3	4	3	55	Moderate	26.7

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
	The development will expose more open soils and create hard surfaces that will result in increased runoff and therefore a decrease in localised infiltration of water.	-	5	4	3	8	3	75	High	Manage areas of identified erosion, and vegetate exposed soils within the footprint area	5	4	2	6	3	60	High	20.0
Visual	Visual impact associated with the operation of the WRD	-	5	4	2	4	2	50	Moderate	Undertake progressive rehabilitation of the WRD practically possible Plant vegetation such as trees and shrubs on periphery of villages directly next to the proposed TSF and WRD to provide a screen/buffer of direct views towards these structures.	4	2	2	4	1	32	Moderate	36.0
Social	<u>Dust and noise exposure</u> Tipping and hauling of waste rock to the northern waste rock dump | Crushing activities at the Primary crusher | Additional traffic and hauling vehicle traffic Increase in dust in the immediate vicinity of the mining activities	-	4	4	3	8	4	60	High	Maintain the existing dust management/mitigation measures on-site. Should dust levels increase the management/mitigation measures should be reviewed to ensure dust levels remain below the respective standards Adhere to the air quality management measures provided in the air quality section Implement MM's social incident management procedure for the Project including the existing grievance procedures to capture community and stakeholder concerns and grievances regarding environmental impacts 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	4	4	2	6	3	48	Moderate	20.0
	<u>Replacement cost of environmental functions</u> NWRD | TSF | Groot Sandsloot River diversion Reduced access to ecosystem services due to conversion of land use	-	4	4	2	8	4	56	Moderate	Develop a management plan to address situations where land currently used by communities, within the mining and surface lease areas, will be lost due to the proposed project activities. The management plan should ensure that there is no net negative impact on the land user Facilitate informed participation of all affected persons. Consultation to continue through the implementation, monitoring and evaluation phases AAP must communicate their grievance mechanism to the affected persons in order to address concerns raised by affected parties	4	4	2	6	3	48	Moderate	14.3
<u>Operation phase impacts applicable to the proposed Contractors Camp</u>																		
Biodiversity	Little additional impacts expected on vegetation as the site already severely modified from the previous activities	-	5	4	1	2	2	35	Moderate	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	4	1	2	3	35	Moderate	0.0
	Impacts on water resources due to runoff and pollution if not captured and recycled	-	5	4	2	6	3	60	High	Contaminated runoff must be contained and re-used	5	4	2	4	2	50	Moderate	16.7
	Impacts on water quality due to runoff and pollution if not captured and recycled	-	5	4	3	6	3	65	High		5	4	3	4	3	55	Moderate	15.4
	The development will expose more open soils and create hard surfaces that will result in increased runoff and therefore a decrease in localised infiltration of water.	-	5	4	3	6	3	65	High	Manage areas of identified erosion, and vegetate exposed soils within the footprint area	5	4	2	4	3	50	Moderate	23.1
	Impact on faunal diversity	-	4	4	2	4	2	40	Moderate	Where practical allow for faunal species to move through fences	4	4	2	2	2	32	Moderate	20.0
<u>Operation phase impacts applicable to the proposed Contractors' Laydown Area</u>																		

Aspect	Nature of the impact		Significance of potential impact BEFORE mitigation P	D	E	M	LoR	Significance		Mitigation Measures	Significance of potential impact AFTER mitigation P	D	E	M	LoR	Significance		Degree of mitigation (%)
Biodiversity	Habitat is severely modified over the larger area due to current activities Further impacts as part of the proposed activities	-	5	4	1	2	3	35	Moderate	Rehabilitate any open spaces in the footprint area and re-vegetate with indigenous grass and indigenous trees	5	4	1	2	3	35	Moderate	0.0
	The natural vegetation is modified, although some basal and woody cover to the south is present – mostly pioneers species with low diversity and numbers of the climax species	-	5	4	1	4	2	45	Moderate	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	4	1	2	2	35	Moderate	22.2
	The water resources will be impacted by the runoff water – potentially high pollution from soils, sediments, fuels and oil	-	5	4	2	6	3	60	High	Manage areas of identified erosion, and vegetate exposed soils within the footprint area	5	4	2	4	2	50	Moderate	16.7
	The water quality will be impacted by the runoff water – potentially high pollution from soils, sediments, fuels and oil	-	5	4	3	6	3	65	High	Contaminated runoff must be contained and re-used	5	4	3	4	3	55	Moderate	15.4
	The development will expose more open soils and create hard surfaces that will result in increased runoff and therefore a decrease in localised infiltration of water.	-	5	4	3	4	3	55	Moderate	Rehabilitate flows to the site, manage areas of identified erosion, and vegetate exposed soils within the footprint area	5	4	2	2	3	40	Moderate	27.3
Operation phase impacts applicable to the proposed Workshop Expansion and Change house																		
Noise	Increase in noise levels associated with workshop activities		3	4	2	2	2	24	Low	The workshop activities to be managed and the noise from the mechanical activities may not exceed the threshold value of 70.0dBA at the boundary of the mine.	2	4	2	2	2	16	Low	75.0
Soils, Land Use and Land Capability	Continued loss of soil utilisation due to contamination from pipelines and pumps, hydrocarbons and/or reagents from vehicles and mechanical infrastructure	-	5	4	2	8	4	70	High	On-going management and control (auditing and monitoring) of vehicle maintenance, movement (access and haulage ways) and the covering to loads of raw materials and by-product during transportation Minimisation or prevent of spillage from haulage, and controlled maintenance of vehicles	3	4	2	4	2	30	Moderate	57.1
Biodiversity	The expansion will have limited added impact on the general habitat during operation	-	5	4	1	2	3	35	Moderate	Rehabilitate remaining habitat	5	4	1	2	3	35	Moderate	0.0
	Very little natural vegetation remains and will not be further impacted on by operations	-	5	4	1	4	2	45	Moderate	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees Rehabilitate any open spaces in the footprint area and re-vegetate with indigenous grass and indigenous trees Ensure that the footprint area of the expansion section is as small as possible	5	4	1	2	2	35	Moderate	22.2
	Main threat to water resources – runoff off buildings and hard surfaces, stores and all stored materials and vehicles	-	5	4	2	6	3	60	High	Manage areas of identified erosion, and vegetate exposed soils within the footprint area	5	4	2	4	2	50	Moderate	16.7
	Impact on water quality from runoff off buildings and hard surfaces, stores and all stored materials and vehicles	-	5	4	3	6	3	65	High	Rehabilitate flows to the site, manage areas of identified erosion, and vegetate exposed soils within the footprint area	5	4	3	4	3	55	Moderate	15.4
	The development will expose more open soils and create hard surfaces that will result in increased runoff and therefore a decrease in localised infiltration of water.	-	5	4	3	4	3	55	Moderate		5	4	2	2	3	40	Moderate	27.3
Operation phase impacts applicable to the proposed Groot Sandsloot River diversion																		
	Reduction in baseflow to the Sandsloot river downgradient of the re-aligned Sandsloot River Diversion (real or perceived)	-	4	4	2	2	2	32	Moderate	Install monitoring boreholes/piezometers along Sandsloot and flow meters to quantify loss of baseflow Implement a design that mimics the natural system as far as practically possible	2	4	2	2	1	16	Low	50.0

Aspect	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	LoR		Significance		P	D	E	M	LoR		Significance	
										Maximise the clean surface water run-off into the system as far as possible and prevent contaminated water from entering the system								
Noise	Groot Sandsloot River		3	4	2	2	2	**24**	**Low**	There will be no acoustic screening required unless water is pumped and noise monitoring to be done to ensure compliance	2	4	2	2	2	**16**	**Low**	33.3
Surface water	Reduced availability of water to downstream water users due to changes in MAR and potential decreased water quality	-	3	4	1	4	2	**27**	**Low**	During the operational phase of the mine, implement a storm water management plan which adheres to GN 704 requirements in terms of separation of clean and dirty water is required so as to ensure no mixing of clean and dirty water occurs.	2	4	4	4	1	**24**	**Low**	11.1
	Community issues with changes in flows (Quantity and Quality) in the Sandsloot River – some of it is perceived but going to be difficult to convince the communities that it is not the mine that caused the reduction in flows (Vaalkop 2 dam was upgraded in the last 10 years)	-	2	5	5	10	2	**40**	**Moderate**	During the operational phase of the mine, implement a SWMP, which adheres to GN 704 requirements in terms of separation of clean and dirty water is required, so as to ensure no mixing of clean and dirty water occurs	2	5	5	10	1	**40**	**Moderate**	0.0
										The WRD along the edge of the diversion will require the construction of paddocks.								
Biodiversity	The habitat is modified by the proximity of the mine pit and rock dump on the banks of the river and diversion of the river will further impact on the habitat. • To an extent – the whole river channel and associated flood plain will be lost with the development	-	5	4	2	8	4	**70**	**High**	Rehabilitate any open spaces in the footprint area and re-vegetate with indigenous grass and indigenous trees	5	4	2	6	3	**60**	**High**	14.3
	The development will have a negative impact on the river habitat and to an extent on the vegetation. The erosion of sediments (alluvial clay material) from the rock dump has modified the soils on the right-hand bank. These deposits have changed the vegetation composition and the *Grewia vernicosa* dominate of this material	-	5	4	2	6	4	**60**	**High**	Additional natural vegetation loss should be mitigated as much as possible through re-vegetation with suitable indigenous grass and indigenous trees	5	4	2	4	4	**50**	**Moderate**	16.7
Social	Replacement cost of environmental functions Expansion of WRD | TSF | Groot Sandsloot River diversion Reduced access to ecosystem services due to conversion of land use	-	4	4	2	8	4	**56**	**Moderate**	Develop a management plan to address situations where land currently used by communities, within the mining and surface lease areas, will be lost due to the proposed project activities. The management plan should ensure that there is no net negative impact on the land user	4	4	2	6	3	**48**	**Moderate**	14.3
										Facilitate informed participation of all affected persons. Consultation to continue through the implementation, monitoring and evaluation phases								
										AAP must communicate their grievance mechanism to the affected persons in order to address concerns raised by affected parties								

The tables below list the main project related activities that will be undertaken during the closure, rehabilitation and post closure phase of the proposed project. Refer to Section 30.4 for the closure actions and post closure monitoring.

Closure / Rehabilitation	Decommissioning and demolition of project related infrastructure
	Handling of potential contaminated soils.
	Monitoring of groundwater.
Post-closure	This is a period of maintenance and monitoring of the various structures and infrastructure closed during the time of rehabilitation. The activities are limited to monitoring activities and maintenance or repairing of erosion and vegetation if necessary as detailed in Section 31.4.

Table 18-9: Closure/rehabilitation phase impacts applicable to all the proposed expansion activities

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
Groundwater	Post closure impacts associated with decommissioning and closure activities	-	4	4	4	8	4	64	High	Implementation of a rehabilitation and closure plan which allows for measures to be implemented that reduce rainwater ingress and infiltration Maintenance of groundwater monitoring programmes and ensure effective follow-up and remedial action based on results Effective remediation of all disturbed areas Effective and legal remediation of all areas where there are demolition activities	3	4	2	2	2	24	Low	62.5
	Communities use the groundwater resources on the mine as potable water supply	+	4	5	2	6	3	52	Moderate	Decommission scavenger wells Develop a long term handover strategy of the wellfields to communities as part of corporate social investment (CSI) projects Evaluate sustainable usage of pit lakes as resource and possibly managed aquifer recharge (MAR), depending on final pit lake water quality	4	5	4	8	4	68	High	-30.8
Noise	Noise increase in the prevailing ambient noise level at the mining right boundaries during the removal of the infra-structure.	+	2	2	1	4	3	14	Low	Demolition activities to be done during daytime working hours with demolition machinery/equipment which complies with the manufacturers specifications on all times.	2	2	1	2	2	10	Low	28.6
	Noise increase along the mining right boundaries during the back-fill of disturbed areas.	+	2	2	1	4	3	14	Low	Earthwork activities to be done during daytime working hours with machinery/equipment which complies with the manufacturers specifications on all times.	2	2	2	2	2	12	Low	14.3
	Noise increase along the mining right boundaries during the planting of grass/vegetation at the disturbed areas.	+	2	2	1	4	3	14	Low	Planting of grass/vegetation activities to be done during daytime working hours with machinery which complies with the manufacturers specifications on all times.	2	2	2	2	2	12	Low	14.3
Soils, Land Use and Land Capability	Loss of soil nutrient and organic carbon stores while in storage and during replacement/rehabilitation process.	-	5	5	2	8	5	75	High	Replacement of nutrient and organic carbon matter needs and requirements at time of rehabilitation, landscaping of the topographic slope (free draining), cultivation of soils and replacement of vegetative cover as soon after replacement of materials as possible. Monitoring of vegetative growth until self-sustaining	4	4	2	6	3	48	Moderate	36.0
	Contamination of in-situ and stored materials by dirty water outwash and use of dirty water for irrigation during rehabilitation of sites.	-	5	5	2	8	5	75	High	Management of stormwater control systems and monitoring of water quality used for irrigation of vegetated areas	4	4	2	6	3	48	Moderate	36.0
	Hydrocarbon/reagent spillage from rehabilitation equipment during reinstatement of soils and vegetative cover, plus potential for compaction of replaced materials, erosion from water and wind of unprotected surfaces and impact on off-site streams and rivers/dams.	-	5	4	3	6	4	65	High	Maintenance and management of all vehicles and restriction on access of vehicles and grazing animals to rehabilitated areas and/or unprotected soils. Installation of erosion control measures along all drainage ways/channels and on any/all sensitive sites	4	4	2	6	2	48	Moderate	26.2
Surface water	Infrastructure not required after closure should be removed and the footprint areas rehabilitated. All rehabilitation activities should be monitored until vegetation is well established	-	3	4	1	6	2	33	Moderate	All rehabilitation activities should be monitored until vegetation is well established and no further surface water quality impacts are deemed likely.	2	1	4	6	2	22	Low	33.3

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
Visual	Visual impact associated with the closure of the South debottlenecking plant at South Concentrator and 3rd concentrator	-	2	5	2	2	1	18	Low	Adhere to the air quality management measures provided in the air quality section	2	4	2	2	1	16	Low	11.1
										Appoint a rehabilitation specialist to implement the requirements of the Closure and Rehabilitation Plan								
Visual	Visual impact associated with closing the TSF and WRD	-	4	5	2	8	1	60	High	Adhere to the air quality management measures provided in the air quality section	2	4	2	2	1	16	Low	73.3
Air Quality	Dust generation potentially resulting in nuisance and health effects on nearby receptors due to materials handling, vehicle entrainment of dust on the haul roads and windblown dust from open and bare areas.	+	3	2	2	4	1	24	Low	Demolish all infrastructure and rehabilitate on the footprint exposed by demolition activities	3	2	2	6	1	30	Moderate	25.0
										Revegetate all open and bare areas to reduce windblown dust								
										Effective and expedient rehabilitation of dust and other emissions sources								
										Continue to implement the routine air quality monitoring program and assess air quality results routinely								
Social	<u>Access to services and facilities during decommissioning and mine closure</u> Decommissioning of Infrastructure and handover to local government Lack of governmental capacity to ensure the sustainability of AAP developed infrastructure and essential services after mine closure	-	3	3	3	6	3	36	Moderate	Consult with provincial and national departments on sector specific programs for alignment throughout the life cycle of MM	2	2	2	2	1	12	Low	66.7
										Ensure that provision is made for infrastructure development projects in the MM SLP with the aim of handing over these facilities to the MLM after closure								
	<u>Level of Hazards and Risk</u> Decommissioning of infrastructure; Rehabilitation of land <u>Reduced level of hazards and risk</u>	+	4	4	2	4	2	40	Moderate	Appoint a rehabilitation specialist to implement the requirements of the Closure and Rehabilitation Plan	5	4	2	8	1	70	High	75.0
										Consider surrounding land uses and design post-mining land use options to support and enhance long-term development options								
	<u>Loss of employment during downscaling or closure</u> Decommissioning of Infrastructure Loss of employment during downscaling or closure	-	5	2	2	8	4	60	High	MM should consider reviewing their policies to ensure full compliance with Anglo American Standards and Policies	5	2	2	6	2	50	Moderate	16.7
										It is proposed that AAP 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. The Zimele programme should be used to build the capacity of businesses within the community, not with the ultimate goal of winning work at MM, but to gain experience at MM which they would then be able to use for future opportunities								
										If not already the case the Zimele team's scope must be expanded to ensure they are creating lasting socio-economic opportunities for the community beyond mine closure								
	<u>Capacity building and skills transfer during decommissioning</u> Decommissioning of Infrastructure Lack in capacity building in preparation for closure	-	4	3	2	4	3	36	Moderate	It is advised that AAP provide training and skills development programmes specifically tailored to local persons interested in obtaining employment as part of municipal infrastructure programmes. 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	4	2	3	6	1	44	Moderate	22.2
										In order to ensure that all AAP'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 AAP principles and policies. The use of local business should also be promoted as far as possible by providing them with preferential								

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
	Environmental amenity value during decommissioning Closing and rehabilitation of WRD and TSF Restored access to cultural ecosystem services; Improved visual significance of WRD and TSF	+	4	5	2	6	2	52	Moderate	Appoint a rehabilitation specialist to implement the requirements of the Closure and Rehabilitation Plan Take into account surrounding land uses and design post-mining land use options to support and enhance long-term development options	5	5	2	8	1	75	High	44.2
	Replacement cost of environmental functions during decommissioning Closing and rehabilitation of WRD and TSF Restored access to ecosystem services	+	3	4	2	6	2	36	Moderate	Appoint a rehabilitation specialist to implement the requirements of the Closure and Rehabilitation Plan	4	4	2	8	1	56	Moderate	55.6

Table 18-10: Post-closure phase impacts applicable to all the proposed expansion activities

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
Groundwater	Rebound of groundwater table and formation of terminal pit lakes with possible decant to river sources	-	5	5	3	6	3	70	High	Improved understanding of groundwater flow and flow regimes - Continued understanding of impacts to groundwater resources Maintenance of monitoring programme for an adequate period of time to be confident in the determination of impact.	3	5	3	4	3	36	Moderate	48.6
Noise	Maintenance of disturbed areas	+	2	2	1	4	3	14	Low	Maintenance activities to be done during daytime working hours with machinery which complies with the manufacturers specifications on all times.	2	2	2	2	2	12	Low	14.3
Soils, Land Use and Land Capability	Addition of fertiliser and compost to rehabilitated sites have potential to contaminate the vadose zone and associated soil water if not well managed.	+	5	5	3	6	5	70	High	Assessment of soil physical and chemical requirements, water holding capabilities, hydro pedological considerations and calculation of fertiliser inputs as part of the soil utilisation plan and rehabilitation implementation programme. Ongoing monitoring of water quality, erosion and compaction concerns and the overall growth of the re-vegetation effort.	4	4	2	6	5	48	Moderate	-31.4
	Uncontrolled access to rehabilitated sites by animals, vehicles, people will result in compaction and erosion of unprotected/non vegetative sites (over grazing etc.).	+	5	5	2	4	3	55	Moderate	Control of access to rehabilitated sites until well established and sustainable.	4	4	2	6	3	48	Moderate	-12.7
Surface water	All infrastructures will have been removed, therefore the surface water quality should not be further impacted by any of the post-closure activities	-	2	1	2	2	1	10	Low	Surface water quality should not be further impacted by any of the post-closure activities.	2	1	1	2	1	8	Low	20.0
Air Quality	With rehabilitation plans expected to be implemented in the closure phase, it is envisaged that the impact will be positive and that the rehabilitation measures will improve the air quality within the study area	+	5	5	2	6	1	65	High	Effective implementation of the closure plan	5	5	2	8	1	75	High	-15.4

Table 18-11: Post-closure phase impacts applicable to the specific expansion activities

Aspect	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	LoR	Significance			P	D	E	M	LoR	Significance		
			Post-closure phase impacts applicable to the proposed construction of the 3rd Concentrator															
Air Quality	With rehabilitation plans expected to be implemented in the closure phase, it is envisaged that the impact will be positive and that the rehabilitation measures will improve the air quality within the study area	+	5	5	2	6	1	65	High	Effective implementation of the closure plan Continuation of monitoring and maintenance procedures to ensure rehabilitation measures have been implemented adequately	5	5	2	8	1	75	High	15.4
Surface water	All infrastructures will have been removed, therefore the surface water quality should not be further impacted by any of the post-closure activities	-	2	1	2	2	1	10	Low	Implement post closure monitoring as detailed in Section 31.4.6	2	1	1	2	1	8	Low	20.0
			Post-closure phase impacts applicable to the proposed construction the Blinkwater 2 TSF and NWRD															
Air Quality		+	5	5	2	6	1	65	High	Effective implementation of the closure plan	5	5	2	8	1	75	High	15.4

Aspect	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	LoR		Significance		P	D	E	M	LoR		Significance	
	With rehabilitation plans expected to be implemented in the closure phase, it is envisaged that the impact will be positive and that the rehabilitation measures will improve the air quality within the study area									Continuation of monitoring and maintenance procedures to ensure rehabilitation measures have been implemented adequately								
Surface water	All infrastructure not required after closure will have been removed, therefore the surface water quality should not be further impacted by any of the post-closure activities	**-**	2	1	2	2	1	**10**	**Low**	Implement post closure monitoring as detailed in Section 31.4.6	2	1	1	2	1	**8**	**Low**	20.0
Groundwater	Post closure impacts associated with waste disposal activities – TSFs and WRDs	**-**	5	5	3	6	2	**70**	**High**	Maintain an effective groundwater monitoring programme for an adequate time period to be confident in the determination of impact Ensure effective surface and stormwater management post closure Demonstrating, through review of monitoring data and/or predicted modelling, if required, that the effect of contaminant plumes that could be arising and/or are already evident from disposal areas could be remediated by natural attenuation	3	5	3	4	2	**36**	**Moderate**	48.6

18.4.1 Soil utilisation plan

A summary of the soil utilisation/conservation plan for the construction, operation, decommissioning and closure phases of the proposed project is provided in Table 18-12.

Table 18-12: Summary of the soil utilisation/conservation plan for the construction, operation, decommissioning and closure phases

Construction phase		
Step	**Factors to consider**	**Comments**
Delineation of areas to be stripped		Stripping will only occur where soils are to be disturbed by activities that are described in the design report, and where a clearly defined end rehabilitation use for the stripped soil has been identified.
Reference to biodiversity action plan		It is recommended that grasses and shrubs that can be recovered be stripped and stored as part of the utilisable soil. However, the requirements for moving and preserving fauna and flora according to the biodiversity action plan should be consulted.
Stripping and handling of soils	Handling	Soils will be handled in dry weather conditions so as to cause as little compaction as possible. Utilisable soil (Topsoil and upper portion of subsoil B2/1) must be removed and stockpiled separately from the lower "B" horizon, with the calcrete and/or any ferricrete layer being separated from the soft/decomposed rock, and wet based soils separated from the dry soils if they are to be impacted.
	Stripping	The "Utilisable" soil will be stripped to a depth of 750mm or until hard rock/calcrete and/or ferricrete is encountered. These soils will be stockpiled together with any vegetation cover present (only large vegetation to be removed prior to stripping). The total stripped depth should be 750mm, wherever possible.
Delineation of stockpiling areas	Location	Stockpiling areas will be identified in close proximity to the source of the soil to limit handling and to promote reuse of soils in the correct areas.
	Designation of Areas	Soils stockpiles will be demarcated, and clearly marked to identify both the soil type and the intended area of rehabilitation.
Operations		
Step	**Factors to consider**	**Comments**
Stockpile management	Vegetation establishment and erosion control	Rapid growth of vegetation on the Soil Stockpiles will be promoted (e.g. by means of watering or fertilisation). The purpose of this exercise will be to protect the soils and combat erosion by water and wind.
	Storm water control	Stockpiles will be established with storm water diversion berms to prevent run off erosion.
	Stockpile height and stability	Soil stockpile heights will be restricted where possible to <1.5m so as to avoid compaction and damage to the soil seed pool. Where stockpiles higher than 1.5m cannot be avoided, these will be benched to a maximum height of 15m. Each bench should ideally be 1.5m high and 2m wide. For storage periods greater than 3 years, vegetative cover is essential, and should be encouraged using fertilization and induced seeding with water. The stockpile side slopes should be stabilized at a slope of 1 in 6. This will promote vegetation growth and reduce run-off related erosion.
	Waste	No waste material will be placed on the soil stockpiles.
	Vehicles	Equipment movement on top of the soil stockpiles will be limited to avoid topsoil compaction and subsequent damage to the soils and seedbank.

Decommissioning and Closure		
Step	**Factors to consider**	**Comments**
Rehabilitation of disturbed land and restoration of soil utilisation	Placement of soils	Stockpiled soil will be used to rehabilitate disturbed sites either ongoing as disturbed areas become available for rehabilitation and/or at closure. The utilizable soil (500mm) removed during the construction phase or while opening up of open cast workings, shall be redistributed in a manner that achieves an approximate uniform stable thickness consistent with the approved postmining land use (Low intensity grazing), and will attain a free draining surface profile. A minimum layer of 300mm of soil will be replaced.
	Fertilisation	A representative sampling of the stripped soils will be analysed to determine the nutrient status of the utilizable materials. As a minimum the following elements will be tested for: EC, CEC, pH, Ca, Mg, K, Na, P, Zn, Clay% and Organic Carbon. These elements provide the basis for determining the fertility of soil. based on the analysis, fertilisers will be applied if necessary.
	Erosion control	Erosion control measures will be implemented to ensure that the soil is not washed away and that erosion gulleys do not develop prior to vegetation establishment.
Pollution of soils	In-situ Remediation	If soil (whether stockpiled or in its undisturbed natural state) is polluted, the first management priority is to treat the pollution by means of in situ bioremediation. The acceptability of this option must be verified by an appropriate soils expert and by DWS, on a case by case basis, before it is implemented.
	Off-site disposal of soils	If in situ treatment is not possible or acceptable then the polluted soil must be classified according to the Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste (DWAF 1998) and disposed at an appropriate, permitted, off-site waste facility.

18.5 Cumulative impacts

Localised cumulative impacts have been identified as part of the specialists' investigations conducted for the proposed Expansion 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 thereof generally uncertain and therefor difficult to quantify, 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 identified for the Expansion Project include:

- **Groundwater:** Development of the North WRD resulting in possible long term impacts due to presence of possible permeable structures (fault zones) within proposed footprint**.**
- **Surface water:** Alterations to the flow of surface waters in the same catchment area causing altered flow regimes and leading to potential conflicts and competition between water users and changes in water availability for communities and ecosystems;
- **Soils:** Continued loss of soil utilisation due to sterilisation from the expansion infrastructure and associated infrastructure if not stripped and stockpiled
- **Biodiversity**: Clearance of vegetation for the expansion infrastructure will result in further habitat modification, increased run off, erosion and vegetation loss. Certain proposed activities will also have an impact on the river habitat and to an extent, on the vegetation
- **Social**: Social differentiation and inequality due to competition over scarce resources such as employment and procurement opportunities leading to social differentiation and conflict. In addition to this, impacts to the cultural heritage as a result of the proposed Expansion project will also occur.

Overall cumulative impact is the reduction in ecosystem services as a result of changes to water resources, loss of soil and land capability and loss or fragmentation of habitat.

19 Specialist Recommendations

Several specialist studies were undertaken to inform the impact assessment and develop the associated management measures which has been included in Section 18 and Appendix 16. The specialists' area of investigation were considerably larger than the required footprint of the proposed Expansion Project infrastructure to allow for alternative placement within the investigation area. This approach allowed the mine to avoid identified sensitive areas as far as possible within the footprint areas. Specialist recommendations which specifically informed the final site layout or design is listed in Table 19-1.

Table 19-1: Summary of specialist recommendation which informed the final site layout or design of the proposed infrastructure

List of studies undertaken	Recommendations of specialists' reports	Specialists recommendations that have been included in the EIA report (mark with an X where applicable)	Reference to applicable section of the report where the specialist recommendations have been included
Biodiversity	• **Blinkwater 2 TSF:** Recommendation regarding the protection of the wetland situated in close proximity of the proposed Blinkwater 2 TSF • **River diversion:** Include roughness (cobbles and boulders) to ensure that the channel doesn't erode, and that the floodplain created will act as a natural system to slow flow velocity • **Biodiversity of rivers:** o Witrivier: it is recommended that the monitoring of the Wit River is included as part of the programme for the Mogalakwena Mine o Groot Sandsloot: Extensive monitoring plan for the system to ensure more detailed data are gathered to update information related to the PES	X	Recommendations have been included as part of the management measures for the impacts identified by each specialist. These management measures will form part of the conditions of the environmental authorisation if the project is approved. Refer to section 18.4 for the management measures for each of the project phases
Heritage	• **Blinkwater 2 TSF:** The design of the proposed TSF will be slightly modified to fall outside the area where heritage sites were identified in close proximity to the north western corner of the proposed Blinkwater 2 TSF.	X	
Groundwater	• **North WRD and Blinkwater 2 TSF:** Proposed ground water protection measures	X	
Surface water	• **North WRD Position:** The North WRD has been positioned within the investigation area to avoid encroachment on the watercourse western side of the investigation area • **North WRD:** Surface water protection measures	X	

20 Environmental Impact Statement

The impact assessment as detailed in Section 18 assessed the types of impact, duration of impacts, likelihood of potential impacts occurring and the significance of impacts.

Assuming all phases of the project adhere to the conditions stated in the EMPr (Section 18) it is believed that the impacts associated with the proposed Expansion Project can be appropriately managed.

20.1 Final site map

A map which superimposes the proposed infrastructure associated with the proposed Expansion Project on the environmental sensitivities of the proposed location of the infrastructure, including buffers is provided in Appendix 19.

20.2 Positive and negative associated with the proposed activity and alternatives

Refer to Section 18 for positive and negative impacts identified for the proposed project.

21 Proposed Impact Management Objectives

Impact management objectives are provided in in Table 21-1. The impacts associated with the proposed Expansion Project and the identified management measures are provided in Section 18. The significance rating of each impact has 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 proposed Expansion Project. The closure objectives is detailed in Section 30.1.

Table 21-1: Impact management objectives

Aspect	Objective
Socio – Economic	• To enhance benefits from the development of the project activities • 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 project activities
Surface and Ground Water	• 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 • Monitor surface water and groundwater quality during the life of the mine and post closure
Air Quality	• Manage mine residue deposits to minimise risk of injury to humans and animals; damage to infrastructure; and contamination of the environment

Aspect	Objective
	• 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 • 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
Cultural Heritage	• To respect the culture and heritage of the people in the area • To avoid disturbance of graves and where not possible to undertake relocating of graves according to legal requirements and to determine mitigation in consultation with local communities
Biodiversity	• 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 proposed Blinkwater 2 TSF on the wetland such that the quantity of water, quality of water, soil and vegetation is protected.
Soils and Land Capability	• To remove and store soil to enable its reuse for rehabilitation • To prevent and minimise soil erosion and contamination
Noise	• To minimise adverse noise impacts from construction and operation • To respond with corrective action to public • complaints about noise

21.1 Final proposed alternatives

There are no additional alternatives to those identified and assessed through the impact assessment process are proposed for the mine development.

21.2 Aspects for inclusion as conditions of authorisation

Over and above the management measures detailed Section 18. The following conditions should be included in the authorisation:

- Mogalakwena mine should continue to reassess the risks and impacts of the development throughout its operational life. Should any change in the risk and impact profile of the development be determined, additional management controls and mitigation measures must be implemented and the EMPr amended to reflect these changes;
- Any substantial change to the infrastructure site layout as represented in the heritage report must be subjected to a field survey;
- The process for the relocation of graves must be followed;
- The specific management measures for the protection of the wetland included in the design of the Blinkwater 2 TSF and to be submitted to DWS as part of the WULA must be complied with; and
- Monitoring of surface and groundwater will be undertaken in line with the monitoring programmes as detailed in the WUL associated with the proposed Expansion Project.
- Environmental noise monitoring to be carried out during the different phases of the project as detailed in Section 31.4.4.

21.3 Description of any assumptions, uncertainties and gaps in knowledge.

The following assumptions, limitations and constraints highlighted and considered as part of the EIA for the proposed Expansion Project:

Table 21-2: Assumptions, limitations and constraints

Study	Assumption/limitation/constraint
General assumptions	• 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 the proposed expansion activities will be constructed in line with these designs.
Air Quality	• Ambient air quality baseline and emissions monitoring have not been undertaken as part of the air quality assessment and SRK have relied on ambient air quality data collected by the client • The air quality assessment is limited to assessing the impacts associated with the proposed Mogalakwena Mine operations and its additional impact on the air quality in the surrounding area. • Any impacts relating to health have not been included in the scope of the air quality study • The model-predicted ambient pollutant concentrations are reflective of contributions from the site and exclude contributions from other emission sources in the surrounding area
Noise	• 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; • Noise measurements in the presence of winds in excess of 3.0m/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; • The noise from the mining activities in the open pits will vary depending on the depth of mining and the point of mining at a specific time. • 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.
Biodiversity	• The survey was conducted during daytime only. All the different habitats at the site were investigated and it was therefore possible to complete a rapid survey and obtain information on the habitats that are present at the site, or that are likely to occur there. No long-term studies were conducted. • Weather conditions during the period were hot with a light wind blowing. The region had received some rainfall prior and during the site visits and the vegetation was in a fair condition and still green in areas. There was some water in the veld during the time of the survey. This will have obvious implications on the biodiversity that are likely to occur in the area. Nevertheless, the conditions during the survey were ideal for a survey (rapid) of this nature
Geohydrology	• Numerical models were developed by Itasca based on the Conceptual Hydrogeological Model. The groundwater flow and solute-transport models were calibrated to the available groundwater-level and groundwater-quality data available at the Mine site. The models used site-specific hydraulic parameters and geologic data provided by the Mine • Seepage predictions do not account for the evaporation and absorption of water in loosened material • Site-specific hydraulic parameters are only available up to depths of 250 mbgs for four boreholes. At this time, the K values of the geologic units were assumed to decrease with depth, based on Itasca's other project experience. Additional hydraulic parameter data are required to help reduce the model uncertainty.

Study	Assumption/limitation/constraint
	• No consistent records of the surface-water run-off or seepage into the pits were available. • The loss of groundwater seepage due to the loosened soils and evaporation was assumed without site-specific data • Records of abstraction rates from dewatering and water-supply boreholes were available for 2016 and 2017. As indicated by the data, flowmeters were typically inoperable, and dewatering rates are estimated • No domestic pumping rate data was available
Heritage	• Heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. In fact, due to the vegetation found within sections of the study area, it is highly likely that the present identified heritage sites are not a complete record of all the archaeological and heritage resources located within the study area • Sites which may be located within the study area include a sacred tree and sacred water site located near Sekuruwe, and which may be located within the Blinkwater 2 TSF footprint area. Consultation with members of Sekuruwe should be conducted before construction commences
Soils and land capability	• It has been assumed that the total area of possible disturbance has been included in the project description, that the development plan as tabled caters for all actions and activities (existing and cumulative) that could potentially have an impact on the soils and land capability, and that the recommendations made and impact ratings tabled will be re-assessed if the development plan changes • Limitations to the accuracy of the pedological mapping (as recognised within the pedological industry) are accepted at between 50% (reconnaissance mapping) and 80% (detailed mapping), while the degree of certainty for the soils physical and chemical (analytical data) results has been based on “composite” samples taken from the dominant soil types mapped in the study area • The areas in question have been mapped on a comprehensive reconnaissance base, the degree and intensity of mapping and geochemical sampling being considered and measured based on the complexity of the soils noted in field during the field mapping, and the interplay of geomorphological aspects (ground roughness, slope, aspect and geology etc.)
Surface water	• SRK assumes that the data provided by Mogalakwena Mine is correct. The surface water report was based on preliminary designs and mitigation measures may have to be reviewed depending on final designs which will be included as part of the WULA • Specific future effects of climate change are uncertain and may have an effect on rainfall which may in turn impact on surface and groundwater, biodiversity, soils and air quality may also be impacted on.
Visual	• The viewshed illustrates the area from which the proposed expansion activities are likely to be visible. It does not take local undulations, existing vegetation and man-made structures into account • At the time of compiling the VIA report detailed design information, including the final heights, arrangements and dimensions were still being undertaken. As such, SRK was provided with the average heights of the key structures, based on similar pre-existing infrastructure on the mine • A VIA, by nature, is not a purely objective or a quantitative process, but is dependent on the subjectivity of the judgments made. Where required, appropriate criteria and motivations have been clearly stated

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

The environmental authorisation process associated with the proposed Expansion Project for Mogalakwena Mine was undertaken in terms of the relevant environmental authorisation requirements as detailed in Section 5. The environmental authorisation process was underpinned by an extensive stakeholder engagement process with in-depth consultation undertaken through various forms of engagement as detailed in Section 13. As part of this engagement, additional pre-application meetings with the leadership structures were conducted prior to the commencement of the environmental authorisation process.

During the consultation processes, various comments were received as detailed in the CRR in Appendix 15. Many of these comments related to historical issues which have been summarised in Section 13.8. The specialists' studies as detailed in Section 14 were undertaken and the findings took into account and addressed (as far as practically possible) the project-specific issues which were raised.

In terms of the locality of the proposed project related infrastructure, areas of sensitivity were taken into consideration during the design phase and were avoided as far as practically possible. Where avoidance could not be achieved in terms of the design requirements of the proposed infrastructure, appropriate mitigation measures were developed to be implemented to reduce the impacts on the environment, as detailed in Section 18. The proposed mitigation measures were developed based on the nature, duration, severity and probability of the impact and based on the recommendations made by the specialists, as presented in Appendix 16.

In addition, since Mogalakwena Mine is an existing operational mine, mine personnel are presently managing impacts in line with exiting environmental management requirement. These impacts are of a similar nature to the proposed Expansion Project.

It is SRK's reasoned opinion that this project should be authorised based on the following:

- The impacts which have been identified can be mitigated through the implementation of the identified management measures in Section 18;
- The proposed Expansion Project is unlikely to result in the generation of any significant cumulative impacts when managed in accordance with the management measures specified in Section 18; and
- Should the proposed Expansion Project not be implemented, Mogalakwena Mine will continue to operate at its current capacity and any additional local economic development opportunities as well as procurement of local goods and services to support the mine activities will not be realised. In addition to this, projected temporary employment opportunities during the construction phase will not be fulfilled.

22.1 Period for which the environmental authorisation is required

The EA is required for the duration of the LoM which is currently estimated to be beyond 2080.

23 Financial Provision

The infrastructure and activities associated with the proposed Expansion Project will increase the existing Mogalakwena Mine liability by an amount of R189 713 390.54 (Refer to Appendix 18).

AAP 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 Expansion Project.

23.1 Explain how aforesaid amount was derived

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.

24 Deviations from the Approved Scoping Report and Plan of Study.

The following deviations from the approved scoping report have reference:

- Subsequent to the approval of the scoping report, more information on the design and location of the proposed bulk ore sorter has become available and has been assessed as part of the draft impact assessment report
- The location of the potential contractor's camp has moved from the original position west of the north pit to an area east of the MSC. This area has been assessed as part of the EMPr conducted for the South Concentrator
- The location of the proposed additional change house has moved from the proposed position to an already disturbed area within the North Mining area;
- The extension to the NEMA regulated timeframes for the submission of the final EIA/EMPr was requested from the DMR and granted on 3 September 2019. Refer to Appendix 4 for the relevant communication.

25 Other Information Required by the Competent Authority

The DMR approved the Final Scoping Report and requested that the items detailed in Table 1-2 be addressed in the EIA/EMPr. Responses to the information request is also included in this table.

26 Impact on the Socio-economic Conditions of any Directly Affected Person

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. The main concern that has been identified through the stakeholder engagement was legacy issues, as well as the lack in employment opportunities available for the immediately affected communities. The social impacts can be mitigated where negative, but by enhancing the positive impacts, the mine will have a far greater positive impact, especially if they implement the AAP Policies such as the Anglo American Social Way and mitigation measures of the SIA and EMPr.

There is a risk that vulnerable persons living within the surrounding communities may be disproportionately affected by the project because of their lack of access to information and political power. AAP should propose and implement differentiated measures so that adverse impacts do not fall disproportionately on them and they are not disadvantaged in sharing development benefits and opportunities. Special care should be taken to ensure that benefits flowing from the SLP, procurement and employment process benefit the vulnerable members of the community.

Since most of the new mining and construction activities will take place within the mine's existing boundary, it is not anticipated that significant impacts on the social environment from the construction and operation of the mine's additional activities will occur. However, despite this, all of the project phases will result in some socio-economic impact that will need to be addressed based on the mitigation measures recommended in this report. It is anticipated that proactive and sustainable mitigation measures will mitigate most of the negative impacts and enhance the positive to an extent that the mine becomes an asset to the local community and enhances their current standard of living.

27 Impact on Heritage Sites.

In terms of the proposed Expansion Project, as well as other activities which have already taken place at Mogalakwena Mine as part of previously approved EMPrs, grave relocation is a relevant activity which has been undertaken and may need to be considered for the proposed project. As cemeteries and graves have Medium to High Heritage Significance, the best option is to change 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, the required mitigation measures are outlined below.

- A grave relocation process must be undertaken if required;
- 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 need to be obtained;
- An exhumation process that keeps the dignity of the remains and family intact needs to be conducted;
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company needs to be undertaken;
- The exhumation process must be done by a reputable company well versed in the mitigation of graves; and
- Test excavations to physically confirm the presence or absence graves need to be conducted. If no evidence for graves is found, no further mitigation measures would be required; and if evidence for graves is found, a full grave relocation process must be implemented.

28 Other Matters Required in terms of Sections 24(4)(a) and (b) of the Act

Not Applicable.

29 Part B: Environmental Management Programme Report

The structure of the EMPr in terms of Appendix 4 of the 2014 NEMA Regulations, as amended is provided in Table 29-1.

Table 29-1: Structure of the EMPr report in terms of Legislation Requirements as detailed in Appendix 4 (contents of an EMPr of GNR 982)

Appendix 4	Legislated requirements as per the NEMA GNR 982 in Appendix 4	Relevant Report Section
(1)(a)	details of-	
	(i) the EAP who prepared the EMPr	Section 2.1
	(ii) the expertise of the EAP, including a curriculum vitae;	Section 2.2
(1)(b)	A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description	Section 6
(1)(c)	a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers;	Figure 6-1 and Figure 6-2
(1)(d)	A description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-	Section 18
	(i) planning and design;	
	(ii) pre-construction activities;	
	(iii) construction activities;	
	(iv) rehabilitation of the environment after construction and where applicable post closure; and	
	(v) where relevant, operation activities;	
(1)(e)	*Removed from Appendix 4 during 2017 NEMA Regulations Amendment and included in 1 (f) below*	
(1)(f)	a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to -	Sections 18 and 23
	(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	
	(ii) comply with any prescribed environmental management standards or practices;	
	(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	
	iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable	
(1)(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 31
(1)(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	

Appendix 4	Legislated requirements as per the NEMA GNR 982 in Appendix 4	Relevant Report Section
(1)(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	
(1)(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	
(1)(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	
(1)(l)	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations	
(1)(m)	an environmental awareness plan describing the manner in which-	
	(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	Section 31.6
	(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	
(1)(n)	any specific information that may be required by the competent authority	Section 31.7
(2)	Where a government notice gazette by the minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	Not Applicable

29.1 Final environmental management programme

29.1.1 Details of EAP

Refer to Section 2.1 for the details of the EAP.

29.1.2 Description of the aspects of the activity

Refer to Section 6 of the report that detailed the aspects related to this activity.

29.1.3 Composite map highlighting sensitive areas

The broad placement of the surface infrastructure was informed by mapping the environmental sensitivities which considered the location of all known sensitive physical, social and environmental features within the mining rights and surface lease areas (Figure 29-1). The environmental sensitivities that were taken into account have been included in Table 29-2:

Table 29-2: Environmental sensitivities

Sensitive feature	Description
Cultural heritage sits	Heritage sites have been found located within the proposed project area. These include archaeological and heritage sites located within the Blinkwater 2 TSF footprint and the North WRD area.
Noise sensitive receptors	Sensitive noise receptor areas during the construction and operational phases have been identified and include the receptors in close proximity to the proposed M3C, Blinkwater 2 TSF and North WRD.
Wetland	The wetland identified to the north east of the Blinkwater 1 TSF is considered to be a sensitive area. A 50 m buffer zone has been created around the wetland. The natural but largely modified wetland can be classified as a hill slope seepage wetland in accordance with SANBI's Classification System for Wetlands.
Soils	The mining and associated support activities being proposed could, if not well managed, have a moderate to high negative impact on the surface conditions. This is especially true of the areas being considered for the Groot Sandsloot River Blinkwater 2 TSF and North WRD.
Air Quality (dust sensitive receptors)	Sensitive receptors located in close proximity to the mine will be affected by the proposed expansion project, however, the predicted increase in dust levels at these receptors will remain below the PM_{10}, $PM_{2.5}$ and dust fallout standards. However, the increase may lead to nuisance levels of dust at these sensitive receptors.
The Sandsloot River	The Groot Sandsloot River is a sensitive area that will be impacted on by the proposed river diversion. It will have a negative impact on the river habitat and vegetation. The whole river channel and associated flood plain will be lost due to the proposed river diversion.
Witvinger Nature Reserve	The Witvinger Nature Reserve (WNR) is located in the Waterberg District of Limpopo Province, South Africa and is situated approximately 80 km to the west of Polokwane and 17 km to the north of Mokopane. This reserve has unique features and beautiful landscapes, important cultural attributes and a vast biodiversity aspect connected with a community surrounding this unique and special reserve. The reserve is 5 400 ha in extent, and it is a proclaimed Nature Reserve. The reserve has a variety of habitats and landscape, including open plains and mountains. Wildlife species include bushbuck, kudu, reedbuck, Tsessebe, Leopard and Zebra. The proposed Expansion Project will not impact on the Witvinger Nature Reserve.

Buffer distances (minimum safe distances), determined primarily from legislation, including GN704 and the MHSA (Table 29-3), were then overlain on the sensitive areas mapped. The placement of proposed site infrastructure options in relation to the identified sensitive areas is shown in Appendix 19. Following the completion of the scoping phase, input from I&APs and the findings of the specialist studies were used to refine the preferred development footprint. The specialist studies did not identify any fatal flaws associated with any of the infrastructure site layout options.

Table 29-3: Buffer distances associated with the Mogalakwena Mine Expansion Project

Infrastructure	Buffer (m)	Legislation/comment
Buildings Roads Railways TSF and WRD Structures	100	MHSA and Regulations
Restricted areas	50	MHSA GN93
Watercourses	100	NWA GN704
Wetlands	500	NWA GN704 GN1199
Potential sensitive receptors	500	A buffer has been suggested for noise, dust and air quality impacts
Powerlines	25	A proposed buffer (either side of centre-line) for protection of powerline infrastructure
Explosives magazine	500	A proposed buffer for safety and avoidance of damage to new infrastructure (in the event of an explosion)

The current activities and infrastructure at Mogalakwena Mine are given in 4.2 Section and shown Appendix 12.

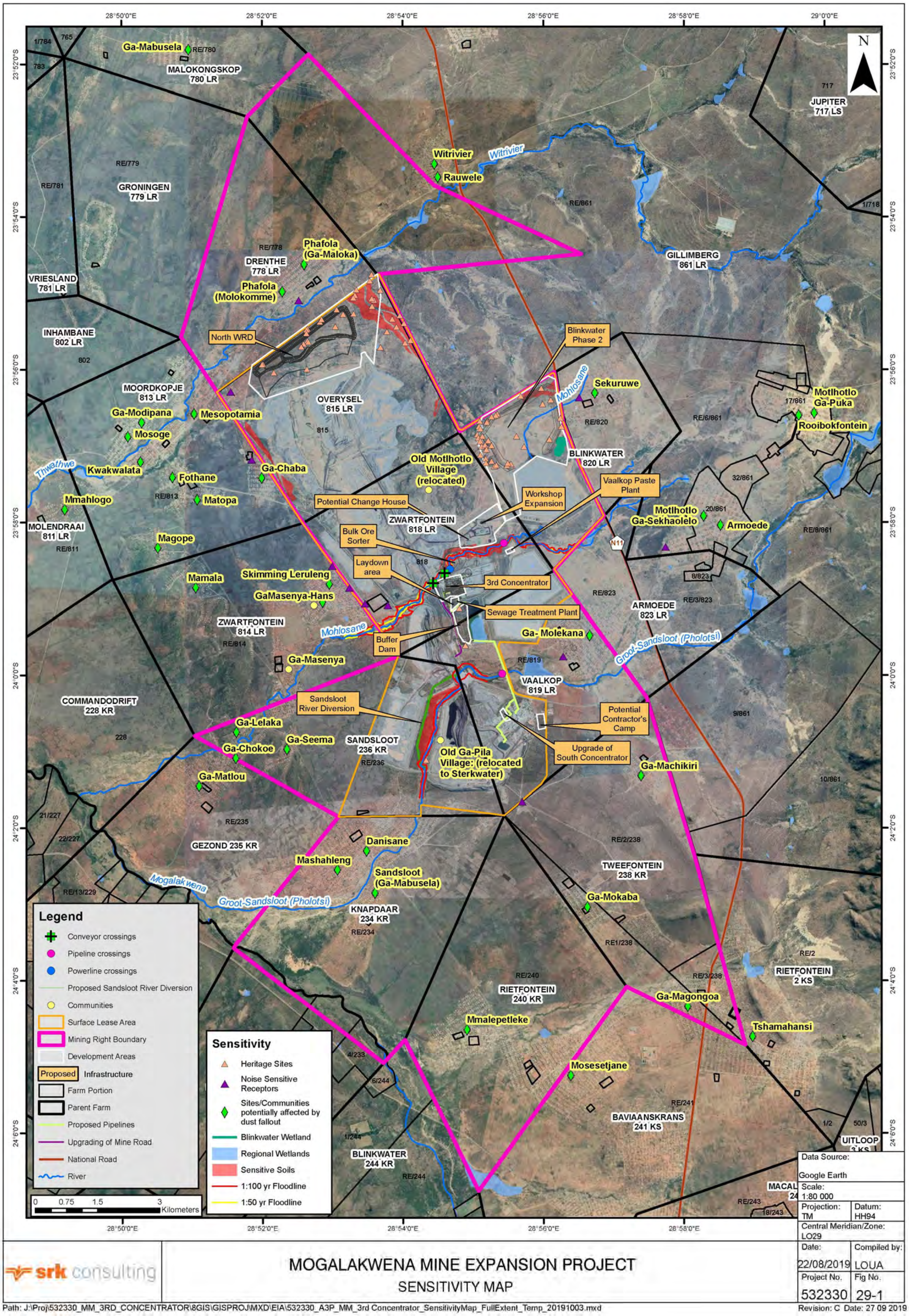


Figure 29-1: Sensitivity map

29.2 Description of impact management objectives including management statements

29.2.1 Determination of closure objectives

The closure objectives detailed in Section 30.1 are based on an extensive environmental database and baseline information gathered during the LoM so far, as well as the baseline studies undertaken as part of the specialist investigations, as detailed in Section 14.

A baseline closure risk assessment was undertaken during 2016 using the Anglo American Plc risk assessment process, where the risk is described and then a determination is taken to assess the nature of the risk and then the risk is ranked according to predetermined criteria for probability and consequence. This baseline was subsequently updated in 2017 and 2018. For purposes of this report, the 2018 risk assessment has been updated to reflect possible closure risks associated with the Expansion Project. The nature of the risks requiring mitigation were used to inform the closure objectives.

29.2.2 Process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity

Through the implementation of the management measures by the relevant responsible persons, any potential environmental impact associated with undertaking listed activities associated with the proposed project will be managed accordingly.

29.2.3 Potential risk of acid mine drainage

Geochemical characterization and waste classification were undertaken on 40 samples from the Mogalakwena Mine to evaluate the acid generation potential and neutralisation potential of the orebody, country rock, waste rock and tailings. From the results of the classification the following can be concluded:

- All materials sampled have a low potential to generate acidity, with all the samples, with the exception of a single medium grade pyroxenite ore, having a sulphur content below the recommended threshold of 0.3%. In addition, testing indicates that there is an excess of neutralising material providing sufficient buffering capacity, associated with the different lithologies. The testing therefore indicates that the leachate potential generated from residue facilities is likely to be neutral during operations, closure and post closure.
- The results to date support the conclusions from the previous geochemical testing work undertaken by SRK (2002) that the waste rock dump should not produce a leachate with low pH and high sulphate concentrations, although manganese was flagged as a potential metal of concern in seepage from the waste rock dump.
- Waste characterization of the tailings material (SRK 2015) from the Mine was found to be non-acid generating. However due to the As, Cu, Mn and Ni > leachable concentration threshold (LCT0), the tailings were classified as Type 3 material requiring disposal in a landfill engineered with a Class C or equivalent barrier system.
- The samples from the tailings, WRD and pit wall samples had B, Ba, Cu, Ni, Pb, V and Zn exceeding the total concentration threshold TCT0 in some samples but not the TCT1 limits (TCT0<TC<TCT1). The LCT0 threshold was not exceeded in any of the samples (Itasca, 2018).
- Based on the results of the Itasca 2018 Waste Classification, most of the samples from both the tailings material, ore stockpile and WRD fall within the category TC≤TCT1 AND LCT0 < LC<LCT1 and are classified as Type 3 waste requiring a Class C or Class C equivalent barrier system.
- Lining of the WRD area is impractical and not likely to be effective in the longer term. Consideration should be given to the design and preparation of the footprint area of the proposed North WRD to minimise the risk of seepage from the WRD from reaching the groundwater.

Although the geochemical characterization indicates a low risk of acid generation from the waste rock dump and tailings materials, leaching of sulphate, nitrate and chloride may result in increased salt loading to the groundwater and must be taken into consideration in the design for the proposed new facilities i.e. Blinkwater 2 TSF and North WRD.

29.2.4 Water use licence requirements

MM currently operates under several existing approved Environmental Management Programmes (EMPrs) (refer to Figure 1-2) and two Water Use Licences (WULs) (approved in March 2007 and October 2017). A WUL is being applied for as part of the integrated environmental authorisation process for the Expansion Project. As agreed with DWS at the pre- application meeting, the water uses from the 2007 and 2017 WULs be consolidated and included in the new WULA for the Mogalakwena Mine expansion project.

Table 29-4 provides a summary of the infrastructure units and associated existing water uses at Mogalakwena Mine with the proposed new water uses associated with the Expansion Project in grey text. The new water uses associated with the proposed Expansion Project are shown in Appendix 17:. Further details on the proposed Expansion Project infrastructure is provided in Section 6 and details relating to the existing infrastructure is provided in Section 8.

Table 29-4: Existing water uses and proposed new water uses associated with the Expansion Project

Farm	Section 21 Water Uses		Infrastructure
	Description		
Overysel 815 LR	a	Abstraction of groundwater 2 Mℓ/d	• PPL Wellfield (Including on the farms Vaalkop 819 LR, Zwartfontein 818 LR, and Sandsloot 236 KR)
	j	Removing water found underground	• PPRust North open pit
	g	Disposing of water containing waste	• PPRust north open pit • West WRD • East WRD • Rock dump runoff dam (runoff from pit and WRD) No. 1 • Roads (irrigation of roads with water containing waste for dust suppression) • Zinc dam north (pit water for use as dust suppression on roads) • North WRD and associated ore stockpiles
Blinkwater 820 LR	c	Impeding or diverting the flow of water in a water course	• Tailings dams 1 & 2 (diversion of headwaters, due to positioning of the Blinkwater TSF on the Mohlosane River) • Boundary fence • East diversion channels around the Blinkwater TSF • West diversion channels around the Blinkwater TSF • Blinkwater TSF 2 Cleanwater Diversion • Blinkwater 1 and 2 TSF within 500 m of a wetland • Groundwater feed via channel to wetland 1 • Groundwater feed via channel to wetland 2 • Stormwater feed via channel to wetland • Blinkwater TSF 1 Protection Berm
	i	Altering the bed, banks, course or characteristics of watercourse	• Tailings dams 1 & 2 (diversion of headwaters, due to positioning of the Blinkwater TSF on the Mohlosane River) • Boundary fence • East diversion channels around the Blinkwater tailings dam • West diversion channels around the Blinkwater TSF • Blinkwater TSF 2 Cleanwater Diversion • Blinkwater 1 and 2 TSF within 500 m of a wetland

Farm	Section 21 Water Uses		Infrastructure
	Description		
			• Groundwater feed via channel to wetland 1 • Groundwater feed via channel to wetland 2 • Stormwater feed via channel to wetland • Blinkwater TSF 1 Protection Berm
	g	Disposing of water containing waste	• Tailings dams • Roads (irrigation of roads with water containing waste for dust suppression) • Blinkwater 2 Tailings Storage Facility
Zwartfontein 818 LR	a	Abstraction of groundwater 2 Mℓ/d	• PPL Wellfield (including on the farms Vaalkop 819 LR, Overysel 815 LR, and Sandsloot 236 KR) • MNC dewatering boreholes (incorporated into • PPL wellfield • Five new pollution control dewatering boreholes along Mohlosane River
	c	Impeding or diverting the flow of water in a water course	• Conveyer and adjacent road crossing river • Haul road bridge over Mohlosane River • Pipeline crossing • Portion of west clean water diversion channel • Haul road crossing • Bridge, ford and conveyor crossing • Access road crossing • Service road crossing • Two tar road crossings • Potable water pipeline and lattice bridge • Two tailings return water pipeline crossing and adjacent road • Two haul road crossings • RWD Extension • Permanent Retaining Walls PRW 1 to PRW 3 • Gantry crossing the Mohlosane River carrying pipelines • Powerline 1 crossing Mohlosane River • Powerline 2 crossing Mohlosane River • Conveyor Crossing 1 over the Mohlosane River to the third concentrator • Conveyor crossing 2 over the Mohlosane River to the third concentrator

Farm	Section 21 Water Uses		Infrastructure
	Description		
			• Conveyor crossing 3 over the Mohlosane River to the third concentrator • Conveyor crossing 4 over the Mohlosane River to the third concentrator • Conveyor crossing 5 over the Mohlosane River to the third concentrator • Conveyor crossing service road 1 over the Mohlosane River to the third concentrator • Conveyor crossing service road 2 over the Mohlosane River to the third concentrator • Vehicle access road 1 over the Mohlosane River to the third concentrator • Vehicle access road 2 over the Mohlosane River to the third concentrator • Conveyor crossing service road 3 over the Mohlosane River to the third concentrator
	i	Altering the bed, banks, course or characteristics of a watercourse	• Conveyer and adjacent road crossing River • Haul road bridge over Mohlosane River • Pipeline crossing • Portion of west clean water diversion channel • Haul road crossing • Bridge, ford and conveyor crossing • Access road crossing • Service road crossing • Two tar road crossings • Potable water pipeline and lattice bridge • Two tailings return water pipeline crossing and adjacent road • Two haul road crossings • RWD extension • Temporary coffer walls (CW 1 to CW 9) • Permanent retaining walls (PRW 1 to PRW 3) • Temporary filter walls (TFW 1 and TFW 2) • Gantry crossing the Mohlosane River carrying pipelines • Powerline 1 crossing Mohlosane River • Powerline 2 crossing Mohlosane River • Conveyor Crossing 1 over the Mohlosane River to the third concentrator • Conveyor crossing 2 over the Mohlosane River to the third concentrator • Conveyor crossing 3 over the Mohlosane River to the third concentrator • Conveyor crossing 4 over the Mohlosane River to the third concentrator

Farm	Section 21 Water Uses		Infrastructure
	Description		
			• Conveyor crossing 5 over the Mohlosane River to the third concentrator • Conveyor crossing service road 1 over the Mohlosane River to the third concentrator • Conveyor crossing service road 2 over the Mohlosane River to the third concentrator • Vehicle access road 1 over the Mohlosane River to the third concentrator • Vehicle access road 2 over the Mohlosane River to the third concentrator • Conveyor crossing service road 3 over the Mohlosane River to the third concentrator
	j	Removing water found underground.	• PPRust north open pit (including central and south pits) • Zwartfontein south open pit • MNC dewatering boreholes
	g	Disposing of water containing waste	• West WRD • East WRD • Pollution control dam (PCD) • WRD run off pollution control dam • MNC pollution control dam: excess plant water and runoff (PCD-NC) • Mining complex stormwater dams 1 & 2 – truck and heli pollution control dams • MNC sewage works (sewage effluent reused in the process) • Contractors camp sewage works • Landfill site with dirty water dam • RWD extension (tailings return water) • Vaalkop TSF 1 & 2 • Zinc dam central (pit water for use as dust suppression on roads) • Zinc dam wash bay (plant water from MNC for use as dust suppression on roads) • Roads (irrigation of roads with water containing waste for dust suppression) • Ore stockpiles • Concentrator Pollution Control Dam • M3C Bulk Ore Stockpile 1 (low grade) • M3C Bulk Ore Stockpile 2 (low grade) • M3C Bulk Ore Stockpile 3 (low grade) • M3C Bulk Ore Stockpile 4 (low grade) • M3C high grade ore stockpile • Buffer Water Storage Dam

Farm	Section 21 Water Uses		Infrastructure
	Description		
Vaalkop 819 LR	a	Abstraction of groundwater 2 Mℓ/d	• PPL wellfield (including on the farms Overysel 815 LR, Zwartfontein 818 LR, and Sandsloot 236 KR)
	c	Impeding or diverting the flow of water in a water course	• Pipeline and haul road crossing • Bridge crossing the Groot Sandsloot River carrying pipelines and upgrade of existing access road
	i	Altering the bed, banks, course or characteristics of watercourse	• Pipeline and haul road crossing • Bridge crossing the Groot Sandsloot River carrying pipelines and upgrade of existing access road
	j	Removing water found underground	• Zwartfontein south open pit
	g	Disposing of water containing waste	• Vaalkop TSFs 1 & 2 • RWD and portion of extension - tailings return water • Southern concentrator sewage works - sewage effluent reused in the process • Dam 1160 - pit water and treated sewage effluent • SP dam - runoff from workshop in settling pond (in series with sump) • Erichsen dam - process water at MSC • SWS dam - runoff from workshop in stormwater sump dam (in series with settling pond) • OS1 (oil sump) • OS2 (old and new dams) - water from workshop oil trap stored in oil sump dam • Roads - irrigation of roads with water containing waste for dust suppression • Zinc Dam ZFT - (pit water for dust suppression on roads) • Landfill site • WRD W07 (Sandsloot and Vaalkop) • Ore stockpiles
Sandsloot 236 KR	c	Impeding or diverting the flow of water in a water course	• Haul road over culvert crossing • Culvert • Diversion of the Groot Sandsloot River
	i	Altering the bed, banks, course or characteristics of watercourse	• Haul road over culvert crossing • Diversion of the Groot Sandsloot River
	j	Removing water found underground	• Sandsloot open pit

Farm	Section 21 Water Uses		Infrastructure
	Description		
			• Portion of Zwartfontein open pit
	g	Disposing of waste rock	• WRD RS3 • WRD W07 (Sandsloot and Vaalkop) • Ore Stockpile SS, ZWS
Blinkwater 244 KR and Rietfontein 240 KR	a	Abstraction of 1.8 Mℓ/day	• Blinkwater wellfield
Molendraai 811 LR, Moordkopje 813 LR Commandodrift 811 LR.	a	Abstraction of 1.0-1.4 Mℓ/d	• Commandodrift wellfield

29.2.5 Impacts to be mitigated in their respective phases

The impact assessment in Section 18 details the potential impacts associated with proposed Expansion Project during the pre-construction, construction, operational, closure and rehabilitation and post closure phases.

29.2.6 Impact management outcomes

In addition to the implementation of the management measures detailed in Sections 18 the compliance standards, that are applicable to the identified impacts are included in Table 19-2 below.

Table 19-2: Compliance Standards to be achieved with regards to social and environmental aspects

Environmental aspect	Phase/Time period	Standard to be achieved	Compliance with standards
Soils, Land Use and Land Capability Terrestrial Ecology	Continuous during construction, operations and closure.	To prevent soil contamination by implementation of: • Inspection and maintenance Plan; • Leak/Spill Procedure' • Emergency Preparedness Plan; • Waste Management; and	Manage soils in line with the requirements of the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN 37603 No 331). Anglo American Policies and Guidelines to manage and remediate spills.
	Continuous during construction, operations and closure.	To demonstrate active stewardship of land and biodiversity by: • Identifying and removing relevant species if necessary;	Anglo American Biodiversity Performance Standards Manage soils in line with the requirements of the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN 37603 No 331). Anglo American Policies and Guidelines to manage and remediate spills. GNR 893 Minimum Emission Standards.
Surface water	Continuous during construction, operations and closure.	To avoid or where not possible, minimise and remedy pollution of water • Implementing a Leak/Spill Procedure; • Continuously implementing the surface water monitoring programme; • Compiling monitoring report; • Implementing Stormwater Management Plans; and • Responding to complaints and implementing a grievance mechanism. • Compliance to WUL	Water Quality Objectives as specified in the Water Use License issued by DWS Anglo American Policies and Guidelines to manage and remediate spills.
Groundwater	Continuous during construction, operations and closure.	No dirty water spillage to the catchment thereby preventing contamination of waterbodies downstream by: • Continuously implementing the groundwater monitoring programme and model; and	Anglo American Policies and Guidelines to manage and remediate spills. Water Quality Objectives as specified in the Water Use License issued by DWS

Environmental aspect	Phase/Time period	Standard to be achieved	Compliance with standards
		• Responding to complaints and implementing a grievance mechanism with regards to groundwater. • Compliance to WUL	
Air Quality	Continuous during construction, operations and closure.	To minimise the entrapment potential of dust. • To keep PM_{10} (and in the future, $PM_{2.5}$) and dust fallout levels at key receptor sites around the project area within guideline levels. As the guidelines vary depending on the priority area and year, the South African Air Quality Information System (http://www.saaqis.org.za/) will be consulted for the most recent guidelines. These aforementioned standards will be achieved by: • Continuously implementing the dust monitoring programme; and • Appropriate dust suppression techniques.	GNR 893 Minimum Emission Standards. Anglo Air Quality Performance Standards.
Noise	Continuous during construction, operations and closure.	To minimise noise impacts on sensitive receptors by: • Developing a complaints register to record complaints regarding noise. • To maintain noise levels at the standards for suburban areas (SANS 10103) as far as practicable.	Compliance with SANS 10103 Acceptable Ambient Levels and SANS 10210 of 2004, the national standard for the calculating and predicting of road traffic noise SANS 10328 of 2008 Noise Control Regulations – General Notice R154 of 10 January 1992
Heritage	Continuous during construction, operations and closure.	To ensure heritage resources are not damaged during the mining process	Ordinance on Excavations (Ordinance no. 12 of 1980) (replacing the old Transvaal Ordinance no. 7 of 1925).
Social	Continuous during construction, operations and closure	To enhance benefits from the development of the Project; • To maximize opportunities for local residents; • To facilitate employment of local labour on the Mine; and • To avoid creating unrealistic expectations. These standards will be achieved by the implementation of the SLP and Social Management Plan, SED Plan, Stakeholder Engagement Plan and other Social Performance policies, procedures and plans.	Anglo American Closure Toolbox. Anglo American Social Way Anglo American Environmental Way

30 Financial provision and closure plan

The information provided in this section is sourced from the closure plan developed for the proposed Expansion Project (Refer to Appendix 18).

The infrastructure and activities associated with the proposed Expansion Project will increase the existing Mogalakwena Mine liability by an amount of R 189 713 390.54.

AAP 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 Expansion Project.

30.1 Closure Objectives

Closure objectives for Mogalakwena Mine have been developed as part of the closure plan and include the following:

- Adhere to all statutory and other legal requirements.
- To develop landforms and land-uses that are stable, sustainable and aesthetically acceptable on closure.
- Ensure safety & health of all stakeholders during closure and post closure and that communities using the site after closure are not exposed to unacceptable risks.
- Ensure that closure supports productive uses, where practical, considering pre-mining conditions and agree with commitments to with stakeholders.
- Physically and chemically stabilise remaining structures to minimise residual risks.
- Promote biodiversity and biological sustainability to the maximum extent practicable.
- Utilize closure strategies that promote a self-sustaining condition with little or no need for ongoing care and maintenance.
- To achieve agreed quality targets set by the Catchment Management Agency (CMA) and the DWS as far as practical relative to impacts and reasonability to achieve.

The infrastructure associated with the Expansion Project which will be rehabilitated is provided in Figure 6-2 and described in Section 6.

The closure objectives listed above were based on an extensive environmental database and baseline information gathered during the LoM so far, as well as the baseline studies undertaken as part of the specialist investigations as detailed in Section 14.

Although the final closure quantum will be refined once the project is completed, commissioned and fully operational, SRK is of the opinion that the estimate of liability is a reasonable reflection of the anticipated closure costs and is of the opinion that the liability is sufficient for the operation to adhere to the closure objectives.

A baseline closure risk assessment was undertaken during 2016 using the Anglo American Plc risk assessment process, where the risk is described and then a determination is taken to assess the nature of the risk and then the risk is ranked according to predetermined criteria for probability and consequence. This baseline was subsequently updated in 2017 and 2018. For purposes of this report, the 2018 risk assessment has been updated to reflect possible closure risks associated with the Expansion Project. These risks and the mitigation thereof informed the development of the closure objectives.

30.2 Consultation with landowners and interested and affected parties

The objectives in relation to closure as detailed in Section 30.1 and rehabilitation will be made available for landowner and public consultation as part of the public participation process detailed in Sections 13.6 and 13.7

30.3 Rehabilitation Plan

The final rehabilitation plan will only be developed once sufficient information is collected from the monitoring of areas where rehabilitation concurrent with mining activities has been undertaken. The learnings from the areas already rehabilitated will be utilised to inform scientifically sound, safe and technically feasible solutions to achieving the rehabilitation objectives. The intention of the plan will be to achieve the objectives in Section 30.1.

30.4 Closure Actions

The rehabilitation actions that the operation intends undertaking at the end of the life of the Expansion Project are described below, with these based on the closure actions for the remainder of the operation as described in the Final Decommissioning, Rehabilitation and Closure Plan (FDRCP) (SRK, 2018). These actions are designed to comply with the requirements of this rehabilitation plan's objectives and the requirement for the development of risk mitigation closure strategies identified during the risk assessment.

30.4.1 North Waste Rock Dump

The strategy will be to undertake closure activities that will result in a stable landform, capable of supporting a vegetation community analogous with surrounding grasslands, where the generation of contact water and sediment laden runoff is limited by the incorporation of appropriate covers in the closure design. Aesthetics associated with the dumps will be improved as a consequence of the establishment of vegetation on these facilities.

Trials will be undertaken to identify the optimal closure slope angles, with there being a possibility that different angles can be used on different positions on the dump and on different morphological aspects. It is likely that the closure angles will be between 18° to 24°.

Historical information indicates that opportunistic vegetation is limited, implying that a form of growth medium is required. During operations, trials will be conducted to determine whether there is a blend of saprolite and topsoil that can be formed to sustain vegetation, without the blend being dispersive and subject to slumping and erosional influences. The cover placement strategy, after reshaping to the desired angle, is likely to include:

- Growth medium placed on the lower slopes of all facilities. This is required to limit sediment washout from higher up the slopes, migrating to the toe of the facilities. It is also required to limit sediment generation from the lower slopes. Vegetation will be established in line with the Vegetation Management Plan (VMP) that will be developed to support revegetation activities at the mine.
- Islands of growth medium placed on the higher slopes to form nodes from which plants may be distributed to other portions of the slopes. The size and spacing of these nodes will be determined from field trials established during the operational period. Vegetation will then be established in line with the VMP.
- The top surfaces of all facilities may require cover with growth medium and vegetation establishment to limit dust generation. Trials will be conducted to determine whether saprolite with appropriate ameliorants will support a vegetation population on these surfaces.
- Access ramps to the top of the dumps will remain while the top is being reclaimed. Once complete, ramps will be reshaped to a profile similar to the rest of the dump.

Where the potential exists, as determined by the physical and geochemical characteristics of the waste rock, the waste rock facilities will remain open for processing by third parties.

30.4.2 Tailings storage facility

Closure activities that will result in a stable landform capable of supporting a vegetation community analogous with surrounding grasslands, where the generation of contact water is limited by the incorporation of vegetation covers in the closure design, will be implemented for Blinkwater 2 TSF. This is in line with the requirements for the existing Blinkwater 1 TSF.

Closure actions will include the following:

- As there is a negative meteoric water balance, excess inventory on the TSF's and in the Return Water Dams will be evaporated and no active dewatering is anticipated.
- All civil structures not required for the management of the facility will be decommissioned, which includes the backfilling of the decant structures.
- The final design profile of the Blinkwater 2 TSF will be downstream embankment at a slope of 2.4H: 1V slopes. Reshaping requirements will be assessed based on the outcomes of the vegetation trials to be undertaken by Mogalakwena Mine on the operational WRDs. Vegetation will then be established in line with the requirements of the VMP.
- A system of paddocks created on the top surface may limit vegetation establishment, depending on how saturated these paddocks remain. Therefore, storm water management will include the construction of spillways discharging to the environment to manage the 1:100 year return flood events, rather than containing water for evaporation in paddocks on the top surface. Mogalakwena Mine assumes that the quality of the contact water will achieve discharge standards, particularly as there will be limited evaporative concentration of any rain water falling on the surface.
- During the final stages of the life of the TSF, deposition will be undertaken to achieve a beach which drains towards the spillways on each of the facilities.
- Experience indicates that vegetation can be established directly onto the surface of the tailings without the placement of growth medium. Therefore, vegetation will be established straight onto the tailings surface. However, a growth medium cover will be required on the rock embankments. Given the material size distribution on the embankment, an intermediate cover of crushed waste rock may be required to provide a more homogenous surface for growth medium placement. The requirement for this will be determined during future iterations of the closure plan. Vegetation will be established in line with the requirements of the VMP.
- Energy dissipaters will be used on the downstream side of the conveyance structure from the spillway to reduce velocity prior to discharge of the water to the receiving water body.
- The existing seepage control structures at the toe of the TSF will be retained for the closure period.

30.4.3 Concentrators and associated infrastructure

All infrastructure for which there is no approved third party post closure (either at the proposed M3C or at the upgrades to the MNC) use will be decommissioned and the footprints reclaimed for the establishment of grasslands. Infrastructure where there is a third party use will be legally transferred to the relevant third parties.

Material inventories will be managed near the end of operations to minimize any surplus materials at closure. Fuel, lubricants and other materials needed to support the closure activities will be utilized during the closure period. The majority of the fuel storage facility will be closed during the first year of operations, but some fuel storage capacity will be required until all equipment has been demobilized from the site at the end of the closure period.

Where practicable, equipment and materials with value not needed for post closure operations will be sold and removed from the site. All other equipment will be demolished and disposed of on-site. Equipment with scrap or salvage value will be removed from the plant and stored either in the existing salvage yard or a facility designated for this purpose during the closure period.

A soil contamination investigation will be conducted on completion of demolition activities, particularly in excavations remaining open following decommissioning. The purpose of this will be to identify areas of possible contamination and design and implement appropriate remedial measures to ensure that the soil closure criteria are obtained.

Excavations remaining following demolition, foundation and slab removal and those where contamination remediation has been undertaken will be filled with waste rock and covered with growth medium. The depth of growth medium placed and the vegetation established will be dependent on the outcomes of VMP. Sufficient growth medium will be placed to allow for the successful establishment of vegetation. Cover and growth medium placement will be undertaken to promote proper runoff drainage and prevent the formation of low points where water may pond.

Closure actions for the buildings will include the following:

- The water and power reticulation and associated infrastructure will be retained until such time as water and power are no longer needed on site. Once no longer required, all power and water services to be disconnected and certified as safe prior to commencement of any demolition works.
- All remaining inert equipment and demolition debris will be placed in the base of the nearest open pit.
- Salvageable equipment will be removed and transported offsite prior to the commencement of demolition.
- All fittings, fixtures and equipment within buildings will be dismantled and removed to designated temporary salvage yards until removed as scrap or disposed as waste.
- All tanks, pipes and sumps containing hydrocarbons to be flushed or emptied prior to removal to ensure no hydrocarbon/chemical residues remain.
- All above ground electrical, water and other service infrastructure and equipment to be removed and placed designated temporary salvage yards until removed as scrap or disposed as waste.
- All pond liners to be removed for disposal in designated landfills.
- Electrical, water and other services that are more than 400 Mogalakwena Mine below ground surface will remain.
- All pipes and structures deeper than 400 mm need to be sealed to prevent possible ingress and ponding of water.
- Concrete slabs and footings will be removed to a depth of 500 mm below ground surface. This concrete (and metal) will be broken up and disposed of in the pit.
- All concrete below 500 mm depth will remain underground with the invert of all structures broken/sealed to prevent possible ingress and ponding of water.
- Soils beneath the plant, storage tanks and chemical storage areas will be sampled. Any contaminated soils found will be removed for disposal as per the mines Waste Management Plan.
- All subsurface cavities such as reinforced concrete tunnels under stockpiles and septic tanks will be backfilled.
- All excavations resulting from demolition of plant, buildings, roads, conveyor platforms, etc. and earth structures will be left in a safe manner.
- All telecommunication towers and dishes to be dismantled and removed.

30.4.4 Roads, laydown and parking areas

Mine roads that are not needed for closure and post closure uses at the site (e.g. security and monitoring) will be closed. Where possible the larger roads that are retained will be resized for post closure use by regrading and ripping to a width that is appropriate for anticipated post closure traffic.

Closure actions for the roads, laydown and parking areas will include the following:

- Removal of all signage, fencing, shade structures, traffic barriers, etc.
- All ‘hard top’ surfaces to be ripped and bitumen removed along with any culverts and concrete structures.
- Where possible preserve existing vegetation – native trees and plants that may currently be incorporated in parking areas.
- All concrete lined drainage channels and sumps to be broken up and removed.
- All excavations or vertical walls resulting from removal of foundations or structures are to have sides slopes battered to 2H:1V and are to be made safe pending final reclamation work.
- All potentially contaminated soils are to be identified and demarcated for later remediation.
- All haul routes that have been treated with dust suppression water need to be sampled to determine whether they need to be treated as “sealed” roads with the upper surface ripped and removed and disposed of as per the mines Waste Management Plan.

30.4.5 Buffer dam

The dam will ultimately be reclaimed and the area shaped to form a stable landform congruent with the surrounding landscape. The dam will, however, be retained during the majority of the closure period to provide water for closure activities as well as to capture any residual seepage and contact water which may be generated on the site.

Closure actions for the dam will include:

- Demolish all concrete structures.
- Remove any silt that accumulated in the dam and classify in line with regulations. Silt to be managed as per the mines Waste Management Plan.
- Remove liners and following waste classification testing, dispose appropriately. If the liner is not identified as a potential future contamination risk, the liner will be buried in situ. Prior to burial, the liner will be punctured or cut so that that natural geohydrological conditions are minimally impacted at closure.
- Backfill excavations with material removed during construction which will be located adjacent to the dams.
- Profile footprint to be free draining with no low points to accumulate water.

30.4.6 Waste management

Waste will be classified as necessary and then depending on the classification handled according to the mines Waste Management Plan. Likely activities are:

- Designated temporary salvage yards will be developed for the storage of mobile equipment, structural steel and mechanical equipment or other equipment with a potential resale or scrap value. The location of these yards will be dictated by existing permitted land clearance. Material will be stored in these salvage yards until opportunities for resale/reuse are exhausted. Residual material will be disposed of according to the Waste Management Plan;
- It may be necessary for security reasons to fence temporary salvage yards particularly where these are located close to public roads.
- Once material is removed from the yards (either through sale or disposal), temporary infrastructure will be demolished, compaction loosed by ripping and the footprint revegetated as per the VMP.

30.4.7 Storm water management

Prior to closure, a water management plan will be prepared to identify which structures are required at closure and which can be decommissioned. Ditches decommissioned will be closed by backfilling the excavations with the material removed and placed adjacent to the structures. Bunds not required will be flattened by redistributing the material across the footprint used to borrow the material for construction.

30.4.8 Fencing and walling

Walls will be demolished by breaking the concrete panels or bricks and mortar and removing support posts from the ground. Rubble and scrap metal will be recycled and where there are not alternatives be disposed to landfill. Excavations for support posts will be backfilled with growth medium. The footprints of the demolished walls will then be rehabilitated as per the footprints for other infrastructure being demolished.

Security fencing around individual infrastructure will be removed once fences are redundant. Support posts will be removed by excavating to base level if necessary. Excavations will be backfilled with growth medium and vegetation established.

30.4.9 Vegetation and wildlife

Successful revegetation will help control erosion of soil resources, maintain soil productivity and reduce sediment loading in streams. As part of biodiversity management, revegetation will enhance the resulting biodiversity opportunities by utilizing non-invasive plants that fit the criteria of the habitat (e.g. soils, water availability, slope and other appropriate environmental factors). Invasive species will be avoided, and the area will be managed to control the spread of these species.

The slopes at the mine residue facilities are likely to be susceptible to erosion, even after reshaping the facilities to a lower gradient. To counter the effects of erosion, naturally occurring grassland species will be planted on the slopes and tops of the facilities. At this time, these species will provide soil holding capacity and reduce runoff velocity. The composition of the natural species and their planting strategy will be determined through revegetation trials conducted concurrently with mining.

The flatter areas, such as those not on mine residue facilities, will be revegetated with the objective of creating a sustainable ecosystem similar to an analogues reference plots.

No specific measures will be taken to reintroduce wildlife as the different animals still occupying the remaining habitat are expected to expand their territories into the Mogalakwena Mine area.

30.5 Future land use after decommissioning

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 Expansion Project nor has it been undertaken for the large mining rights area, for purposes of current planning and liability costing for the Expansion Project, various assumptions relating to closure have been developed.

Given the extent of the disturbance within the lease area, with the majority of the disturbance remaining post closure in the form of mine residues (tailings and waste rock) and various open pits, post closure land use is unlikely to contain alternatives that could be utilised sustainably by the community. However, should infrastructure be demolished, 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 Mines17, with these covers expected to support landforms that support indigenous vegetation. Flat areas where decommissioning activities are undertaken will be converted to a mosaic of land where the intended use is industrial and agricultural.

As the nature of the disturbance associated with the Expansion Project is similar to that which already exists for the operational infrastructure, the PCLU for the Expansion Project is aligned with the above. It is likely that on closure of the expansion infrastructure, the residues will present few sustainable land use options to the communities, however, infrastructure that remains, as well as the footprints that remain, after decommissioning may have associated sustainable post closure land uses.

As the demographics of the areas surrounding the mine may change at closure as communities potentially move in seek of other livelihoods, pressures on the land may reduce. 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

[17] Now known as Minerals Council South Africa

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.

31 Mechanisms for Monitoring Compliance

Internal and external environmental monitoring is undertaken on an ongoing basis at Mogalakwena Mine as required in the relevant authorisations, permits and licences. Details associated with the compliance monitoring is provided in the sections below.

31.1 Monitoring of impact management actions

A performance assessment against this EIA/EMPr, which includes all the previously approved EMPr undertaken for Mogalakwena Mine, will be undertaken every second year to assess the compliance against:

- Impact management measures for the:
    - the Expansion Project infrastructure and activities as detailed in Section 18; and
    - previously approved EMPrs detailed in Appendix 9.

31.2 Responsible persons for implementation of management actions

The responsible persons for the implementation of the management measures, as listed in 31.1, and the monitoring of environmental compliance at Mogalakwena Mine is provided in Table 2-5.

31.3 Time period for implementation of management actions

The infrastructure and activities associated with the Expansion Project are aligned with the planned LoM of Mogalakwena Mine. The time period for the implementation of the management actions associated with the proposed Expansion Project will be aligned with the different phase of the expansion activities as detailed in Section 18 .

31.4 Specific environmental monitoring requirements

This section details the existing and proposed specific environmental monitoring requirements for Mogalakwena Mine and includes the monitoring of the following:

- Surface and ground water;
- Biomonitoring;
- Air quality;
- Noise;
- Soils;
- Post Rehabilitation monitoring.

31.4.1 Surface and groundwater

MM has an extensive monitoring program which includes all water and waste management facilities and has been aligned with BPG G3 (DWAF, 2006), as well as the objectives set out in the Anglo Water Management Guideline (GTG 21). According to the Anglo guideline this program must include as a minimum:

- responsibility for the monitoring program;
- locations of routine samples to be taken and purpose;
- required sampling and preservation guidelines (surface / groundwater);
- analytical parameters required per sample;
- frequency of sampling;

- sample quality/custody controls; and
- data management, and reporting.

Sampling of surface water and groundwater is done by Mogalakwena Mine staff and external appointed companies.

Water resources are currently monitored in the Mohlosane and Groot Sandsloot (Pholotsi) River, upstream and downstream of mining activities and on Vaalkop Dam. Samples are submitted to an approved laboratory for analyses and check samples are sent to the SABS laboratories to verify results. Surface, process and groundwater are monitored monthly, and rest water levels are measured biannually.

The sampling protocol is reviewed every two years and all parties involved in the monitoring are informed of updates (Groundwater and Surface water Monitoring Procedures MS-SHE-ENV-PRO-0009 and MS-SHE-ENV-PRO-0004, respectively).

MM's WULs identifies the groundwater and surface water monitoring points required to be sampled. The monitoring program has expanded considerably since the issuing of these WULs. The intention of the WULs is to ensure protection of the resource and downstream users. The current monitoring program in place is designed to:

- monitor process water, discharges, effluents and receiving water to identify impacts caused by Mogalakwena Mine operations;
- measure compliance to WUL;
- determine the extent of groundwater pollution plumes;
- determine the fitness for use of water for potential downstream/down gradient users;
- inform Mogalakwena Mine's water management strategy, which is reliant on the implementation of a well-designed and maintained monitoring program and database.

Quantity monitoring includes water consumption and metering of the various water and waste streams on the mine. The data is reflected in the mine water balance.

A WUL is being applied for as part of the integrated environmental authorisation process for the Expansion Project. As agreed with DWS at the pre- application meeting, the water uses from the 2007 and 2017 WULs be consolidated and included in the new WULA for the Mogalakwena Mine expansion project. Refer to Section 29.2.4 and Appendix 17: for further details relating to the new water uses associated with the proposed Expansion Project.

Surface and groundwater monitoring at the mine will be undertaken in line with the requirements specified in the WUL, which will include additional monitoring requirements associated with the Expansion Project.

31.4.2 Biomonitoring

Stream assessment scoring system (SASS5) aquatic biomonitoring is not undertaken at Mogalakwena Mine due to the intermittent flows experienced in the rivers only during rainfall events and the main river flow being subsurface. Mogalakwena Mine requested that the biomonitoring conditions within the 2007 WUL be removed and this was granted by the Department in 2010. As a result, biomonitoring is not conducted regularly at Mogalakwena Mine, however, habitat assessments of the rivers have been undertaken during specialist field investigations.

31.4.3 Air quality monitoring

Air quality at Mogalakwena Mine is monitored through 32 Dust Fallout (DFO) monitoring and three PM_{10} monitoring points situated across the mining area. Currently the DFO sampling stations consist of 18 residential area DFO units and 13 non – residential area DFO units. The location of the monitoring stations is listed in Table 14-13 and shown in Figure 14-11.

31.4.4 Noise monitoring

Noise monitoring was undertaken as part of the noise impact assessment. The location of the monitoring points is listed in Table 14-5 and shown in Figure 14-6.

The Noise Impact Management Plan for the proposed mine expansion project is shown in Table 31-1.

Table 31-1: Noise monitoring plan for the mine expansion project

Action	Description	Frequency
Management objective	To ensure that the legislated noise levels will be adhered to at all times.	Quarterly for a period of a year after which the frequency can change to an annual basis.
Monitoring objective – Construction phase	Measure the environmental noise levels during the construction phase of the project to ensure compliance to the recommended noise levels.	Quarterly for a period of a year after which the frequency can change to an annual basis.
Monitoring objective – Operational phase	Measure the environmental noise levels during the operational phase of the project to ensure compliance to the recommended noise levels.	Quarterly for a period of a year after which the frequency can change to an annual basis.
Monitoring technology	The environmental noise monitoring must take place with a calibrated Class 1 noise monitoring equipment.	Quarterly for a period of a year after which the frequency can change to an annual basis.
Specify how the collected information will be used	The data must be collated and discussed on a monthly basis during the construction phase and on a monthly basis during the operational phase for the first two years thereafter on an annual basis.	Quarterly for a period of a year after which the frequency can change to an annual basis.
Spatial boundaries	At the boundaries of the identified abutting residential areas as well as at the boundaries of the different mining areas.	Quarterly for a period of a year after which the frequency can change to an annual basis.
Define how the data will be analysed and interpreted and how it should be presented in monitoring reports	Reports must be compiled for each monitoring cycle and the results must be compared to the previous set of results to determine if there was a shift in the prevailing ambient noise.	Quarterly for a period of a year after which the frequency can change to an annual basis.
Accuracy and precision of the data	The noise surveys will have to be conducted in terms of the recommendations of the Noise Control Regulations and SANS 10103 of 2008.	Calibrated equipment must be used at all times and at noise monitoring points.

31.4.5 Soils

During the rehabilitation of the impacted areas soil quality monitoring should be carried out to accurately determine the fertiliser requirements that will be needed. Additional soil sampling should also be carried out on the re-instated soils as required until the levels of nutrients are at the required levels for sustainable growth.

Once the desired nutritional status has been achieved, it is recommended that the interval between sampling is increased. An annual environmental audit should be undertaken as part of the monitoring strategy.

If growth problems develop, ad hoc, sampling should be carried out to determine the problem.

Monitoring should always be carried out at the same time of the year and at least six weeks after the last application of fertilizer

Soils should be sampled and analysed for at least the following parameters:

- pH (H_2O)
- Phosphorus (Bray I)
- Electrical conductivity
- Calcium mg/kg
- Cation exchange capacity
- Sodium mg/kg;
- Magnesium mg/kg;
- Potassium mg/kg
- Zinc mg/kg;
- Clay Organic matter content (C %)

The following management and maintenance is also recommended:

- During rehabilitation and the establishment of the vegetative cover the sites must be fenced, and all animals kept off the area until the vegetation is self-sustaining;
- Newly seeded/planted areas must be protected against compaction and erosion ;
- Traffic should be limited were possible while the vegetation is establishing itself;
- Plants should be watered and the sites weeded as required on a regular and managed basis were possible and practical;
- Check for pests and diseases at least once every two weeks soon after planting, and treat if necessary;
- Replace unhealthy or dead plant material;
- Planted (Hydro seeded and grassed) areas should be fertilised soon after germination, and
- Repair any damage caused by erosion

31.4.6 Closure and post closure period

The purpose of implementing closure actions detailed in Section 30.4, is to reduce closure risk to an acceptable residual risk timeously. Based on the work required, AAP has determined that closure will be implemented over a five-year period, based on the premise that significant remedial work will have been undertaken on the WRDs and decommissioned infrastructure during the remaining Life of Mine.

Once the closure activities have been completed, the operation will enter a ten-year post closure period. During this time, erosion repair and vegetation establishment will be undertaken, if monitoring activities indicate that it is required. This is within the context that the areas under consideration in this plan are flat and are not likely to be subject to significant erosion.

A post closure period of ten years is considered by AAP to be sufficient time as biological process can be demonstrated to be occurring, leading to vegetation covers being stable and sustainable, within this timeframe. Furthermore, sufficient data can be collected to demonstrate that the achievement of the specific relinquishment criteria comply with the trend for the biophysical category under consideration.

31.4.7 Continuous maintenance

The mine undertakes continuous maintenance on infrastructure that has the potential to affect the environment. This infrastructure includes pipelines, roads, conveyors and infrastructure traversing watercourses. The maintenance is a result of planned inspections on these facilities where specific requirements for maintenance on the above infrastructure is required and is conducted in line with a maintenance schedule.

31.5 Frequency of the submission of the performance assessment report

A formal audit of the performance assessment of the EMPr will take place every 2 years.

31.6 Environmental awareness plan

The proposed project will utilise the existing Mogalakwena Mine SHE Department Environment – Competence, Training and Awareness procedure attached in Appendix 20:.

31.7 Specific information required by the competent authority

The DMR approved the Final Scoping Report and requested that the items detailed in Table 1-2 be addressed in the EIA/EMPr. Responses to the information request is also included in this table. Please refer to the DMR acceptance letter in Appendix 4.

31.8 Undertaking.

I Franciska Lake herewith confirm:

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

Signature of the EAP

DATE: 5 November 2019

I Ashleigh Maritz herewith confirm:

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

Signature of the EAP

DATE: 5 November 2019

I Kavilan Naidoo herewith confirm:

- The correctness of the information provided in the reports;
- The inclusion of comments and inputs from stakeholders and Interested and Affected parties;
- The inclusion of inputs and recommendations from the specialist reports where relevant; and

- The acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

Signature of the EAP

DATE: 5 November 2019

32 Statement of SRK Independence

Neither SRK nor any of the authors of this 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 Mogalakwena Mine 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.

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Franciska Lake

Principal Partner

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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