Draft Basic Assessment Report and Environmental Management Programme to amend the Waste Management Licence for the Proposed Extension and Reconfiguration of the North Waste Rock Dump to be located at Anglo American Platinum, Rustenburg Platinum Mines, Mogalakwena Complex, Limpopo Province

Ref: LP 30/1/2/3/2/1 (50) EM

Report Prepared for

Anglo American Platinum Limited – Mogalakwena Complex

Report Prepared by

srk consulting

June 2022

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Anglo American Platinum Limited – Mogalakwena Complex

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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 Anglo American Platinum Mogalakwena Complex (AAP). The opinions in this Report are provided in response to a specific request from AAP 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.

mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

DRAFT

BASIC 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 Complex

TEL NO: 015 418 2000

FAX NO: 086 776 3656

POSTAL ADDRESS: Anglo American Platinum Ltd, Mogalakwena Complex, Private Bag X2463, Mokopane, 0600

PHYSICAL ADDRESS: Sandsloot Farm, N11 Groblers Bridge Road, Mokopane

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 basic assessment process is to, through a consultative process—

(a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;

(b) identify the alternatives considered, including the activity, location and technology alternatives;

(c) describe the need and desirability of the proposed alternatives;

(d) through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focussed on determining the geophysical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within the sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:

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

  (ii) the degree to which these impacts—

  (aa) can be reversed;

  (bb) may cause irreplaceable loss of resources, and

  (cc) can be managed, avoided or mitigated;

(e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to-

  (i) identify and motivate a preferred site, activity and technology alternative;

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

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

Executive Summary

Mogalakwena Complex is a wholly owned subsidiary of Anglo American Platinum Limited (AAP) and was originally called the Potgietersrus Platinum Mine; however, 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 AAP, Rustenburg Platinum Mines (RPM), Mogalakwena Complex.

Project Description

In 2019 an application was made to the Department of Mineral Resources and Energy (DMRE) for an Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) and a Waste Management Licence (WML) in terms of the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA) for, amongst other mining related activities and infrastructure, a new Waste Rock Dump of a 130ha, known as the North Waste Rock Dump (NWRD), and an ore stockpile and associated infrastructure at Mogalakwena Complex. In addition to the application for an EA and WML, a Water Use Licence Application was submitted to the Department of Water and Sanitation (DWS) in terms of the National Water Act (Act No. 36 of 1998) (NWA) for water uses associated with the NWRD, ore stockpile and associated infrastructure.

The authorised NWRD[1] of a 130ha (which has not been developed) included the following:

- Water management infrastructures to manage surface water runoff from the site;
- Haul roads to the authorised NWRD to be located between the North Open Pit and the authorised NWRD; and
- Ore stockpile are of 80ha to be placed in the area between the edge of the existing North open pit and the authorised NWRD area.

Mogalakwena Complex received an integrated[2] (NEMA and NEM:WA) environmental authorisation (LP30/5/1/2/3/2/1 (050) EM) on 13 August 2020 and a Water Use Licence (WUL) No. 07/A61G/ABCGIJ/9887 on 4 December 2020, covering the approval of the NWRD, water management infrastructure, ore stockpile area and haul roads.

Subsequent to the receiving the EA and WUL for the NWRD, water management infrastructure, ore stockpile and haul roads, AAP decided that the ore stockpile was not longer required and the area could be utilised for additional waste rock.

Based on the above, the project requires an amendment to the existing WML in terms of NEM:WA GN R 921 under Category A through a Basic Assessment process to be undertaken in terms of NEMA to extend and reconfigure the NWRD.

As a result of the Biodiversity Assessment undertaken to support this Basic Assessment (BA) process to extend the NWRD over the authorised ore stockpile, a wet response habitat was identified within the NWRD proposed extended footprint area (previously the ore stockpile area now designated for waste rock disposal). Subsequently, a freshwater ecosystem assessment delineated the wet response habitat as a seep wetland with a channelled outflow. The wet response is likely formed as a result of bedrock interflow that reaches an impermeable layer beneath the ground and is forced to surface at this location. This has formed an isolated area within the landscape which accumulates surface water in sufficient quantities to allow wetland soils and vegetation to persist and is therefore classified as a

[1] As authorised in 2019 (130ha)
[2] Integrated Environmental Authorisation was issued in terms of the National Environmental Management Act, Act 107 of 1998 (NEMA) and National Environmental Management: Waste Act, Act 59 of 2008 (NEM:WA).

watercourse under the National Water Act, 1998 (Act 36 of 1998). This isolated area supports vegetation typically adapted to life in saturated soil, it is considered to be of low/marginal ecological significance since it is hydrologically isolated and not significant in terms of biodiversity support.

Therefore, Mogalakwena Complex is proposing to extend and reconfigure the approved 130 ha footprint of the authorised NWRD to include a 500 m wetland protection buffer resulting in a total reduced reconfigured footprint area of approximately 128 ha, including the stormwater infrastructure described in Section 10.11.

The application for authorisation was submitted to the Limpopo Province's DMRE for consideration. An updated NWRD design report will be submitted to the DWS for approval in terms of the WML.

This report is titled Draft Basic Assessment Report and fulfils the requirements for a BA as contemplated in the NEMA 2014 EIA Regulations, as amended.

AAP appointed SRK Consulting (South Africa) (Pty) Ltd (SRK) as an independent Environmental Assessment Practitioner (EAP) to undertake the BA and associated public participation.

Outcomes of the impact assessment

The impact assessment undertaken by the EAP, as part of the environmental authorisation process for the project , followed due process to inform the study in accordance with the EIA Regulations of 2014, as amended. The BA process included an assessment of the identified potential impacts, undertaking the legislated required public participation process and the development of an EMPr. As an impact assessment had already been undertaken for the proposed NWRD as part of the Environmental Management Programme (EMPr) Amendments Project (authorised in August 2020), the biophysical and socio-economic impacts are largely understood, however, SRK (together with its appointed specialist sub-consultants) has revised the assessment conducted in 2019 to factor the change of the extended footprint from an ore stockpile use to additional NWRD footprint use.

Assuming all phases of the project adhere to the mitigation and management commitments stipulated in this BA/EMPr, it is believed that the 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.

Conclusion

The environmental authorisation process associated with the project was undertaken in terms of the relevant environmental authorisation requirements as detailed in Section 5.

In terms of the locality of the proposed project, the key area of sensitivity which would need to be taken into consideration during the initial dumping phases of the NWRD would be the identified wetland.

The proposed mitigation measures were developed based on the nature, duration, severity and probability of the impact in consultation with the various specialists who undertook studies, from both a biophysical and social perspective, at the proposed site.

In addition, since Mogalakwena Complex is an existing operational mine, mine personnel are presently managing impacts in line with existing environmental management requirements.

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 11; and
- The proposed project is unlikely to result in the generation of any significant cumulative impacts when managed in accordance with the management measures specified in Section 11.

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List of Abbreviations

AAP	Anglo American Platinum Limited
AASW3	Anglo American Social Way 3
BA	Basic Assessment
CMA	Catchment Management Agency
DBAR	Draft Basic Assessment Report
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
DFO	Dust fallout
DHSWS	Department of Human Settlements, Water and Sanitation
DMRE	Department of Minerals Resources and Energy
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Programme
EMPr	Environmental Management Programme Report
GM	General Manager
GN	Government Notice
GNR	Government Notice Regulation
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IFC	International Finance Corporation
LDV	Light delivery vehicle
LEDET	Limpopo Department of Economic Development Environment and Tourism
LoM	Life of Mine
MLM	Mogalakwena Local Municipality
MNC	Mogalakwena North Concentrator
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MRA	Mining Right Area
MSC	Mogalakwena South Concentrator
NEM:WA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PAIA	Promotion of Access to Information Act (Act No. 2 of 2000)
PES	Present ecological state

PGM	Platinum group metals
PPL	Potgietersrus Platinum Limited
RSA	Republic of South Africa
SCC	Species of Conservation Concern
SHE	Safety, Health and Environment
SIA	Social Impact Assessment
SP	Social Performance
SRK	SRK Consulting (Pty) Limited
SWMS	Social Way Management System
TA	Traditional Authority
TSF	Tailings Storage Facility
WML	Waste Management Licence
WUL	Water Use Licence
WULA	Water Use Licence Application
ZoI	Zone of Influence

Units of measurement

dBA	Decibels A
Ha	Hectare
Km	Kilometre
Km^2	Square kilometres
L	Litre
M	Meter
m^3	Cubic meter
mamsl	Meters above mean sea level

Part A: Scope of assessment and Basic Assessment Report

1 Introduction, Background and Scope of the Basic Assessment

Mogalakwena Mine is a wholly owned subsidiary of Anglo American Platinum Limited (AAP) and was originally called the Potgietersrus Platinum Mine; however, 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 AAP, Rustenburg Platinum Mines (RPM), Mogalakwena Complex.

In 2019 an application was made to the Department of Mineral Resources and Energy (DMRE) for an Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) and a Waste Management Licence (WML) in terms of the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA) for, amongst other mining related activities and infrastructure, a new Waste Rock Dump of a 130ha, known as the North Waste Rock Dump (NWRD), and an ore stockpile and associated infrastructure at Mogalakwena Complex. In addition to the application for an EA and WML, a Water Use Licence Application was submitted to the Department of Water and Sanitation (DWS) in terms of the National Water Act (Act No. 36 of 1998) (NWA) for water uses associated with the NWRD, ore stockpile and associated infrastructure.

The authorised NWRD[3] of a 130ha (which has not been developed) included the following:

- Water management infrastructures to manage surface water runoff from the site;
- Haul roads to the authorised NWRD to be located between the North Open Pit and the authorised NWRD; and
- Ore stockpile are of 80ha to be placed in the area between the edge of the existing North open pit and the authorised NWRD area.

Mogalakwena Complex received an integrated[4] (NEMA and NEM:WA) environmental authorisation (LP30/5/1/2/3/2/1 (050) EM) on 13 August 2020 and a Water Use Licence (WUL) No. 07/A61G/ABCGIJ/9887 on 4 December 2020, covering the approval of the NWRD, water management infrastructure, ore stockpile area and haul roads. The 2020 integrated authorisation included the NWRD and associated activities and was issued in terms of NEMA, NEM:WA and NWA. These authorised activities specific to the NWRD are summarised below:

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

Establishment of the NWRD[5], ore stockpiles and haul roads (210 ha)

GNR 983 Listing Notice 1	GNR 984 Listing Notice 2:
Activity 12 – activities within 32 meters of a watercourse	**Activity 15** –The clearance of an area of 20ha or more of indigenous vegetation

[3] As authorised in 2019 (130ha)

[4] Integrated Environmental Authorisation was issued in terms of the National Environmental Management Act, Act 107 of 1998 (NEMA) and National Environmental Management: Waste Act, Act 59 of 2008 (NEM:WA).

[5] Including water management infrastructure.

GNR 983 Listing Notice 1	GNR 984 Listing Notice 2:
Activity 19 – The infilling or depositing of any material of more than 10m^3 into watercourse	**Activity 17** – Any activity including the operation of that activity which requires a mining right.
Activity 24 - The development of a road	

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

Establishment of the NWRD, ore stockpiles and haul roads (210 ha)

Category B
Activity 10 - The construction of a facility for a waste management activity listed under Category B
Activity 11 - The establishment or reclamation of a residue stockpile or reside deposit resulting from activities which require a mining right

The National Water Act (Act No. 36 of 1998) (NWA)

NWRD and Ore Stockpiles (total area 210ha)

Section 21 water uses
Section 21 g - Disposing of waste in a manner which may detrimentally impact on a water resource

As a result of the Biodiversity Assessment undertaken to support this Basic Assessment (BA) process to extend the NWRD over the authorised ore stockpile, a wet response habitat was identified within the NWRD proposed extended footprint area (previously the ore stockpile area now designated for waste rock disposal). Subsequently, a freshwater ecosystem assessment delineated the wet response habitat as a seep wetland with a channelled outflow. The wet response is likely formed as a result of bedrock interflow that reaches an impermeable layer beneath the ground and is forced to surface at this location. This has formed an isolated area within the landscape which accumulates surface water in sufficient quantities to allow wetland soils and vegetation to persist and is therefore classified as a watercourse under the National Water Act, 1998 (Act 36 of 1998). This isolated area supports vegetation typically adapted to life in saturated soil, it is considered to be of low/marginal ecological significance since it is hydrologically isolated and not significant in terms of biodiversity support.

Therefore, Mogalakwena Complex is proposing to extend and reconfigure the approved 130 ha footprint of the authorised NWRD to include a 500 m wetland protection buffer resulting in a total reduced reconfigured footprint area of approximately 128 ha, including the stormwater infrastructure described in Section 10.1110.11.

Based on the above the project requires an amendment to the existing WML in terms of NEM:WA GN R 921 under Category A through a Basic Assessment process to be undertaken in terms of NEMA to extend and reconfigure the NWRD.

The application for authorisation was submitted to the Limpopo Province's DMRE for consideration and acceptance thereof was received on 23 December 2021. An updated NWRD design report will be submitted to the DWS for approval in terms of the WML, however, no additional WUL Application will be required as the existing NWRD footprint and the approved ore stockpile area are authorised under an existing Section 21(g) water use in the current Mogalakwena Complex WUL and a 500 m buffer zone around the delineated wetland will be adhered to. Therefore, no further water uses will be triggered in terms of the NWA.

This BA and Environmental Management Programme (EMPr) has been compiled in terms of the provisions of Appendix 1,4 and 5 of the NEMA Environmental Impact Assessment (EIA) Regulations of 2014, as amended (GNR 982), as well as the requirements of the BA/EMPr template issued by the DMRE. A summary of the requirements of a BA/EMPr report including cross-references to sections in this report where these requirements have been addressed is provided in Table 1-1 for the BA, Table1-2 for the closure aspects, and Table 26-1 for the EMPr.

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

AAP appointed SRK Consulting (South Africa) (Pty) Ltd (SRK) as an independent Environmental Assessment Practitioner (EAP) to undertake the BA and associated public participation.

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

Appendix 1	Legislated requirements as per the NEMA GNR 982 in Appendix 1	Relevant Report Section
(1)(a)	details of-	
	(i) the EAP who prepared the report	2.1
	(ii) the expertise of the EAP, including a curriculum vitae;	2.2 (Appendix A)
(1)(b)	The location of the activity including:	
	(i) The 21-digit Surveyor General code of each cadastral land parcel;	3
	(ii) where available, the physical address and farm name;	3
	(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 -	5
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	N/A
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken.	4
(1)(d)	A description of the scope of the proposed activity, including	
	(i) all listed and specified activities triggered and being applied for; and	5.1
	(ii) a description of the activities to be undertaken including associated structures and infrastructure;	5.2
(1)(e)	A description of the policy and legislation context within which the development is proposed including-	6
	(i) An identification of all legislation, polices, plans, guidelines, spatial tools, municipal development panning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and	6
	(ii) How the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks and instruments;	6
(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 location;	7
(1)(g)	A motivation for the preferred site, activity and technology alternative;	8
(1)(h)	A full description of the process followed to reach the proposed preferred alternative within the site, including:	
	(i) details of all the alternatives considered	8
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs	9

Appendix 1	Legislated requirements as per the NEMA GNR 982 in Appendix 1	Relevant Report Section
	(iii) a summary of the issues raised by interested and affected parties (I&APs), and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	9
	(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	10
	(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	11
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of the potential environmental impacts and risks associated with the alternatives;	11.3
	(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	11.4
	(viii) the possible mitigation measures that could be applied and the level of residual risk	12
	(ix) the outcome of the site selection matrix	N/A
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	13
	(xi) a concluding statement indicating the preferred alternatives including the preferred location of an activity.	14
(1)(i)	A full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity including -	11.3
	(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process, and	11.3
	(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.	11.3
(1)(j)	An assessment of each identified potentially significant impact and risk, including -	11
	(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 1	Legislated requirements as per the NEMA GNR 982 in Appendix 1	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 avoided, managed or 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 report.	16
(1)(l)	An environmental impact statement which contains-	17
	(i) a summary of the key findings of the environmental impact assessment	17.1
	(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	Appendix F
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	17.3
(1)(m)	Based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr	19
(1)(n)	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 authorisation	19
(1)(o)	A description of any assumptions, uncertainties and gaps in the knowledge which relate to the assessment and mitigation measures provided.	20
(1)(p)	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	21
(1)(q)	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.	22
(1)(r)	An undertaking under oath or affirmation by the EAP in relation to:	28
	(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 1	Legislated requirements as per the NEMA GNR 982 in Appendix 1	Relevant Report Section
(1)(s)	Where applicable, details of any financial provisions for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts	23 and 26.5
(1)(t)	Any specific information that may be required by the competent authority; and	27.7
(1)(u)	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.	Noted

Table1-2: Structure of the BA reporting in terms of Legislation Requirements as detailed in Appendix 5 (Closure Plan) of GNR 982

Appendix 5	Legislated requirements as per the NEMA GNR 982 in Appendix 5	Relevant Report Section
(1)(a)	details of-	
	(i) the EAP who prepared the report	2.1
	(ii) the expertise of the EAP;	2.2
(1)(b)	closure objectives	26.5.1
(1)(c)	proposed mechanisms for monitoring compliance with and performance assessment against the closure plan and reporting thereon;	27
(1)(d)	measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity and associated closure to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development, including a handover report, where applicable;	26.5.3
(1)(e)	information on any proposed avoidance, management and mitigation measures that will be taken to address the environmental impacts resulting from the undertaking of the closure activity;	26.4
(1)(f)	a description of the manner in which it intends to—	
	(i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation during closure;	26.5.1
	(ii) remedy the cause of pollution or degradation and migration of pollutants during closure;	26.5.1
	(iii) comply with any prescribed environmental management standards or practices; and	26.5.1
	(iv) comply with any applicable provisions of the Act regarding closure;	26.5.1
(1)(g)	time periods within which the measures contemplated in the closure plan must be implemented;	27.4

Appendix 5	Legislated requirements as per the NEMA GNR 982 in Appendix 5	Relevant Report Section
(1)(h)	the process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of closure;	27.5
(1)(i)	details of all public participation processes conducted in terms of regulation 41 of the Regulations, including—	9
	(i) copies of any representations and comments received from registered interested and affected parties;	
	(ii) a summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments;	
	(iii) the minutes of any meetings held by the EAP with interested and affected parties and other role players which record the views of the participants;	
	(iv) where applicable, an indication of the amendments made to the plan as a result of public participation processes conducted in terms of regulation 41 of these Regulations	
(1)(j)	where applicable, details of any financial provision for the rehabilitation, closure and on-going post decommissioning management of negative environmental impacts.	26.5

2 Details of the project applicant and environmental assessment practitioner

SRK Consulting were appointed by Mogalakwena Complex as the EAP to manage and facilitate the BA and associated public participation process in accordance with NEMA. Below are the details of the EAP, Mogalakwena Complex 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 Draft BA/EMPr and their contact details are provided in Table 2-1.

Table 2-1: EAP contact details

Name	Contact Number	Fax Number	Email Address
Franciska Lake	011 441 1024	086 555 0886	flake@srk.co.za
Michelle Miles	011 441 1111	086 503 1222	mmiles@srk.co.za
Ashleigh Maritz	011 441 1154	086 503 1222	amaritz@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 A.

Table 2-2: EAP Qualifications

Name	Qualifications	Professional registration	Years' Experience
Franciska Lake	B.Sc. Hons (Zoology)	PrSciNat (400248/05)	20
Ashleigh Maritz	MSc. (Biochemistry),	Reg. EAP (EAPASA)	14
Michelle Miles	B.Sc. Hons (Environmental Water Management)	Registered EAP (2020/1057)	5

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 A.

Table 2-3: EAP expertise

EAP Name	Expertise
Franciska Lake	Franciska Lake, BSC (Hons) Pr Sci Nat, Partner and Principal Environmental Scientist at SRK Johannesburg with 20 years' experience in the environmental consultancy industry. Her core experience is related to the undertaking Environmental Impact Assessments, the compilation, implementation and assessing of Environmental Management Programmes and Plans, environmental auditing, site assessments and assessing environmental compliance. Her experience in these projects mainly includes project

EAP Name	Expertise
	management, coordination, compilation and review of technical documentation and consultation with authorities and stakeholders. She has thorough knowledge and understanding of South African Environmental Legislation and has experience in the implementation of the regulatory requirements in an integrated manner.
Michelle Miles	Michelle has 5 years' experience within the environmental science and management field. She has been involved in various aspects of projects ranging from concept studies all the way through to environmental construction management. Michelle has experience in conducting environmental legal reviews as well as environmental permitting processes such as Environmental Impact Assessments and Basic Assessments. Her experience include environmental authorisations such as Basic Assessments and Environmental Impact Assessments as well as other associated environmental permits, environmental baseline assessments, environmental design criteria as well as permitting strategies, construction environmental management plans, independent audit report, legislative reviews of various countries and Geographical information systems (GIS) analyses

2.3 Mogalakwena Complex details

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

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

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

Table 2-5: Mogalakwena Complex responsible persons

Name	Designation	Responsibilities
Willie Noordman	Acting Senior General Manager (GM)	A/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	All environmental matters at Mogalakwena Complex

2.4 Details of specialists

The EAP has worked closely with specialists to determine the baseline conditions which will assist in identifying risks and impacts as part of other projects conducted at the Mogalakwena Complex. The EAP therefore has extensive knowledge of the site as well as what the relevant studies that will be required to support the project. The following specialist studies formed part of the project and focussed on the specific area (refer to Figure 4-1) on Mogalakwena Complex which will be impacted on by the proposed activities:

- Air quality;
- Biodiversity (terrestrial and aquatic);

- Soils, land use and land capability;
- Heritage and palaeontology;
- Noise;
- Social;
- Surface water;
- Groundwater;
- Visual; and
- Noise.

The specialists complied their reports in accordance with the requirements stipulated in Appendix 6 of the NEMA EIA Regulations of 2014 (as amended).

Any recommendations made by the specialists have been incorporated into the Draft BA/EMPr. The specialist studies are also appended to the Draft BA/EMPr.

2.5 Provincial authorities' details

Environmental authorisation is required from the DMRE whose details are provided in Table 2-6. An application for the environmental authorisation process was submitted on 26 May 2021. The application form acknowledgement letter was received on 23 December 2021 and a letter for extension to the NEMA regulatory timeframes was submitted to the DMRE on 4 April 2022 and extension was granted on 26 May 2022. The screening report is included in Appendix D.

Table 2-6: Competent authority details

Department	Contact Person
DMRE (Polokwane Office)	Mr Telly Mashau

2.6 Municipality and ward details

Mogalakwena Complex 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 2-7 and shown in Figure 2-1.

Table 2-7: Local and district municipality details

Municipality	Contact Person	Designation
Mogalakwena Local Municipality	Mr Puledi Selepe	Acting Municipal Manager
Mogalakwena Local Municipality	Ms Solane Ntshane	Town planning officer
Mogalakwena Local Municipality	Cllr M.J. Mampane.	Ward Councillor (Ward 13)
Waterberg District Municipality	Mr Morris Maluleka	Municipal Manager
Waterberg District Municipality	Mr Peter Makondo	Acting Executive Manager of the environmental department

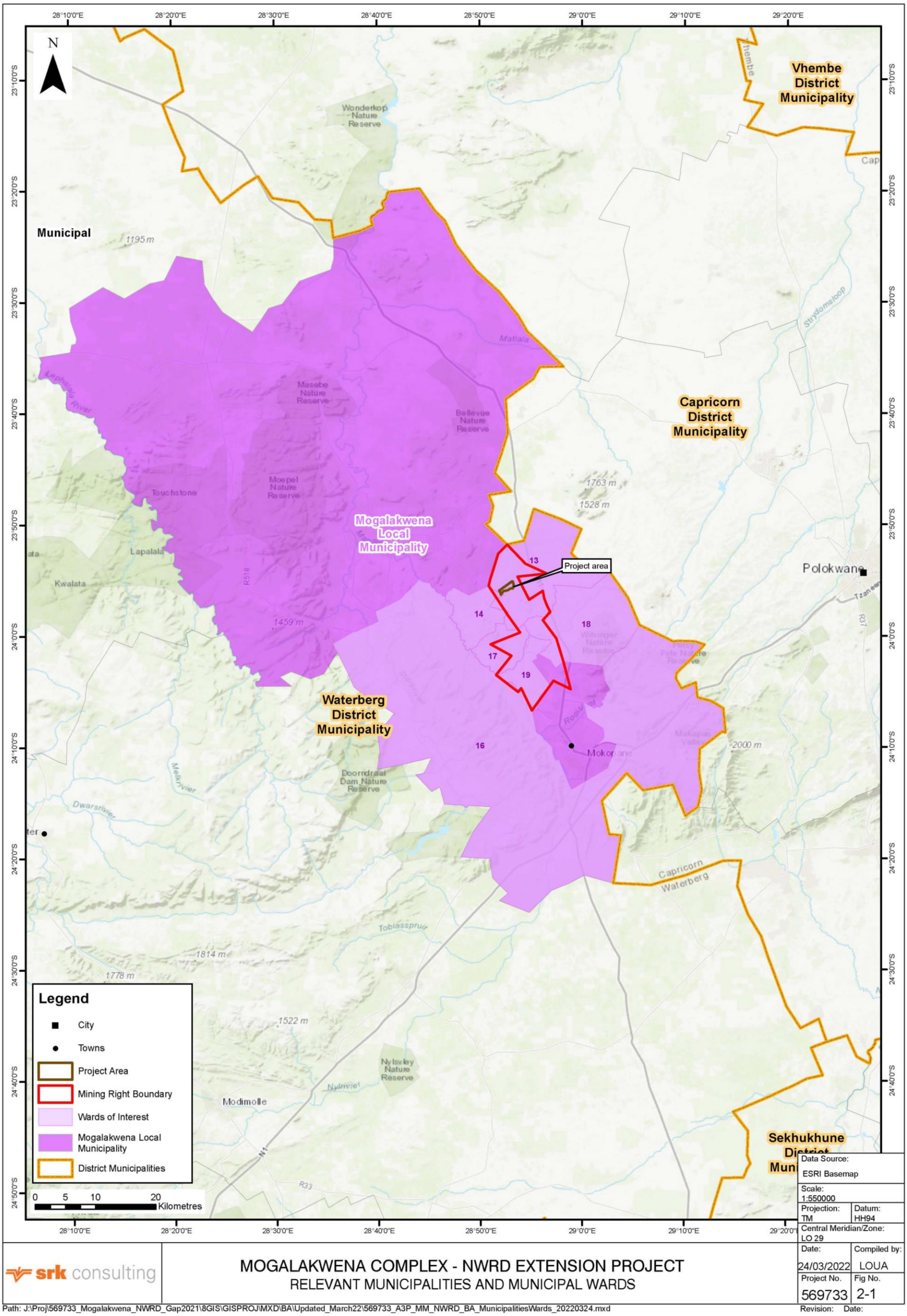


Figure 2-1: District and local municipalities and wards relevant to Mogalakwena Complex

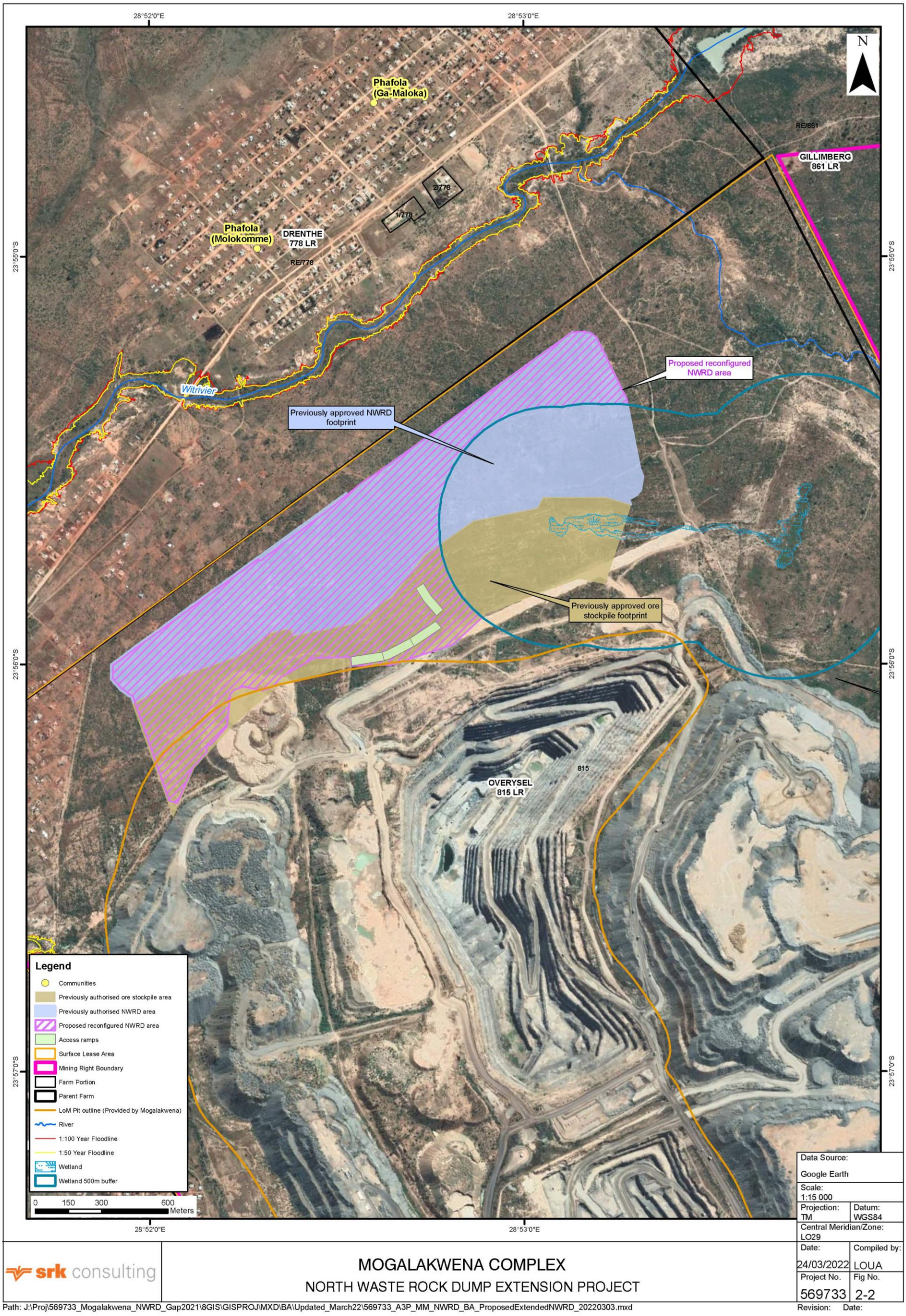


Figure 2-2 : District and local municipalities and wards relevant to Mogalakwena Complex

3 Description of the property

The description of the property where the proposed extension and reconfiguration to the authorised NWRD will be located is shown in Table 3-1. The property information was obtained via Windeed (included in Appendix B).

Table 3-1: Description of the properties applicable to the NWRD extension and reconfiguration

Farm name	Portion 0 of the Farm Overysel 815 LR
Owner[6]	National Government of the Republic of South Africa (RSA) (Held in Trust by the National Government of the Republic of South Africa).
Total area (ha)	1851.95 ha
Application area (ha)	Approximately 50 ha[7] for the extension into the approved ore stockpile area
Magisterial district	Mogalakwena Local Municipality and Waterberg District Municipality
Distance from nearest town/s	• 35 km in a south-south easterly direction of Mokopane • 65 km in an easterly direction of Polokwane • 108 km in a south-westerly direction of Modimolle
21-digit Surveyor General code for each farm portion	T0LR00000000081500000
Title deed	T22441/1942PTA

4 Locality of the proposed project

Mogalakwena Complex is situated approximately 30 km north-west of the town of Mokopane within the Mogalakwena Local Municipality, which forms part of the greater Waterberg District Municipality of the Limpopo Province (refer to Figure 4-1). The Mogalakwena Complex lease area covers approximately 51.05 km^2 and stretches approximately 8 km from east to west and approximately 13 km from north to south. To the east of Mogalakwena Complex 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

The proposed extended footprint of the NWRD will be located on Portion 0 of the Farm Overysel 815 LR within Mogalakwena Complex's mining right and surface lease areas (refer to Figure 4-1).

[6] Land ownership has been determined using WINDEED and the property information obtained from WINDEED has been provided in Appendix B

[7]Current authorised NWRD and associated infrastructure is 130 ha and the proposed extension and reconfiguration of the authorised NWRD over the approved ore stockpile are will total 128 ha.

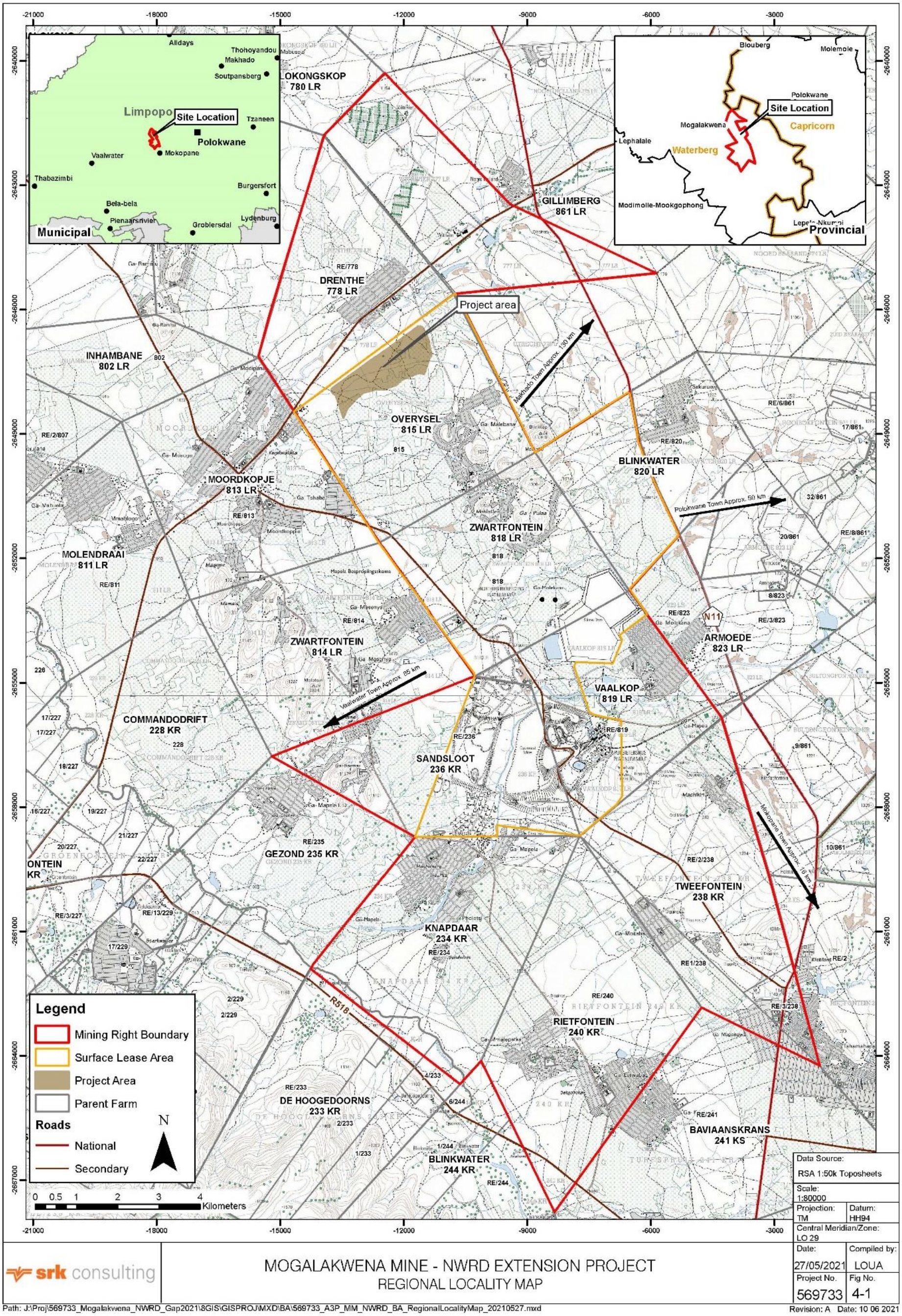


Figure 4-1: Locality of proposed extension and reconfiguration of the NWRD

5 Description of the scope of the proposed overall activity

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

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

Table 5-1 provides a summary of the current and proposed (authorised but not yet constructed/developed) mining and process operations as well as the water and waste management systems at Mogalakwena Complex.

Table 5-1: Overview of the Mogalakwena Complex 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 Complex 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 Complex '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. An additional concentrator, the known as the 3rd Concentrator is planned but not yet constructed. • 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

Aspect	Description
	• Concentrate is dewatered prior to dispatch to the smelter in Polokwane via road • Tailings from the MNC are pumped to the Blinkwater 1 TSF whilst the Vaalkop TSF complex (original and extension) receives tailings from the MSC • Tailings form the proposed 3rd Concentrator will be pumped to the proposed Blinkwater 2 TSF.
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. In addition to this the NWRD has been authorised but not developed. • **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)[8]
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 Complex 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)
	  ○ Vaalkop TSF 1 was designed for 1 909 200 tons per annum (tpa) dry tonnes,
	  ○ 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
	  ○ Blinkwater 1 TSF is designed for 112 472 651 m³;
	  ○ The extended Blinkwater 2 TSF, which has not been constructed.

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 • The treated sewage effluent at MSC, with a design capacity of 120 m³/day, is pumped back into the plant process water circuit • The treated sewage effluent at MNC, with a design capacity of 200 m³/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 m³/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

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

Aspect	Description
Domestic, general and hazardous waste disposal	• Mogalakwena Complex 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 Complex'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 • 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

Aspect	Description
	• 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.
Electricity Supply	Electricity to the mine is supplied by Eskom via an electricity distribution network.
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.

5.1 Listed and specified activities

As indicated in Section 1 Mogalakwena Complex received an integrated (NEMA and NEM:WA) environmental authorisation (LP30/5/1/2/3/2/1 (050) EM) on 13 August 2020 and a Water Use Licence (WUL) No. 07/A61G/ABCGIJ/9887 on 4 December 2020, covering the approval of the NWRD and ore stockpile, haul roads and water management infrastructure. The extent of the NWRD[9] and ore stockpile were authorised in terms of NEMA and NWA, however at the time of the application for the WML only the extent of the NWRD (130 ha) was authorised under NEM:WA. Therefore, the NWRD extension and reconfiguration requires an amendment to the existing WML authorised in 2020.

The proposed extension and reconfiguration of the NWRD footprint entails an area located north of the current North open pit that has been earmarked for the development that will provide additional storage capacity for the placement of waste rock generated by the current mining operation.

The discovery of a wetland within the extended footprint area has resulted in the reconfiguration of the NWRD footprint area in order that the regulated (Government Notice (GN) 509 in Government Gazette (GG) 40229 of 26 August 2016) buffer zone of 500 m around the wetland be accommodated.

The proposed extended and reconfigured NWRD footprint will therefore have a total area of approximately 128 ha (inclusive of the authorised ore stockpile area, water management infrastructure and associated access ramps) which is less than the original authorised NWRD footprint of 130 ha.

Refer to Figure 5-1 for the authorised NWRD area (indicated in solid blue) and ore stockpile area (indicated in solid brown) and the proposed extended NWRD footprint (indicated by the purple hatching).

Table 5-2 below provides the NEM:WA related listed activities that will be trigged due to the proposed project. The listed activities triggered by the proposed project have been indicated in Figure 5-1. This section also describes the activities to be undertaken.

[9] Including water management infrastructure and access ramps.

Table 5-2: Listed activities trigged for the proposed project

NAME OF ACTIVITY **(E.g. For prospecting -** drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route **etc…etc…etc** **E.g. for mining**,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)	**Aerial extent of the Activity** **Ha or m²**	**LISTED ACTIVITY** (Mark with an **X** where applicable or affected).	**APPLICABLE LISTING NOTICE** ***(GNR 983, GNR 984 or GNR 985)/ NOT LISTED***	**WASTE MANAGEMENT AUTHORISATION** (Indicate whether an authorisation is required in terms of the Waste Management Act). **(Mark with an X)**
Extension and reconfiguration of the NWRD	Approximately 50 ha for the extension over the authorised ore stockpile area, combined extended NWRD footprint will be 128 ha (which in less than the original approved NWRD which was 130 ha) including water management infrastructure and access ramps	X	N/A	Category A – Activity 13 (GNR 921, 2013

5.2 Description of the activities to be undertaken

The authorised NWRD (which has not been developed) will provide additional storage capacity for the placement of waste rock generated by the current mining operations. The authorisation obtained in 2020 included the following:

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

The authorised NWRD specifications are provided in Table 5-3. The specifications for the extended and reconfigured NWRD including water management infrastructure and access ramps are provided in Table 5-4.

Table 5-3: Design specifications of the authorised NWRD

Volume	21 000 000 m^3 (per year)
Area	130 ha (including haul roads and water management infrastructure)
Design Height	1130 mamsl

The proposed extended and reconfigured NWRD will therefore have a total area of approximately 128 ha (inclusive of the authorised ore stockpile area, water management infrastructure and associated

access ramps) resulting in the reduction of the authorised NWRD footprint of 130 ha. The design specifications of the extended and reconfigured NWRD is indicated in Table 5-4.

Table 5-4: Design specifications of the extended and reconfigured NWRD

Area	128 ha (including access ramps and water management infrastructure)
Design Height	1130 mamsl

An updated design report to reflect the changes to the design for the extended NWRD footprint will be submitted to the DWS for approval.

The results of the 2018 Waste Classification and landfill assessment 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. Exemption from Regulation 704 was granted in the 2020 WUL for the use of waste rock as a Type 4 waste based on the inert material.

The NWRD design report indicated 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 Section 10.11).

A WUL was issued for the area covering the authorised NWRD as well as the ore stockpile. The authorised NWRD design included water management infrastructure to ensure that all dirty water is contained within the authorised NWRD area. These management measures have been updated to incorporate the proposed NWRD footprint extension and reconfiguration as listed below and shown in Figure 5-2.

- Paddocks are required along the north, west and eastern extents of the extended and reconfigured NWRD footprint.
- Due to the possibility of precipitation infiltrating into the NWRD and seeping into the groundwater beneath the extended and reconfigured NWRD, a series of drainage channels are proposed beneath the NWRD to divert infiltration to the dirty water disposal system (paddocks) and prevent seepage into the groundwater system and potential impact on the Witrivier (Thwathwe River);
- The proposed drainage channels will make use of gravity flow which will assist in providing a preferred path for the infiltrated precipitation to flow. The drainage channels will act as a preferred drainage path and redirect the seepage to the dirty water disposal system (paddocks);
- The drainage channels will act as a preferred drainage path and redirect the seepage to the dirty water disposal system (paddocks[10]). The proposed drainage system consists of channels

[10] The paddocks may in future be converted to channels to facilitate the capture and reuse of runoff water

sloping from SE to NW, spaced at an interval of approximately 250 m. The draining system will be aligned with the updated design report to be submitted to the DWS.

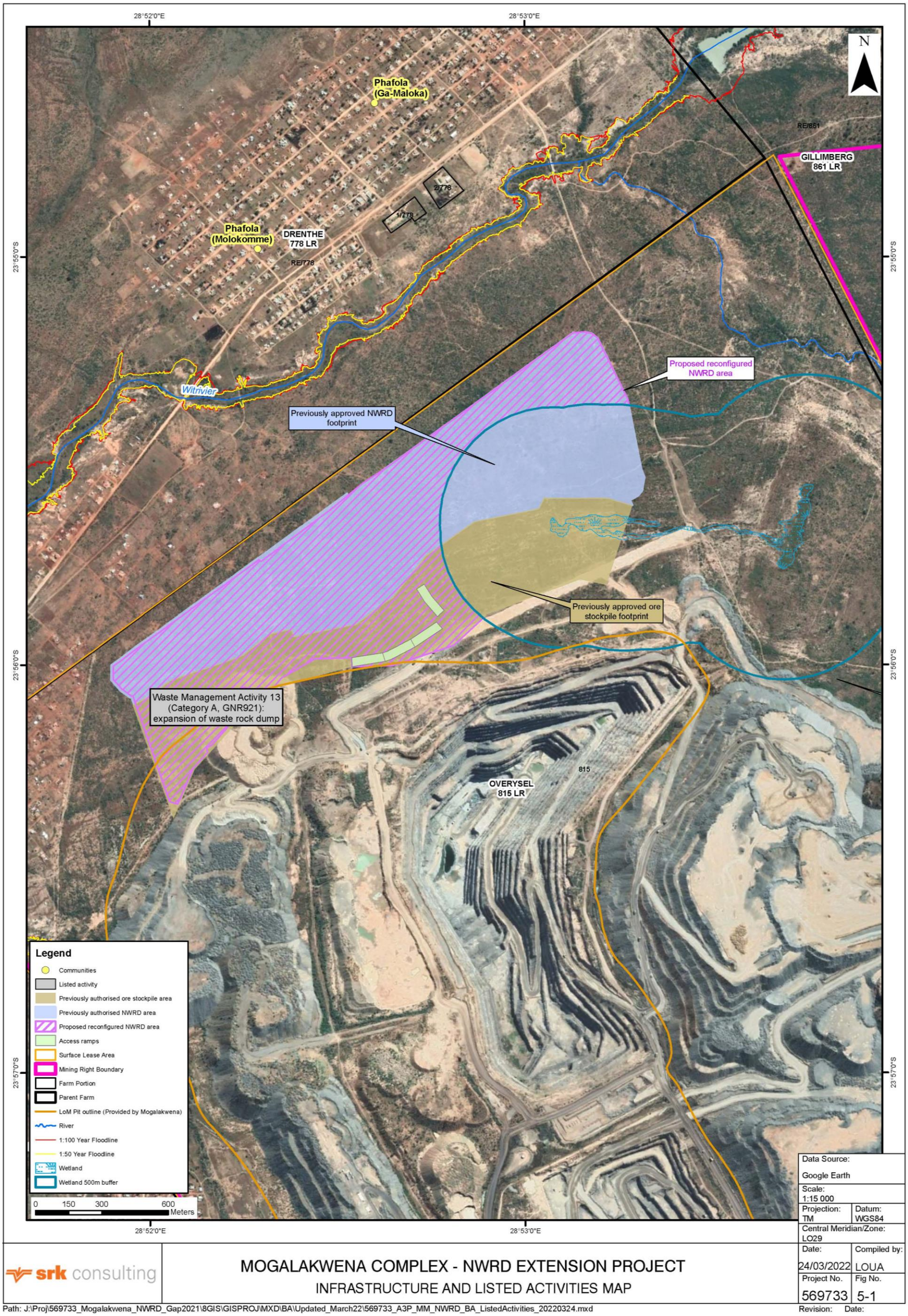


Figure 5-1: Listed activities triggered by the extension and reconfiguration of the NWRD

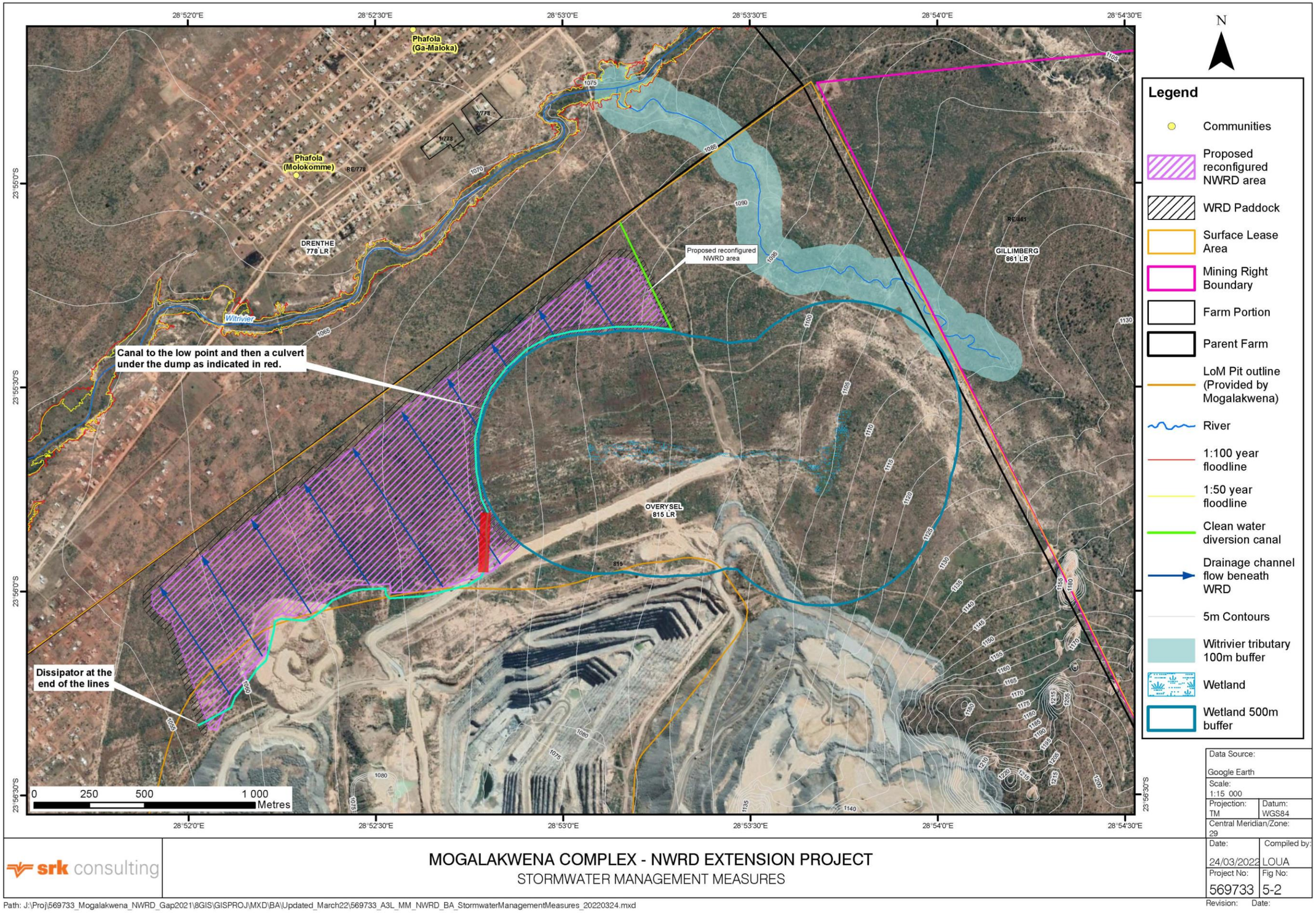


Figure 5-2: NWRD stormwater management measures

6 Policy and Legislative Context

This section provides an overview of the policy and legislative context within which the project will operate. It identifies all legislation, policies, plans, guidelines and other applicable legislation to this activity to be considered in the assessment process, which may be applicable or have relevance to the project. This sections also describes Anglo American policies and guidelines.

6.1 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. The right to a safe environment and the right to information are addressed during the environmental authorisation process through stakeholder engagement, where available information pertaining to the environment and proposed activities are disclosed.

6.2 The Promotion of Access to Information Act, 2000(Act No. 2 of 2000)

The Promotion of Access to Information Act ("PAIA") gives effect to the Constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights, and to provide for matters connected therewith. In addition to providing access to information, cognisance should be taken that PAIA also makes provision for the refusal of access to information that is deemed to be of a sensitive, confidential or classified nature. Without access to information, a person may be unable to determine whether or not his or her right to just administrative action (or to an environment not harmful to human health or wellbeing or, for that matter, any other Constitutional right) has been infringed.

6.2.1 Protection of Personal Information, 2013 (Act No. 4 of 2013)

The Protection of Personal Information Act 4 of 2013 (POPIA), which aims to promote protection of personal information, came into effect on 1 July 2021. The EIA Regulations, 2014 require, inter alia, transparent disclosure of registered stakeholders and their comments. In terms of the EIA Regulations, 2014, stakeholders who submit comment, attend a meeting or request registration in writing are deemed registered stakeholders who must be added to the project stakeholder database. By registering, stakeholders are deemed to give their consent for relevant information (including contact details) to be processed and disclosed, in fulfilment of the requirements of the EIA Regulations, 2014 and the National Appeal Regulations, 2014.[11]

[11] All personal information contained in this report will not be shared publicly and will only be distributed to the DMRE and the AAP Project team.

6.3 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.

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

The all-encompassing principle of the National Environmental Management Act 1998 (Act 107 of 1998) ("NEMA") is sustainable development. It defines sustainability as meaning the integration of social, economic and environmental factors into planning, implementation and decision making so as to ensure the development serves present and future generations.

Section 24 of the NEMA, headed "Environmental Authorisations" sets out the provisions which are to give effect to the general objectives of Integrated Environmental Management ("IEM"), and laid down in Chapter 5 of the NEMA. In terms of section 24(1), the potential impact on the environment of listed activities must be considered, investigated, assessed and reported on to the competent authority charged by the NEMA with granting of the relevant environmental authorisation.

On 04 December 2014, the Department of Environmental Affairs ("DEA") published the 2014 NEMA Environmental Impact Assessment ("EIA)" Regulations and listed activities in Government Gazette No. 38282, which was amended in 2017.

The proposed infrastructure involves listed activities detailed in Section 5.1 as identified in terms of the NEMA read with the Environmental Impact Assessment Regulations of 2014. In terms of section 24(2) and 24D of the NEMA no person may commence an activity listed or specified in terms of the act unless the competent authority has granted an environmental authorisation for the activity.

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

The NWA promotes the protection, use, development, conservation, management, and control of water resources in a sustainable and equitable manner. Chapter 4 of the National Water Act stipulates that water uses (abstraction, storage, waste disposal, discharge, removal of underground water and alteration to watercourses) must be licensed.

6.5.1 Government Notice 509

General Authorisation in terms of section 39 of the NWA for water uses as defined in section 21 of the NWA can be issued by the DWS to all persons or any category of persons to use water. GN 509 in GG40229 of 26 August 2016 specifically relates to water uses as defined under section 21 (c) impeding or diverting the flow of water in a watercourse and 21 (i) altering the bed, banks, course or characteristics of a watercourse, of the NWA. GN509 defines the regulated area of a watercourse for section 21(c) or (i) of the Act water uses as (a) The outer edge of the 1 in 100 year flood line and /or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the

watercourse of a river, spring, natural channel, lake or dam; (b) in the absence of a determined 1 in 100 year flood line or riparian area the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); or (c) a 500 m radius from the delineated boundary (extent) of any wetland or pan.

6.6 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.

Section 38 of the NHRA details how heritage resources must be managed and provide development categories which include the requirement that all developers, including mines, must 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.

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

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.

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

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.

6.9 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/m2/day) taken over a 30 day average (with no more than 2 exceedances per year, in non-sequential months), and non-residential areas as dust fallout >600<1200 (mg/m2/day) taken over a 30 day average (with no more than 2 exceedances per year, in non-sequential months).

6.10 National Forests Act (84 of 1998)

Supports sustainable forest management and the restructuring of the forestry sector, as well as protection of indigenous trees in general.

6.11 Municipal plans and policies

6.11.1 Mogalakwena Municipality Integrated Development Plan

The Mogalakwena Local Municipality (MLM) Integrated Development Plan (IDP) identified mining as the main economic contributor 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.

6.12 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.

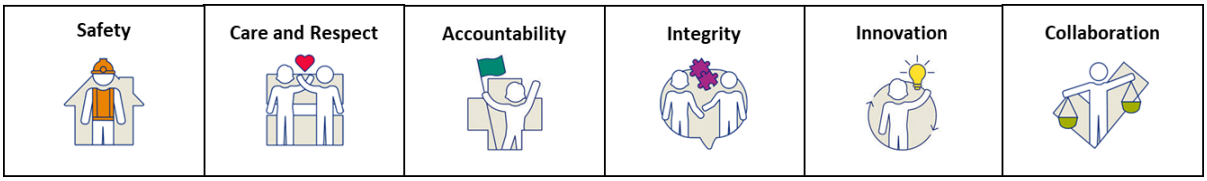
The Anglo American Safety, Health and Environmental (SHE) Policy describes Anglo's environmental vision, which is to minimise harm to the environment by designing, operating and closing all of their operations in an environmentally responsible manner.

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.

6.12.1 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.



Anglo American Platinum Values

6.12.2 Anglo American Platinum environmental policy

Mogalakwena Complex 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.

6.12.3 Anglo American Social Way

The Anglo Social Performance (SP) Standards prescribe the minimum level of performance expected for key management areas, where there are social risks and/or opportunities. These requirements are based on the Anglo-American Social Way Management System (SWMS), also known as the Anglo-American Social Way Version 3 (AASW3). The AASW3 is made up of three key components namely:

- Social Way Policy which sets out Anglo’s vision and principles for SP, defines Anglo’s systems for SP management and provides overview of SP management requirements;
- Social Way Toolkit which contains detailed guidance on the standards, processes and procedures required for effective SP through implementation of the Social Way Policy; and
- Social Way Assurance Framework which provides guidelines and outlines the requirements and processes through which sites are to be assessed for compliance with the Social Way Policy.

The AASW3 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 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 AA 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 and third-party audits.

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 Complex 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 Complex 's life of mine (LoM) extends well beyond 2080. The proposed NWRD footprint extension and reconfiguration will allow Mogalakwena Complex to continue with the mining activities.

7.2 Environmental responsibility

The purpose of this project is to apply for an amendment to the WML through a BA process to extend the authorised NWRD footprint over the area which was previously authorised for ore stockpiling at Mogalakwena Complex. This document contains management measures to avoid, minimise and reduce the potential negative impacts on the environment as a result of the project.

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

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

7.3 Socio-economic benefits

Mogalakwena Complex 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. It is not anticipated that the proposed project will create additional permanent jobs however it will assist the mine in operating more effectively in terms of the management of its mine residue.

7.4 Employment and local procurement opportunities

In the current planning, the labour requirements for the development of the extended NWRD footprint will be met by existing employees.

Procurement for the project, if required, will be undertaken as per the existing AAP Inclusive Procurement policies. Meaningful participation of local businesses will be maximised as far as possible and practicable.

7.5 Project timeline

It is anticipated that the development of the proposed extended and reconfigured NWRD will be required during the first quarter of 2024 and will commence once the heritage sites have been mitigated. This will be subject to the outcome of the decision received from the DMRE following the submission of the Final BA.

7.6 No-Go option

The purpose of the proposed project is secure additional footprint for the disposal of waste rock generated from the open pit operations at Mogalakwena Complex. Should the proposed project not be implemented, Mogalakwena Complex will continue to operate as it currently operates however space for disposal of waste rock will become limited which will result in the operations having to either reduce the rate of mining (which would have a negative socio-economic impact) or investigate other immediate waste rock disposal alternatives. The latter option will also require environmental permitting (full scoping/EIA, waste management licence and WUL) and currently does form part of Mogalakwena Complex's life of mine plan however this will be addressed as part of a separate process due to the immediate requirement for waste rock disposal in the proposed NWRD area.

8 Motivation for the overall preferred site, activities and technology alternatives including a full description of the process followed to reach the proposed alternatives within the site

The section below describes the development footprint alternatives which have been considered for the activities associated with the NWRD footprint extension and reconfiguration. These include the following:

- Property and location;
- Type of activity; and
- Design or layout.

Alternatives with regards to location, infrastructure and transportation were considered for the 2019 Expansion Project authorised in 2020. This project will be an extension and reconfiguration of the authorised NWRD limiting alternative sites.

8.1 Property, location and activity alternatives

For practicality purposes, the proposed NWRD footprint extension is required in the area which was previously authorised as an ore stockpile area. This area is immediately adjacent to the proposed NWRD (refer to Figure 4-1) which will be required in the immediate future. Therefore, no alternative property or location alternatives have been considered for the purposes of the proposed project.

Design/layout alternative

As the location of the proposed NWRD footprint extension will be located on the authorised ore stockpile area and will ultimately be developed as one WRD no layout alternatives were considered.

The area for the NWRD footprint extension and reconfiguration is situated on land which has been relatively undisturbed by mining however it has been altered by activities such as grazing of livestock and wood collection.

8.2 No-Go alternative

Please refer to Section 7.6.

9 Details of the public participation process to be followed

9.1 Objectives of stakeholder engagement

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

9.1.1 Project Announcement Phase

The objectives of the stakeholder engagement during the announcement phase are to introduce the project to I&APs and to inform them that an environmental authorisation process will be followed.

9.1.2 During Basic Assessment

The objectives of public participation during the Basic Assessment phase is to provide sufficient and accessible information to I&APs in an objective manner to enable them to raise comments, issues of concern and suggestions.

9.1.3 During the Decision-Making Phase

Following the outcome of the decision-making process by authorities, stakeholders will be informed of the outcome and how and by when the decision can be appealed.

9.2 Stakeholder Identification

The NEMA EIA Regulations (GNR 982 as amended) require identification of and consultation with communities and I&AP's. In terms of Section 24 0 (2) of NEMA, specific State Departments were identified and recognised as commenting authorities on aspects of this Basic Assessment. Representatives from these departments are included in the stakeholder database.

A register of I&APs in terms of Section 42 of the EIA Regulations (GNR 982 as amended) was compiled. This regulation requires that the register contain full contact details of registered I&APs and be submitted to the competent authority[12].

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

- Mapela Traditional Authority (Landowner)
- Landowners adjacent to the property where the activity is proposed to take place
- Department of Mineral Resources and Energy, Limpopo
- Department of Water and Sanitation, Limpopo
- Limpopo Department of Economic Development, Environment and Tourism
- Department of Agriculture, Land Reform and Rural Development
- Cooperative Governance, Human Settlements and Traditional Affairs
- Mogalakwena Local Municipality
- Waterberg District Municipality

[12] 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 below provides more information regarding the distinction between I&APs and registered I&APs.

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.

9.2.1 Identification of Landowners

The identification of landowners in the area is an important part of the stakeholder engagement process. SRK conducted a deeds search to identify landowners directly affected, adjacent to and in the immediate surroundings of Mogalakwena Complex. Refer to Table 9-1.

Table 9-1: Affected Landowners

Farm Name	Farm Portions	Owner	Mogalakwena Complex Area
Overysel 815 LR	Portion 0	National Government of the RSA*	Mining and surface (Mapela lease)

*Held in Trust by the National Government of the Republic of South Africa.

9.2.2 Properties adjacent to the proposed project

Details of the properties directly adjacent to the proposed extended NWRD area is provided in Table 9-2.

Table 9-2: Properties adjacent to proposed

Farm Name	Farm Portions	Owner
Drenthe 778 LR	Portion 0	National Government of the RSA
Gillimberg 861 LR (Previously Witrivier 777 LR)	Portion 0 Remaining Extent	National Government of the RSA
Zwartfontein 818 LR	Portion 0	National Government of the RSA
Moordkopje 813 LR	Portion 0	National Government of the RSA*.

*Held in Trust by the National Government of the Republic of South Africa.

9.2.3 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 Limpopo. Mogalakwena Complex is situated in Ward 13 of the Mogalakwena Local Municipality. Details of the relevant municipalities and respective ward councillors are provided in Table 9-3.

Table 9-3: District and Local Municipalities

Municipality	Contact Person	Designation
Mogalakwena Local Municipality	Mr Puledi Selepe	Acting Municipal Manager
Mogalakwena Local Municipality	Ms Solane Ntshane	Town planning officer
Mogalakwena Local Municipality	Cllr M.J. Mampane	Ward Councillor (Ward 13)
Waterberg District Municipality	Mr Morris Maluleka	Municipal Manager
Waterberg District Municipality	Mr Peter Makondo	Acting Executive Manager of the environmental department

9.2.4 Identification of Relevant Government Departments

The relevant authority applicable to the environmental authorisation process for the proposed project is the DMRE and contact details are provided in Table 9-4. A meeting was held with the DMRE on 30 March 2021 and 14 April 2021 to discuss and confirm the process and way forward for the proposed environmental authorisation for the project.

Table 9-4: Relevant Government Departments

Department	Contact Person
DMRE - Polokwane Office	Mr Telly Mashau

Other commenting authorities consulted with during this process include DWS, Limpopo Department of Economic Development Environment and Tourism (LEDET), Department of Agriculture, Rural Development and Land Reform, Cooperative Governance, Human Settlements and Traditional Affairs, Mogalakwena Local Municipality, and the Waterberg District Municipality. Proof of communication with these authorities has been included in Table 9-4.

9.3 Stakeholder Engagement

9.3.1 Introductory meetings with key stakeholders

The proposed NWRD footprint extension and reconfiguration falls within the Mapela TA area of jurisdiction. An introductory meeting with the Mapela TA was held on **1 June 2021** and with the Mapela Headmen and Headwomen on **24 June 2021.**

The purpose of the meetings was threefold:

- To consult with the owner of the property where the proposed NWRD footprint extension is planned to take place;
- To introduce the team to representatives of the TAs; and
- To announce the project and give the TA an opportunity to comment and present their concerns.

9.3.2 Announcement Phase

The project was announced to the public through the methods summarised in Table 9-5. I&APs were notified of the opportunity to comment on the proposed project and to register as an I&AP via various engagement methods (see Appendix C for copies and proof of all notification materials).

Table 9-5: Summary of announcement methods and dates

Stakeholder group	Announcement activity/materials	Date of announcement / distribution of materials
Mapela TA	Introductory meeting with the Mapela TA	1 June 2021
	Meeting with the Mapela Tribal Council Headman/Woman	24 June 2021
	Hand delivery of notification letters, BIDs and registration and comment forms (in English and Sepedi) to the Mapela TA.	7 July 2021
	Placement of notices at the Mapela TA Offices	7 July 2021
	Placement of 100 copies of the BIL and comment sheet (25 Sepedi copies and 75 English copies) at the Mapela TA offices	7 July 2021
Public	217 emails including English BIL and comment sheet to various stakeholder groups notifying them about the project	20 July 2021
	258 sms notifications informing stakeholders of the project and contact details to obtain additional information	20 July 2021
	Placement of 1 English and 1 Sepedi site notices at strategic points including Mogalakwena Complex social performance office, Mogalakwena North Concentrator and South Concentrator	7 July 2021
	Placement of 300 copies of the BIL and comment sheet at the Mogalakwena Complex social performance office, Mogalakwena North Concentrator and South Concentrator (75 English and 25 Sepedi at each site)	7 July 2021
	Placement of the BID and registration and comment form in English and Sepedi on SRK's website (https://docs.srk.co.za/en/za-mogalakwena-mine-nwrd-expansion-project)	5 July 2021
	Advertisements in English and Sepedi in The Bosvelder	8 July 2021

Project specific comments were received based on the information distributed. The comments have been grouped into thematic areas below together with references to the sections in this report where more information can be obtained.

- The public participation process that will be followed as part of the Basic Assessment process – refer to Section 9.3.3 and Section 9.3.4.
- The extent of the air quality impact assessment in relation to blasting[13] - refer to Section 10.8 and Section 11.
- Location of the extension of the NWRD footprint – refer to Section 1 and Section 4.
- Landownership and mining right boundaries – refer to Section 3 and Appendix B.
- Project benefits to the communities – refer to Section 7.3.

Comments and feedback received during the BA process will be captured as detailed in Section 9.3.5.

[13] It is unlikely that blasting will be undertaken as part of this project

9.3.3 Availability of the Draft Basic Assessment Report for Public Comment

The DBAR will be made available for public comment for a period of 30 days, from 10 June 2022 to 11 July 2022. The availability of the DBAR will be announced as follows:

- Distribution of letters to registered I&APs, accompanied by a comment form (in English and Sepedi), inviting I&APs to comment on the DBAR. I&APs will be invited to request a telephonic consultation with the Mogalakwena and SRK project teams to discuss any questions or comments on the DBAR.
- Notification to registered I&APs of the availability of the DBAR via SMS, email and letters.
- Posting the DBAR, notification letter and comment form on the SRK website (https://www.srk.com/en/public-documents/mogalakwena-mine-nwrd-expansion-project).
- The DBAR, with letters inviting comments on the DBAR and comment forms will be made available for public review at selected easily accessible places around the project area.

9.3.4 Final Basic Assessment Report to Department of Mineral Resources

The Final BAR will be prepared at the end of the comment period and updated with issues, comments and suggestions raised by stakeholders during the public review period. The Final BAR will then be submitted to the DMRE for decision making.

9.3.5 Comment and Response Report

Comments received throughout the Basic Assessment process will be collated into a Comments and Responses Report. The Comments and Responses Report will be updated with comments received and responses provided during the DBAR commenting period as part of the Final BAR to be submitted to the DMRE (template provided in Appendix C).

10 The environmental attributes associated with the baseline environment

This section provides a summary of the key biophysical and socio-economic attributes for the NWRD extension and reconfiguration area within the mining right and surface lease areas.

As part of the 2019 expansion project various specialist studies were conducted which covered the proposed NWRD footprint extension and reconfiguration area to the south. Some specialist studies have been updated based on the proposed project. The general baseline information in this section is extracted from the updated specialist studies undertaken in 2021.

Refer to Appendix E for the specialist studies undertaken specific to this Project.

10.1 Climate and meteorology

The information presented in this section is extracted from the specialist surface water study and air quality study undertaken by SRK in 2021.

10.1.1 Rainfall and evaporation

Rainfall data was sourced from Weather Station W0633482 located approximately 15 km southwest of the mine (1903-2000), as well as from the on-site weather stations (from 2000 to present). Together, the stations have a 117-year record of rainfall data. The mean annual precipitation (MAP) for weather station W0633482 is 620 mm, as reflected in Table 10-1.

During the rainy season a maximum of 8 to 12 rain days per month is 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.

Evaporation data (station WB AB A6E001) are presented in Table 10-1. The average annual A-pan evaporation is 2301 mm which indicates that evaporation exceeds the MAP of 620 mm (the mean annual S-pan evaporation at Mogalakwena Complex is 1 755 mm).

Table 10-1: Rainfall and evaporation data

Month	Average Rainfall (mm) WB 633482 (1903 to 2000) and Site Rainfall (2000 - Present)			Average Evaporation (mm) WB AB A6E001	
	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

Month	Average Rainfall (mm) WB 633482 (1903 to 2000) and Site Rainfall (2000 - Present)			Average Evaporation (mm) WB AB A6E001	
	Average	Maximum	Minimum	A-pan	S-pan
July	5.2	86.6	0	212.4	88.1
August	6.2	56.7	0	158.4	122.4
TOTAL	**620**			**2301.1**	**1755.6**

An A-Pan is a galvanised steel circular container that is placed above the ground and evaporation is measured by measuring change in water level within the pan. The S-Pan is an evaporation pan that is installed into the ground. The conversion factor from S-Pan to lake was obtained from The Surface Water Resources of South Africa reports (Midgley, Pitman, Middleton, 2012).

10.1.2 Site temperature

Ambient air temperature is important, both for determining the effect of plume buoyancy (as the larger the temperature difference between the emissions plume and the ambient air, the higher the plume is able to rise), and determining the development of the mixing depth and inversion layers.

The monthly average, maximum and minimum temperatures are presented in Table 10-2. The average temperature ranges from 12.7 °C to 23.6 °C, with a minimum temperature of 3.9 °C and a maximum temperature of 33.6 °C.

Table 10-2: Average monthly temperature data (ºC)

Month	Average Temperature	Maximum Temperature	Minimum Temperature
January	22.9	33.2	11.9
February	22.8	31.9	14.1
March	21.9	32	9.9
April	19.2	29.5	10.1
May	15.6	25.4	6.2
June	13.0	22.9	3.9
July	12.7	22.9	4.1
August	15.8	25.4	4.6
September	18.7	29.2	5.9
October	20.6	33.1	8.2
November	22.2	32.9	9.1
December	23.6	33.6	12
Annual average	**19.1**	**29.3**	**8.3**

10.1.3 Wind speed and direction

The wind roses for all hours, daytime and night-time for the modelled Lakes Environmental data for the period January 2017 to December 2019 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. The wind class frequency distribution shows that 92.1% of winds can be classified as low speed winds (< 5.7 m/s), while 7.9% of winds can be classified as moderate to high wind speeds (5.7 to 11.1 m/s).

The average wind speed for the period from January 2017 to December 2019 is 3.44 m/s with calm conditions occurring 0.36% of the time. During the day (06h00-18h00), the average wind speed is 2.95 m/s with calm conditions occurring 0.64% of the time. The average wind speed during the early night is 3.68 m/s and increases to 4.17 m/s during the latter part of the night.

Seasonal wind roses show that there are prevailing east-north-easterly winds during the summer, autumn and spring. During winter, east-south-easterly winds are prevalent. The frequency of winds from the east increases during autumn albeit at lower wind speeds. The highest average wind speeds of 3.76 m/s occur during spring with calm conditions occurring 0.37% of the time. The lowest average wind speeds occur during autumn with an average wind speed of 3.13 m/s and calm conditions occur 0.44 % of the time. The wind speeds during summer and winter are 3.59 and 3.24 m/s respectively.

It is not expected that the NWRD extension and reconfiguration will have an additional impact on climate of the area to what has been assessed for the authorised NWRD

10.2 Geology

Mogalakwena Complex 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.

It is not expected that the NWRD extension and reconfiguration will have an additional impact on the geology of the area to what has been assessed for the authorised NWRD.

10.3 Topography

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.

The topography of the study area can be described as undulating with a maximum elevation of 1 830m and a minimum of 875m above mean sea level (AMSL). The landscape varies between rocky outcrops in the immediate vicinity of the mine to increased elevations to the south-east and south west.

It is not expected that the NWRD extension will have an additional impact on the topography of the area to what has been assessed for the authorised NWRD

10.4 Soils, land use and land capability

The information presented in this section is extracted from the specialist soils, land use and land capability study compiled by Earth Science Solutions (Pty) Ltd (ESS) in 2019

10.4.1 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).

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 10-1 provides an overview of the dominant soil types in in the project area.

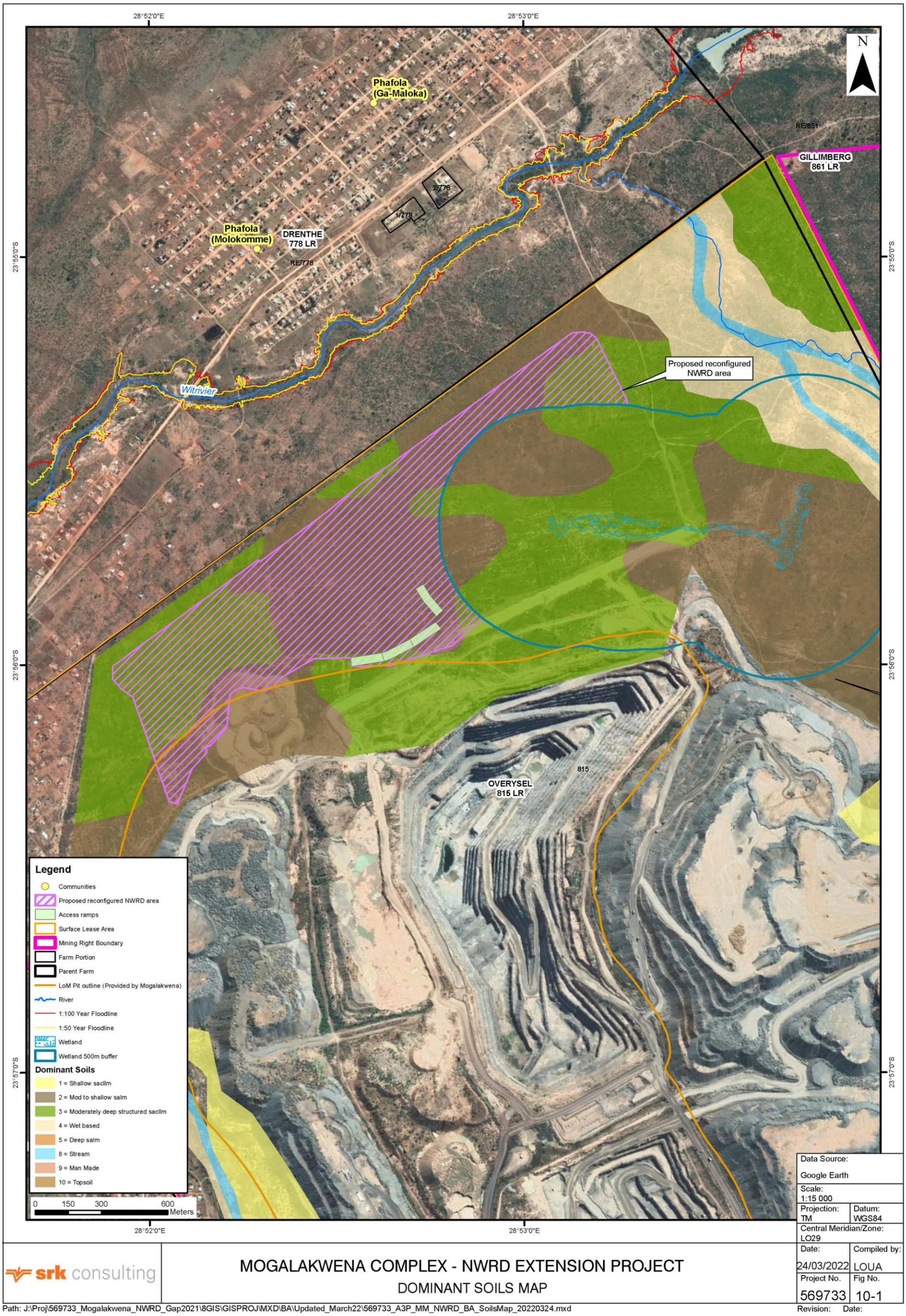


Figure 10-1: Dominant soil types

10.4.2 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.

10.4.3 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.

10.4.4 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.

10.4.5 Land capability and land use

The area to be disturbed by the proposed NWRD will impact the surface environment, with the footprint of impact being planned over an area where, until now, only subsistence grazing has been the impact.

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 Table 10-3).

- 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.

The baseline study indicates that the proposed development will impact some sites with sensitive to moderately sensitive soil forms (refer to), 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 10-2.

It is not expected that the NWRD extension and reconfiguration will have a significant impact on the soils, land use and land capability of the area to what has been assessed for the authorised NWRD.

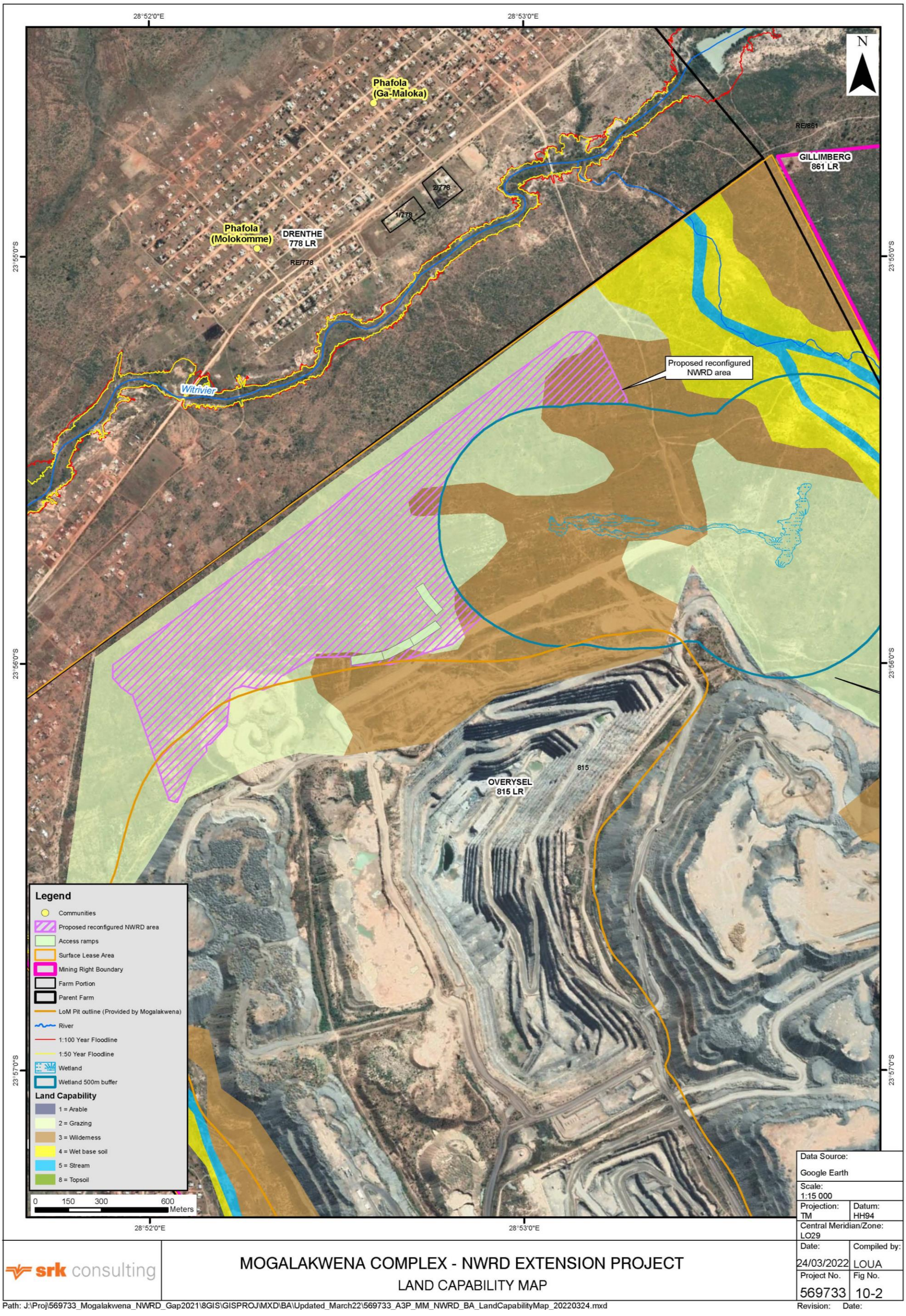


Figure 10-2: Land capability and land uses map

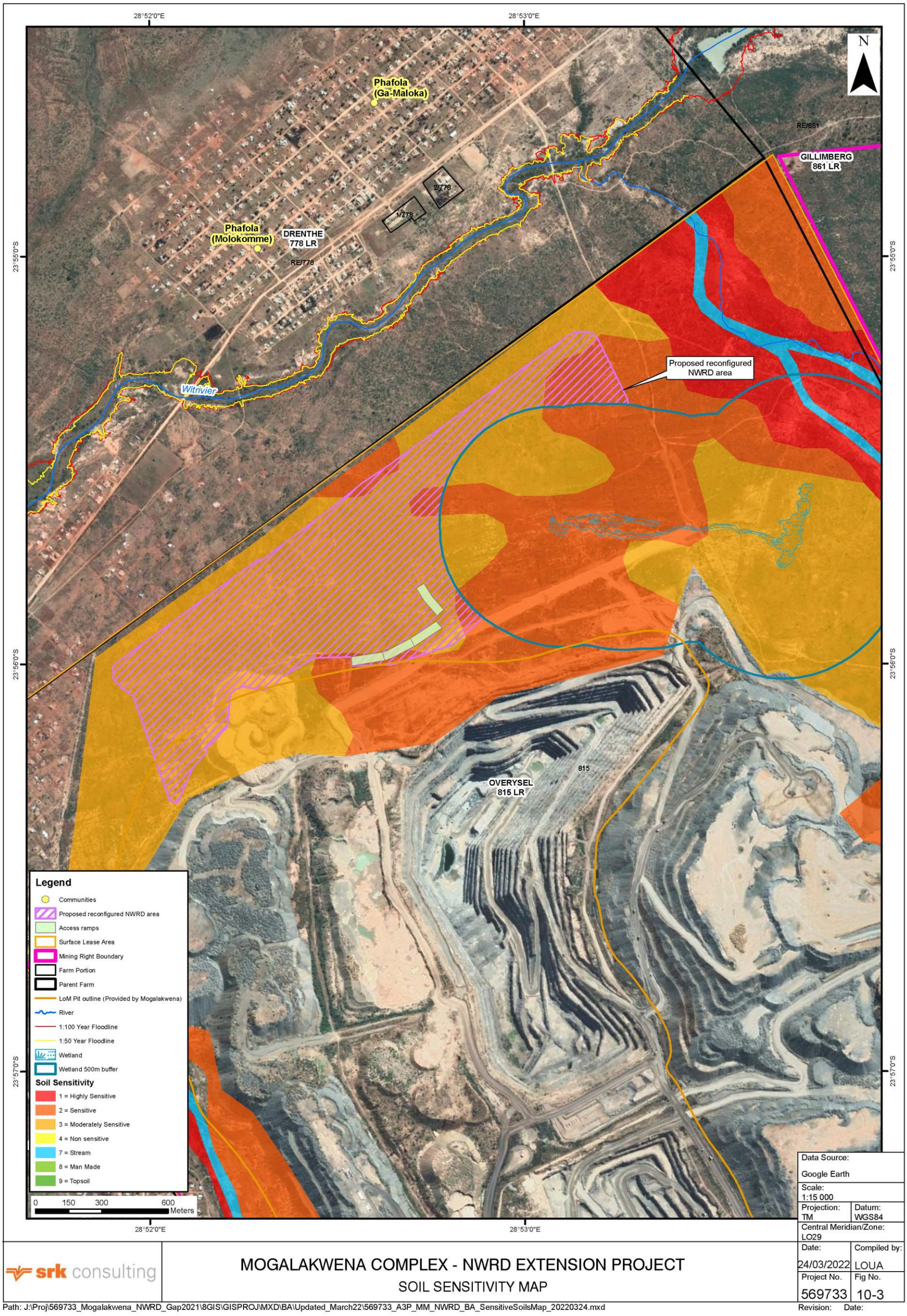


Figure 10-3: Sensitive Soils Map

10.5 Biodiversity

The information presented in this section is extracted from the Flora and Faunal Assessment compiled by Scientific Terrestrial Services in 2021.

10.5.1 Floral Biodiversity

Overall, the habitat within the study area ranged from well-vegetated areas to transformed areas in which indigenous vegetation was scarce. The biodiversity of the study area can thus be defined under three broad habitat units. The three broad habitat units include:

- **Bushveld Habitat**: This habitat unit consisted largely of sandy soils. Overall, this habitat unit supported a moderate species richness. Different community compositions were supported within the habitat unit and as such, two subunits namely, *Dichrostachys* Bushveld and Mixed Bushveld
- **Wet Response Habitat**: This habitat comprised the smallest extent of all the Habitat Units within the study area. This Habitat Unit supported floral species that favour moist soils, including species such as *Sporobolus africanus*, *Schizachyrium jeffreysii*, *Cyperus laevigatus and Cyperus sexangularis;* and
- **Transformed Habitat**: This habitat unit includes the topsoil dumps, haul roads and associated mining development within the study area. Due to mining activities this habitat unit has an altered physical environment and is scarcely vegetated.

The habitat and species overview of the bushveld habitat, wet response habitat and transformed habitat are outlined in Table 10-3 and shown in Figure 10-4.

Table 10-3: Habitat and species overview

<table>
<tr><th colspan="2">Bushveld Habitat Unit</th></tr>
<tr><th colspan="2">Dichrostachys Bushveld Subunit</th></tr>
<tr><th>Habitat overview</th><th>Species overview</th></tr>
<tr><td>This habitat unit comprises the largest extent of the study area. Indigenous floral species dominate within the habitat, although alien and invasive plant (AIP) species were occasionally recorded throughout. Much of this subunit has historically been subjected to agricultural practices. The subunit is largely encroached, with the major encroaching species being Dichrostachys cinerea. Given the anthropogenic influence, e.g., firewood collection, altered fire regimes,historic cultivation, current overutilisation of the study area for grazing purposes, and the overall encroached nature of the subunit, the Dichrostachys Bushveld subunit is no longer considered to be representative of the reference vegetation type, i.e., the Makhado Sweet Thornveld vegetation.

Vegetation structure: The vegetation structure can be described as closed woodland that is largely encroached by thorny, woody species, particularly D. cinerea. Overall, the habitat unit supporteda moderately low to moderate species diversity.</td><td>Compositional characteristics of the habitat unit:
• Dominant grass species included Heteropogon contortus, Aristida congesta subsp. barbicollisis, Panicum maximum, Brachiaria nigropedata, and Eragrostis trichophora;
• Representative forb and herb species included Harpagophytum zeyheri subsp. zeyheri, chamaecrista absus, Leucas sexdentata, Geigeria burkei, and Tephrosa sp.
• The woody layer was well represented where Dichrostachys cinerea dominated. Other common species included Senegalia erubescens, Vachellia gerrardii, Senegalia mellifera subsp. detinens Combretum apiculatum, Ziziphus mucronata and Grewia flava;
• Common succulent species recorded included Aloe marlothii and Euphorbia ingens; and
• AIPs were not prominent within the habitat subunit, although occasional individuals of Tagetesminuta, Bidens pilosa, Zinnia peruviana, Tecoma stans, Opuntia ficus-indica and Agave sisalana were recorded.

Refer to Appendix C of the Biodiversity Assessment (Appendix E) for a list of species recorded within this Habitat Subunit.</td></tr>
<tr><th colspan="2">Mixed Bushveld Subunit</th></tr>
<tr><th>Habitat overview</th><th>Species overview</th></tr>
<tr><td>This habitat subunit comprises the smallest extent of the Bushveld Habitat Unit. The overall species richness of this Habitat subunit was higher than that of the Dichrostachys Bushveld subunit and supported a moderate species richness. Floral species mainly comprised of indigenous floral species; however, occasional AIP species are evident within the subunit. This subunit has historically experienced less cultivation (due to the rockier nature of this subunit) and is currently utilised for grazing purposes and is currently overgrazed in several areas. Although not representative of the reference vegetation type, this subunit does share a slight affinity in terms of species composition with the Makhado Sweet Thornveld vegetation. However, given the level of anthropogenic influence(e.g., firewood collection and altered fire regimes and grazing pressures from domestic animals), the subunit is not considered to be fully representative of the reference vegetation types in the relative corresponding areas.

Vegetation structure: The vegetation structure can be described as open</td><td>Compositional characteristics of the subunit:
• Dominant grass species identified within the subunit included Aristida congesta subsp. congesta, Brachiaria nigropedata, Digitaria eriantha, Melinis repens, Eragrostis rigidior, Heteropogon contortus, Panicum maximum and Urochloa mosambicensis;
• Representative forb, and herb species included Abutilon angulatum subsp. angulatum, Harpagophytum zeyheri subsp. zeyheri, Indigophera sp., Zornia glochidiata, Senna italica subsp. arachioides and Kyphocarpa angustifolia;
• The woody layer was well represented by a mix of thorny species (e.g., Dichrostachys cinerea, Vachellia karroo, Vachellia permixta, and Ormocarpum trichocarpum) and broad-leaf woody species (e.g., Searsia lancea, Combretum molle, Combretum zeyheri, Terminalia sericea, Vangauria infausta, Grewia flavescens and Grewia flava);
• Common succulent species recorded included Sansevieria aethiopica and Aloe marlothii; and</td></tr>
</table>

to closed woodland that is dominated by a mix of both thorny and broad-leaf woody species.	• AIPs were not prominent within the habitat subunit, although occasional individuals of *Tagetesminuta, Bidens pilosa, Hibiscus trionum, Zinnia peruviana, Opuntia ficus-indica and Agave sisalana* were recorded. Refer to Appendix C of the Biodiversity Assessment (Appendix E) for a list of species recorded within this Habitat Subunit.
Wet Response Habitat Unit	
Habitat overview	**Species overview**
This habitat subunit comprises the smallest extent of the study area. The overall species richness of this Habitat Unit was moderate. Floral species mainly comprised of indigenous floral species, although occasional AIP species are evident within the Habitat Unit. This habitat unit has been largely impacted by associated edge effects (particularly from nearby mining activities and AIP infestation). As such, this habitat unit is somewhat degraded in nature. This increased abundance of AIPs within this habitat are related to both the historic and current disturbance (cultivation and grazing) that have occurred. The extent of the representation of the Wet Response Habitat was based on floral species composition (as no standing water was evident) and was delineated by the author. The extent of the representation of the Wet Response Habitat was based on floral vegetation and was delineated by the author as such. It is thus recommended that a more accurate delineation of the boundary of this habitat be undertaken by a qualified freshwater specialist to determine whether a true watercourse is present as per the definition in the NWA and, if so, to determine the regulatory authorisation required by applicable ZOR in terms of the NEMA and the NWA Vegetation structure: The Wet Response Habitat supported a well-structured graminoid layer and comprised of AIP and weedy herbaceous species. The Wet Response Habitat can be described as moist, short to tall, open grassland.	Compositional characteristics of the subunit: • Dominant graminoid species identified within the habitat unit included *Sporobolus africanus, Schizachyrium jeffreysii, Eragrostis lehmanniana, Cyperus laevigatus* and Cyperus sexangularis; • The woody layer was largely absent although occasional individuals of Ziziphus mucronata and *Seasrisa lancea* were recorded; and • AIPs were somewhat prominent within the habitat unit. Common species recorded included *Tagetes minuta, Bidens pilosa, Xanthium strumarium and Schkuhria pinnata*. Refer to Appendix C of the Biodiversity Assessment (Appendix E) for a list of species recorded within this Habitat Subunit.
Transformed Habitat	
Habitat overview	**Species overview**
This habitat unit was associated with areas of active mining activity, including parts of haul roads and existing sand dumps. Vegetation structure: The vegetation structure can be defined as transformed habitat in which no specific vegetation structure was evident. Floral diversity was very low within this habitat unit. Species that were occasionally recorded throughout the habitat comprised mainly of AIP species.	Compositional characteristics of the habitat: • Indigenous species were largely lacking. Indigenous species occasionally encountered within this habitat included *Gomphocarpus fruticosus and Plantago lanceoltata; and* • AIPs were dominant (although infrequent) within the habitat unit. Species recorded *Tagetes minuta Ricinus communis* and *Argemone ochroleuca.* Refer to Appendix C of the Biodiversity Assessment (Appendix E) for a list of species recorded within this Habitat Unit.

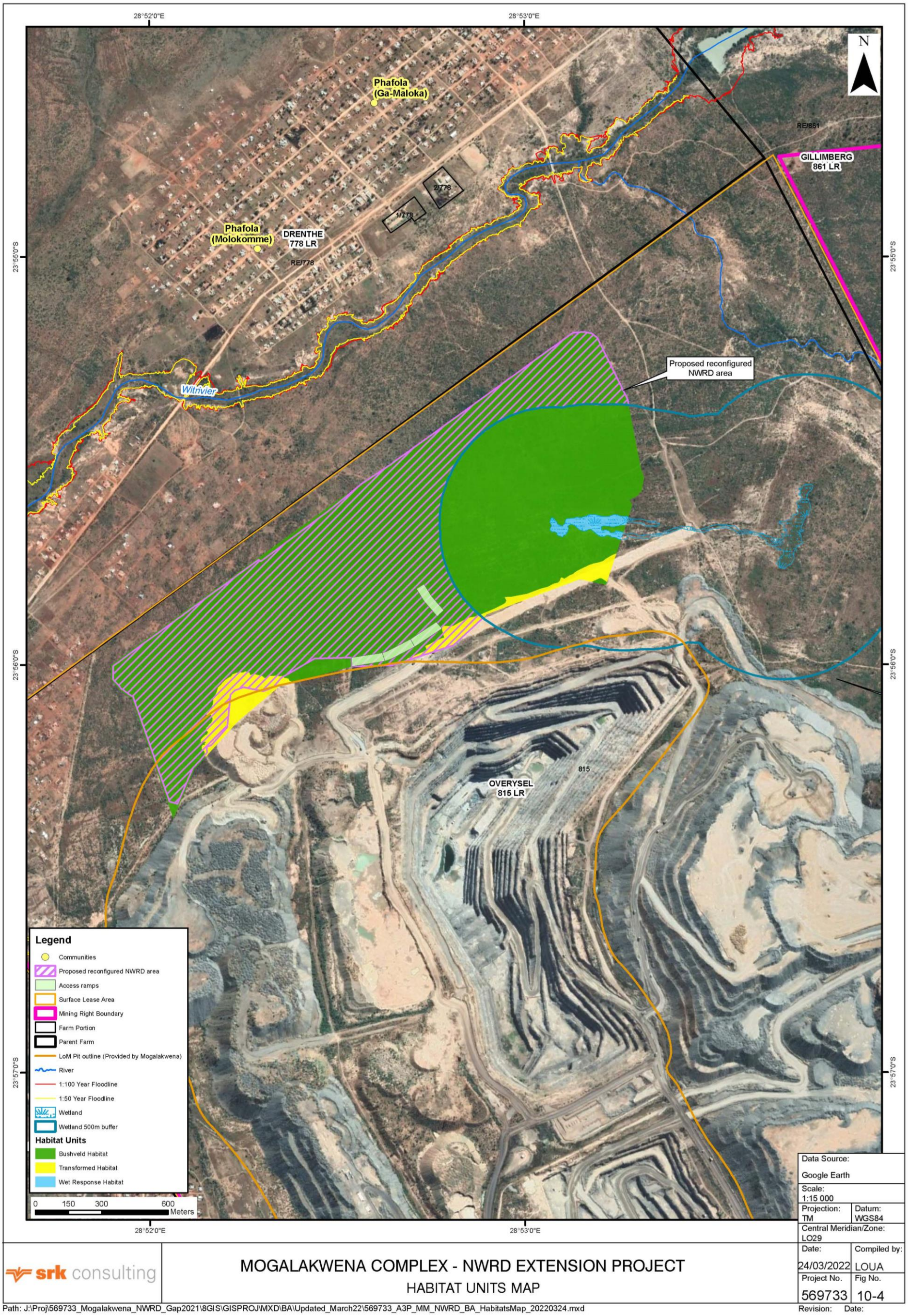


Figure 10-4: Habitat units associated with the project

Species of Conservation Concern

Within each of these habitats, it was assessed if there is a presence of a unique landscape as well as if there are any species of concern within the proposed project areas and habitats.

Bushveld Habitat

Presence of Unique Landscape

This habitat Unit is not situated within any Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs).

No unique habitat is provided within the *Dichrostahys* Bushveld subunit. However, the small, scattered rocky areas (which further provide habitat for Species of Conservation Concern (SCC)), within the Mixed Bushveld subunit do provide more unique habitat for floral species that have an affinity for rocky areas. As such, the propensity of the Mixed Bushveld subunit to provide more unique habitat within the study area, as well as the surrounding area, is higher than the *Dichrostahys* Bushveld.

Species of Conservation Concern

No threatened floral SCC were recorded on site during the May 2021 field assessment. In terms of Section 56 of the National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA), threatened species are Red Data Listed (RDL) species falling into the Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Protected (P) categories of ecological status.

The National Web-based Environmental Screening Tool indicated that the study area is in an area of **Low Sensitivity** from a Plant Species Theme perspective. As such, no SCC were expected to be associated with this habitat unit according to the screening tool.

The Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003) (LEMA) provides a list of Specially Protected Species (Schedule 11) and Protected Species (Schedule 12) for the Limpopo Province. Several provincially protected species were recorded within this habitat subunit. The Probability of Occurrence (POC) calculations for LEMA protected species are presented below for each of the Habitat Subunits:

- *Dichrostachys* Bushveld:
    - *Boscia foetida subsp. minima* (POC = Medium; Status = Least Concern (LC)); and
    - *Spirostachys africana* (POC = Medium; Status = LC).
- Mixed Bushveld:
    - *Huernia zebrina* subsp*. magniflora* (POC = High, Status = LC);
    - *Boscia foetida* subsp. *minima* (POC = Medium; Status = LC);
    - *Stapelia gigantea* (POC = Medium, Status = LC);
    - *Scadoxus puniceus* (POC = Medium, Status = LC); and
    - Spirosta*chys africana* (POC = Medium; Status = LC).

Additionally, several protected tree species, as per the National Forest Act, 1998 (Act No. 84 of 1998) (NFA), were observed within the Habitat unit. The POC calculations for these species are presented below the habitat subunits:

- *Dichrostachys* Bushveld:
    - *Sclerocarya birrea* subsp. *caffra* **(POC = Confirmed; Status = LC);**
    - *Combretum imberbe* **(POC = Confirmed; Status = LC); and**
    - *Vachellia erioloba* **(POC = Medium; Status = LC).**
- Mixed Bushveld:
    - *Sclerocarya birrea* subsp. *caffra* **(POC = Confirmed; Status = LC); and**

- *Elaeodendron transvaalense* **(POC = Confirmed, Status = NT).**

The Threatened or Protected Species (TOPS) List as per the 2007 Regulations provides a list of protected species for the Limpopo Province. Suitable habitat was identified for the following species within the study area:

- Dichrostachys Bushveld:
  - ***Harpagophytum zeyheri* subsp*. zeyheri* (POC = Confirmed; Status = LC);**
- Mixed Bushveld:
  - ***Harpagophytum zeyheri* subsp*. zeyheri*** (POC = Confirmed; Status = LC).

Wet Response Habitat

Presence of Unique Landscape

The Wet Response Habitat is considered unique within the greater landscape as it potentially serves as a movement corridor for both fauna and flora. This Habitat Unit provides habitat for species that favour wetter conditions and thus provides habitat for a different set of species than that supported by the Bushveld Habitat Unit. This habitat potentially provides corridors to connect to other sensitive habitat (i.e., freshwater habitat) outside of the study area.

Species of Conservation Concern

No threatened floral SCC were recorded on site during the May 2021 field assessment.

The National Web based Environmental Screening Tool indicated that the study area to of Low Sensitivity from a Plant Species Theme perspective. As such, no SCC are expected to be associated with this habitat unit. No SCC were identified within the habitat unit. No SCC are likely to be identified within the habitat unit given the overall impacted nature of the area (specifically from edge effects associated with the nearby mine and AIP infestation).

Suitable habitat to support a LEMA protected species is available within this Habitat Unit. In particular, the following species have a possibility of being recorded within this habitat unit:

- *Spirostachys africana* (POC = Medium; Status = LC).

Suitable habitat to support a NFA protected species is available within this Habitat Unit. In particular, the following species have a possibility of being recorded within this habitat unit:

- Elaeodendron transvaalense (POC = High, Status = NT).

No suitable habitats to support floral SCC as per the TOPS List were identified within the Habitat Unit.

If SCC were to be encountered within the Habitat Unit, then permits from the LEDET and authorisation from the DFFE should be obtained to remove, cut, or destroy any of the above-mentioned protected and/or threatened species before any vegetation clearing may take place.

Refer to Appendix B of the Biodiversity Assessment (Appendix E) for the complete floral SCC assessment results.

Transformed Habitat

Presence of Unique Landscape

There are no unique landscapes within this area. The floral communities are indicative of acutely disturbed habitat.

Species of Conservation Concern

No floral SCC were recorded within this habitat unit. Due to the extent to which natural floral community structure and composition has been altered by both historic and current mining activities, floral SCC are less likely to establish viable populations (if any), especially within areas that have been completely transformed. Refer to Appendix C of the Biodiversity Assessment (Appendix E) for the complete floral SCC assessment results.

Alien and Invasive Plant (AIP) Species

South Africa has released several Acts legislating the control of alien species. Currently, invasive species are controlled by the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) – Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated 25 September 2020. AIPs defined in terms of NEMBA are assigned a category and listed within the NEMBA List of Alien and Invasive Species (2020) in accordance with Section 70(1)(a) of the NEMBA:

- **Category 1a** species are those targeted for urgent national eradication;
- **Category 1b** species must be controlled as part of a national management programme, and cannot be traded or otherwise allowed to spread;
- **Category 2** species are the same as category 1b species, except that permits can be issued for their usage (e.g., invasive tree species can still be used in commercial forestry, providing a permit is issued that specifies where they may be grown and that permit holders “Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to Regulation 3”); and
- **Category 3** are listed invasive species that can be kept without permits, although they may not be traded or further propagated, and must be considered a Category 1b species if they occur in riparian zones.

Duty of care related to listed invasive species are referred to in NEMBA Section 733. The motivation for this duty of care is both environmentally and economically driven. Management of alien species in South Africa is estimated to cost at least ZAR 2 billion (US$142 million) each year - this being the amount currently spent by the national government’s DFFE - i.e., the Working for Water programme (van Wilgen, 2020). Managing AIPs early on will reduce clearing costs in the long run.

Alien Invasive Plants identified on Site

A total of ten species were recorded within the study area. Of the ten AIPs recorded during thefield assessment, six species are listed under NEMBA Category 1b and one species was listedunder NEMBA Category 2. The remaining three species are not listed under NEMBA, but these species, namely *Bidens pilosa, Zinnia peruviana* and *Tagetes minuta*, are considered problem plants and are deemed to have a negative impact on indigenous floral communities within the study area.

The following AIP’s were identified on site:

- Woody Species
    - *Nicotiana glauca*
    - *Ricinus communis*
- Graminoid Species
    - *Pennisetum cladestinum (Not Listed)*
- Forb & Herb Species
    - *Argemone ochroleuca*

- *Bidens pilosa*
- *Datura ferox*
- *Tagetes minuta*
- *Xanthium strumarium*
- *Zinnia peruviana*

- Succulent Species
  - *Opuntia ficus indica*

Refer to the Biodiversity Assessment in Appendix E (Appendix E) for more detail on each species.

10.5.2 Faunal Biodiversity

Mammals

Based on the field study conducted by Scientific Terrestrial Services the following mammals were identified on site:

- *Ichneumia albicauda* (White-tailed Mongoose);
- *Raphicerus campestris* (Steenbok);
- *Tragelaphus strepsiceros* (Kudu);
- *Parahyaena brunnea* (Brown Hyaena);
- *Galerella sanguinea* (Slender Mongoose); and
- *Lepus saxatilis* (Scrub Hare).

Mammal diversity within the study area has been notably reduced, with loss of habitat, severe bush encroachment and persecution from the local communities being the main driving factors behind this reduction of diversity. Large mammals were largely absent from the focus area with the exception of sporadic signs of *Tragelaphus strepsiceros* (Kudu).

Smaller ungulates such as *Raphicerus campestris* (Steenbok) and *Sylvicapra grimmia* (Grey Duiker) were observed in the study area. *Canis mesomelas* (Black-backed Jackal) although not observed, likely also occurs in the study area, whilst *P. brunnea* (Brown Hyaena) will forage in the study area.

Smaller species such as *Tatera leucogaster* (Bushveld Gerbil), *Micaelamys namaquensis* (Namaqua Rock Mouse), *Elephantulus* sp. (Elephant Shrew), *Saccostomus campestris* (Pouched Mouse), *Mastomys coucha* (Southern Multimammate Mouse) and *Lemniscomys rosalia* (Single-striped Grass Mouse) will also likely inhabit the study area. Additionally, these small species form a base food resource for mesopredators, raptors as well as predatory snakes.

Although sections of the study area are fenced (mine boundary fence), this fence has been broken in many places, allowing for relatively free movement of inhabiting mammals. Species movement to and from the study area is largely limited by communities and the mine, with access only readily available from the east, which connects to larger, open space, natural areas which likely also form part of the larger mammal species home ranges and foraging grounds. As with all areas located near communities, hunting (snares and hunting dogs) remains a constant problem and is a continuous threat to mammal species. Several snares for small and medium sized species were observed within the study area during the survey.

Species of Conservation Concern

***Parahyaena brunnea* (Brown Hyaena):** Brown Hyaenas are remarkable adaptable, able to live amongst communities in rural areas. Their predominantly nocturnal activities and ability to survive off multiple food sources (meat and plant material) allows them to inhabit the areas surrounding the mine. It is likely that the large granite domes south-east of the study area are used for denning and refuge during the daylight hours. The study area will likely form part of this species foraging area. The development of the NWRD will likely result in decreased foraging potential for this species.

Brown Hyaena's are classified as Near Threatened and are protected. The probability of Brown Hyaena's occurring within the proposed project area is high.

Faunal Sensitivity

The Screening Tool indicated a **Low** mammal sensitivity for the study area. Given the observations onsite and the disturbed and encroached state of the available mammal habitat, this study does, to a degree, concur with this rating.

It must be noted, however that although disturbed, the study area does still provide suitable habitat and breeding sites for several small and medium sized mammals, and as such cannot be wholly disregarded as unimportant in the regional setting. The development of the NWRD will result in habitat loss and the displacement of several mammal species from the study area. This loss of habitat and species displacement will lead to an increase in population numbers in the surrounding natural areas, placing increased pressure of food resources and an increased level of competition for space. Snaring operations are also likely to become more focused in the remaining areas, which will lead to further species off-take.

Avifauna

Based on the field study conducted by Scientific Terrestrial Services the following avifauna were identified on site:

- *Pternistis swainsonii* (Swainson's Spurfowl);
- *Calendulauda sabota* (Sabota Lark);
- *Estrilda astrild* (Common Waxbill); and
- *Bradornis pallidus* (Pale Flycatcher).

For avifauna vegetation structure, as opposed to actual plant species richness, is widely acknowledged as the primary determinant of bird communities. During the site assessment, limited avifauna were observed on site, this is likely attributable to the late season of assessment, but also the encroached nature of the environment which makes direct observation difficult. The study area displayed a low variation in vegetation structure, dominated by dense woody species and a relatively homogonous grass sward. This limits avifaunal habitat availability whilst leading to a limited band of available food resources. Dominant avifaunal species comprised those which select for dense vegetation structure, whilst the limited open space areas around the wet response habitat and the rocky outcroppings within the mixed bushveld habitat were favoured by species which select for more open habitat. Additionally, the dense vegetation structure will limit raptors as they are unable to easily seek out and hunt prey items within the dense vegetation.

Species of Conservation Concern

***Aquila verreauxii* (Verreaux's Eagle):** This species is known within the region, with a breeding pair known to frequent and nest in the granite domes to the east of the mine. The study area, due to the proximity to the domes, will be used as a foraging area for this species, although, it is unlikely to present a favourable area to forage within given the encroached nature of the veld. Although encroached, there are open patches and roads, and should the opportunity present itself, it is likely that this species will take prey items herein.

The Verreaux's Eagle has a high probability of occurring within the proposed project area and is classified as vulnerable.

Faunal Sensitivity

Avifaunal observations on site were limited during the site assessment. The majority of bird species observed were small insectivorous and granivorous species that select for dense stand of vegetation, where they can move about the lower strata in search of food resources. Large raptors are not likely

to frequent the study area due to the unsuitable hunting grounds, as they risk serious injury flying into the dense stands of *Dichrostachys cinerea* that is proliferate throughout.

The NWRD will result in a loss of habitat and foraging grounds for several avifaunal species, however these species are considered to be common and widespread in the region, and as such, it is unlikely that this loss of habitat will have a significant impact on avifaunal abundance or diversity at a regional scale. The loss of habitat will displace species, which may lead to increase pressure on food resources and space in the remaining undeveloped areas, however, avifauna are more easily able to move between habitats, and as such, this pressure is likely to be readily alleviated through the absorption of the dispersing individuals in the surrounding habitats.

Herpetofauna

Based on the field study conducted by Scientific Terrestrial Services the following herpetofauna were identified on site:

- *Phrynomantis bifasciatus* (Banded Rubber Frog);
- *Trachylepis damarana* (Damara Variable Skink);
- *Trachylepis punctatissima* (Spekled Rock Skink); and
- *Trachylepis margaritifera* (Rainbow Skink).

Due to the lack of permanent surface water areas and/or areas where the soil moisture content is more permanent, habitat is limited for amphibian diversity within the study area. The dense herbaceous layer will further limit foraging and movement abilities of small amphibians. As such, amphibian species will opt to inhabit the open space areas where woody encroachment is less, notably in the mixed bushveld habitat. During the assessment a single species, *Phrynomantis bifasciatus* (Banded Rubber Frog), was observed sheltering under a rubber mat under a large marula tree. This specie in known to inhabit bushveld and savanna habitats and can survive away from permanent water, provided there is sufficient soil moisture content and cover from the heat of the sun. The study area is likely to only host a low diversity of water independent amphibians. Other species that may occur on site include *Schismaderma carens* (Red Toad) and species of the *Genus Tomopterna* (Sand Frogs).

The study area, with its dense vegetation, dead wood material and intermittent rock outcrops provided suitable habitat and areas of refuge for several reptile species. Although no snakes were observed during the field assessment, it is highly likely that several species will occur on site, including *Bitis arietans* (Puff Adder), *Naja annulifera (*Snouted Cobra) and *Lycophidion capense* (Cape Wolf Snake). These predatory snakes will roam throughout the study area in search of food resources in the form of small mammals and reptiles. Smaller reptiles such as skinks were readily observed on the rock outcrops as well as around the bases of larger woody trees. The smaller skinks thrive in such environments where the denser cover provides better cover and protestation from predators whilst foraging on vertebrates.

Species of Conservation Concern

***Kinixys lobatsiana* (Lobatse Hingeback Tortoise)**: This species is known within the region where it selects for rocky hills where it can find refuge within. This species may occur within the dolomite domes to the east of the mine, however there is insufficient suitable habitat within the study area itself to support this species. The small number of rock outcroppings within the mixed bushveld habitat are insufficient in size and depth to provide adequate shelter and food for this species.

The Lobatse Hingeback Tortoise has a low probability of occurring within the proposed project area and is classified as vulnerable.

Lycophidion variegatum (Variegated Wolf snake): Known within the region, although no previous recordings of this species within the QDS according to the reptile database of the Animal Demography

Unit (ADU). This species may have historically occurred within the study area, but previous agricultural activities, current mining expansion and habitat degradation now likely limits such occurrence.

The Variegated Wolf snake has a low probability of occurring within the proposed project area and is classified as protected within Limpopo.

Faunal Sensitivity

Small reptiles (skinks) were abundant throughout, whilst larger predatory snakes will have a lower abundance as food resources are not sufficient enough to support a higher abundance. The lack of permanent water bodies limits amphibian assemblages to those which are water independent and adapted to surviving in the bushveld environment. Loss of habitat will result from the development of the NWRD, displacing these species yet they will readily be able to relocate to the surrounding areas and as such, limited impacts to species abundances and diversity is expected.

Invertebrates

Based on the field study conducted by Scientific Terrestrial Services the following invertebrates were identified on site:

- *Cyrtophora citricola* (Tropical Tent-web Spider).
- *Family Agelenidai* (Funnel-web Spiders).
- *Anacridium moestum* (Tree Locust).

Overall invertebrate abundance and diversity are widely considered as a good indicator of ecological condition. In areas of decreased invertebrate, notably insect, diversity and abundance, this often has notable knock-on impacts for remaining faunal assemblages, as insects form the base food resource for many avifaunal, reptiles, amphibian and in instances, mammal species. Additionally, insects provide important ecosystem functions, removing detritus from the surface as well as cycling dung and other material back into the soil layers. Due to the late season of assessment, a decreased abundance and diversity of invertebrates was observed, however, given the disturbed nature of the site and the relative homogeneity in vegetation, it is unlikely that the study area will support a high diversity of invertebrate species. Insect species observed and indicated by online databases were predominantly of the Families Coleoptera, Lepidoptera and Orthoptera appeared to be dominant in the study area. None of the insect species observed are considered specialist or niche habitat species. Observed insect diversity comprised predominantly of species that feed on plant material, other insects and detrital material and as such are better adapted to surviving in disturbed environments.

Only two species of spiders were observed, however it must be noted that arachnid species are in general secretive and hard to detect. As such, food availability and habitat was used to infer potential arachnid diversity. Habitat disturbance and the encroached bushveld may be a limiting factor for ground hunting spider and scorpion species, however the woody nature of the study area is more conducive to plant living and web building spiders. The rocky outcrop areas do provide areas of refuge for ground dwelling arachnids, whilst the rock crevices are suitable for ambush hunters. Overall, the study area is not expected to have a moderate diversity of arachnid species, largely driven by habitat and food resources, with the later fluctuating on a seasonal cycle.

Species of Conservation Concern

***Hadogenes spp* (Flat Rock Scorpions):** This Genus of scorpions is often found inhabiting rocky outcrops, where they seek shelter between crevices and under boulders. Although none were found on site, the small rock outcroppings within the mixed bushveld habitat may be inhabited by individuals of this Genus.

The Flat Rock Scorpions has a medium probability of occurring within the proposed project area and is classified as protected.

Faunal Sensitivity

Commonly occurring insect were observed throughout the study area, notably those which are better adapted to feeding on plant material with increase cellulose (less palatable grasses) and tannins (some tree species). These species in turn serve as food resources for many arachnid species as well as other faunal species. Development of the NWRD will lead to a decrease in invertebrate abundance at a local scale, though diversity is unlikely to be affected, as no niche habitats are present. Invertebrate species present all, in general, have a mixed habitat tolerance and as such can relocate to surrounding natural areas.

10.6 Wetlands

The information presented in this section has been extracted from the Freshwater Ecosystem Assessment compiled by Scientific Aquatic Services in 2022.

Scientific Terrestrial Services CC (STS) was appointed to conduct a Biodiversity Assessment as part of the BA Environmental Authorisation process for the proposed extension and reconfiguration of the NWRD. During the field assessment STS identified a wet response habitat to the east of the ore stockpile footprint. STS recommended that the wet response habitat be further investigated by a wetland specialist.

Scientific Aquatic Services (SAS) was appointed to conduct a freshwater ecosystem assessment as part of the BA process to address the Biodiversity Assessment wet response habitat finding for the proposed extension and reconfiguration of the NWRD footprint. The purpose being to define the ecology of the area in terms of freshwater ecosystem characteristics, including mapping of the freshwater ecosystems, discussion of key ecological drivers and to define the Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS), as well as the socio-cultural and ecological service provision of the freshwater ecosystems utilising current industry “best practice” assessment methods in order to ascertain what impact the activities may have on the freshwater ecosystems associated with the study area. Additionally, this assessment aimed to define the Recommended Management Objectives (RMO) and Recommended Ecological Category (REC) for the freshwater ecosystems.

The assessment identified a seep wetland with a channelled outflow that would potentially be at risk from the proposed NWRD extension and reconfiguration project (Figure 5-1). The seep wetland forms as a result of bedrock interflow that reaches an impermeable layer beneath the ground and is forced to surface. This results in an isolated area in the landscape which accumulates surface water at or close to the surface but there is insufficient moisture to generate runoff that allows the wetland conditions to persist in the landscape and confluence with the Witrivier. This isolated area supports vegetation typically adapted to life in saturated soil and is classified as a watercourse according to the NWA, although it is considered to be of low/marginal ecological significance since it is hydrologically isolated and not significant in terms of biodiversity support. Table 10-4 presents a summary of the freshwater ecosystem assessment for the wetland.

Table 10-4: Summary of the freshwater ecosystem assessment for the wetland affected by the proposed NWRD footprint

Freshwater Ecosystem	PES / Ecostatus	Ecoservices	EIS	REC / RMO / Best Attainable State (BAS)
Seep wetland with a channelled outflow	Category D (Largely Modified)	Moderately Low	Low/Marginal	REC Category: D BAS Category: D RMO: Maintain

The extent of modification to the seep wetland is considered to be low given that the seep wetland will be avoided by the proposed extended and reconfigured footprint of the NWRD, and any additional edge effects will be reduced by the reconfiguration of the footprint as a result of the application of a 500m buffer zone around the freshwater environment. SAS, 2021 however, indicated that the continued disposal of waste rock material will likely result in increased sediment runoff and dispersion as a result of steeper slopes and material load [on the NWRD] which will ultimately impact the freshwater environment (Witrivier and wetland). In addition, the salinisation of the freshwater habitat and general salt loading has the potential to impact on the freshwater habitat and this may in addition pose a toxicological risk to the aquatic ecology of the freshwater ecosystems. The overall impacts significance of these activities can be reduced by means of mitigation measures which reduce the risk.

10.7 Noise

The information presented in this section has been extracted from the Noise specialist study compiled by dBAcoustics in 2020 and updated in 2021.

A noise survey was conducted in 2019 as part of the Mogalakwena Expansion Project. The information has not changed since the survey was conducted in 2019, thus, only an update was undertaken in order to assess the possible noise intrusion levels as a result of extending the NWRD footprint. The existing prevailing ambient noise levels along the boundaries of the mine was used to determine the potential noise impact at the abutting noise sensitive areas in the vicinity of the proposed project.

10.7.1 Current noise sources

Based on the 2021 study update the following noise sources (measured at the points included in Table 10-5 and shown in Figure 10-3 were identified in the vicinity of and at the boundaries of the study area:

- Mining activity noise such as hauling vehicles, crushing activities, TSF activities and blasting;
- Traffic noise which can be continuous and/or intermittent at times along the feeder road beyond the mine property boundaries;
- Domestic type noises such as people talking, animals, amplified music and traffic.

Table 10-5: 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 Complex.
2	23^0 56.298' S	028^0 51.553' E	Kwakalata Mesopotania Village along the south-eastern side facing Mogalakwena Complex.
3	23^0 57.183' S	028^0 51.850' E	Ga-Tshaba Village on the eastern side of the village facing Mogalakwena Complex.

10.7.2 Sensitive receptors

The noise receptors which are the closest in proximity to the proposed project are detailed in Table 10-6 and shown in Figure 10-5.

Table 10-6: Location of the noise receptors

Receptor	Distance (meters) from the proposed project
Individual houses north-west of the project	501
Individual housesnorth-east of the project	437
Molokomme	1 231
Gamaloka	1 572
Mesopotamia	507

10.7.3 Noise survey

The prevailing ambient noise levels are recorded in Table 10-7 provide an indication of the noise sources currently present in the area which include domestic, traffic noise, distant mine noise and natural noise sources.

Table 10-7: Noise levels for the day and night in the study area

Position	Day time				Night Time			
	Leq* - dBA[14]	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.

* 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.

Sound levels were used in determining the noise intrusion level for the project during the phases of the proposed project. The criteria for assessing the magnitude of a noise impact are illustrated in Table 10-8.

Table 10-8: Criteria for assessing the magnitude of a noise impact

Increase Δ-dBA[15]	Assessment of impact magnitude	Color code
0 <Δ≤ 1	Not audible	
1 <Δ≤ 3	Very Low	
3 <Δ≤ 5	Low	

[14] Noise levels are measured in decibels (dB). dB are weighted (A) according to the weighting curve to approximate the way in which humans ears hear noise (dBA)

[15] Δ-dBA is the change in the weighted noise levels

5 <Δ≤ 10	Medium	
10 <Δ≤ 15	High	
15 <Δ	Very High	

10.7.4 Noise level intrusion 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 level criteria for the proposed project is shown in Table 10-9.

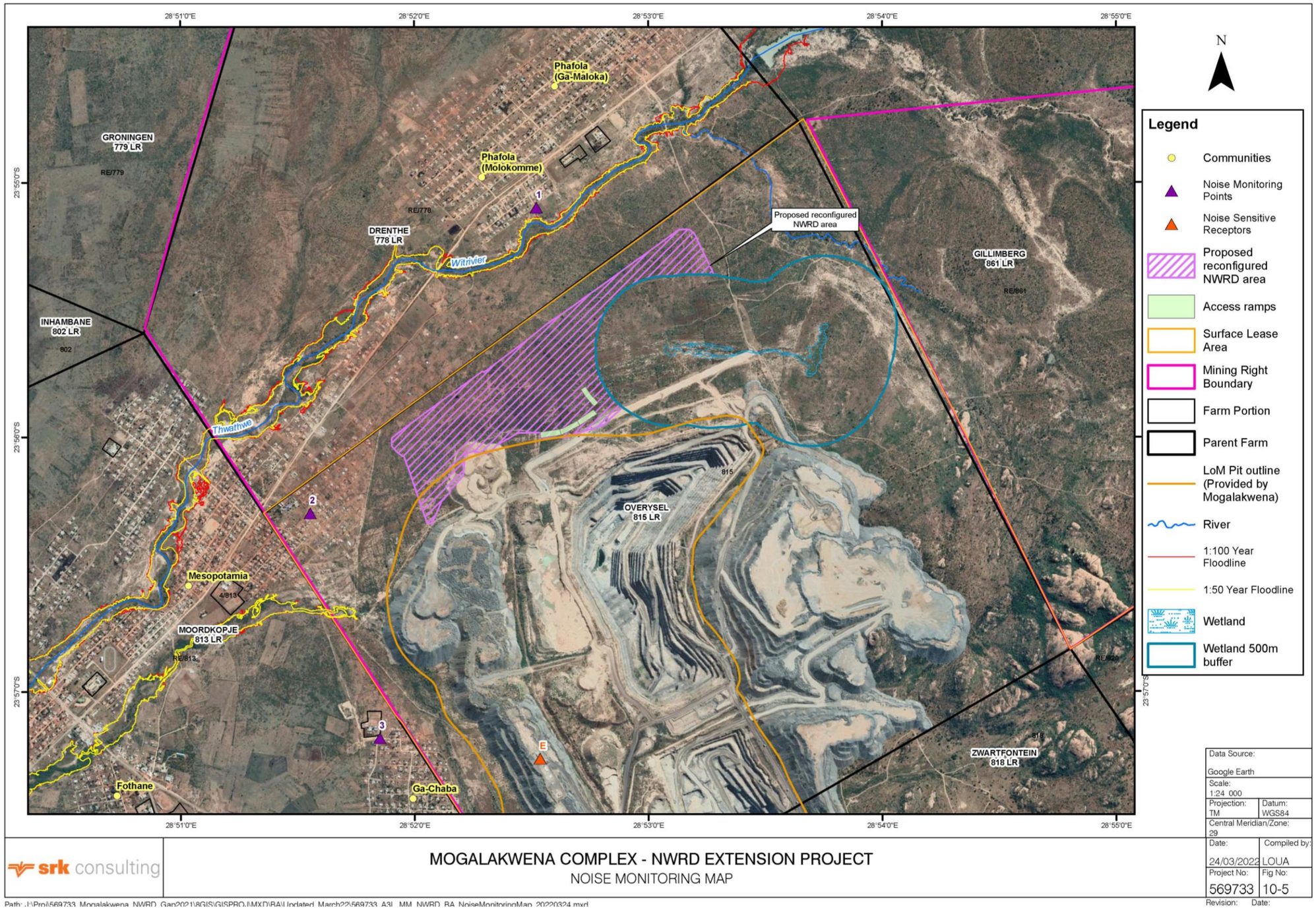


Figure 10-5: Noise monitoring points within the study area

Table 10-9: Projected noise intrusion levels

Receptor	Noise level at receptor during tipping activity	Noise level at receptor from reverse signal	Prevailing ambient noise level day time - dBA	Prevailing ambient noise level night-time - dBA	Cumulative Levels	Cumulative noise level - Daytime	Cumulative noise level Night-time	Intrusion noise level daytime	Intrusion noise level – night-time
Individual houses North West of the project area	31.0	36.0	35.7	33.7	37.2	39.5	38.8	**3.8**	**5.1**
Individual houses North East of the project area	32.2	37.2	35.7	33.7	38.4	40.3	39.7	**4.6**	**6.0**
Molokomme	23.2	28.2	34.8	38.8	29.4	35.9	39.3	**1.1**	**0.5**
Gamaloka	21.1	26.1	34.8	38.8	27.3	35.5	39.1	**0.7**	**0.3**
Mesopotamia	30.9	35.9	35.7	33.7	37.1	39.5	38.7	**3.8**	**5.0**

10.8 Air Quality

The information presented in this section is extracted from the specialist Air Quality study undertaken by SRK in 2021.

10.8.1 Ambient air quality

Air quality monitoring data from Mogalakwena Complex for this project is presented in this section. Data was received for dust fallout (DFO) and PM_{10}. A total of 36 DFO units have been installed in and around the Mogalakwena Complex project area. Twenty are residential area DFO units and sixteen are non-residential rea DFO units. Three PM_{10} sampling stations have been installed within the Mogalakwena Complex project area. PM_{10} data for the period 2013 to 2019 was acquired from Mogalakwena Complex. The location of all the monitoring stations are presented in Table 10-10, with those in close proximity to the proposed project highlighted in grey and shown in Figure 10-6.

The following datasets have been collated:

- Mogalakwena Complex DFO results for the period January 2014 to April 2021.
- Mogalakwena Complex daily PM_{10} concentrations:
    - PM1 for the period February 2015 to October 2019.
    - PM2 for the period December 2013 to September 2019.
    - PM3 for the period December 2013 to July 2019.

10.8.2 Existing Emission Sources

The existing air emissions sources identified within and around the Mogalakwena Complex include the following: sources which contribute to the baseline air quality

- Dust from roads and motor vehicles
- Vehicle tail pipe emissions
- Mining and processing activities
- Mine residue deposits
- Drilling and blasting
- Ore stockpiles
- Open pits
- Crushing
- Drilling and blasting

Table 10-10: PM_{10} and DFO monitoring locations

Field ID	Parameter	Classification	Latitude (X)	Longitude (Y))
PM1	PM_{10}	*N/A*	691920	7348155
PM2		*N/A*	696120	7342648
PM3		*N/A*	695342	7348086
P34	DFO	Non-residential	695815	7344169
P46		Non-residential	693144	7346056
P9		Non-residential	694865	7345368

Field ID	Parameter	Classification	Latitude (X)	Longitude (Y))
TS		Non-residential	696706	7346051
TEXS		Non-residential	696922	7346259
TES		Non-residential	696941	7346868
P21		Non-residential	695868	7347337
P31		Non-residential	695176	7347346
ZWNDS		Non-residential	693135	7346189
PPRN		Non-residential	692214	7347320
GTRDS		Non-residential	690440	7349415
NB		Non-residential	689649	7351198
Blinkwater N		Non-residential	697236	7350560
Blinkwater S		Non-residential	698006	7348563
TMD (NESW)		Non-residential	696706	7346051
GTRDMD (NESW)		Non-residential	690440	7349415
Hans Langa		Residential	690343	7345346
Manamela HSE no 385		Residential	688744	7350921
Mashishi		Residential	689835	7349205
House 100559		Residential	687703	7350058
Nyaatlo 020169		Residential	688446	7346580
Mahlanya 100068		Residential	690760	7353507
Matso 010290		Residential	690648	7343975
PUKA-444		Residential	703079	7350554
PAPO-19		Residential	700158	7347309
RAMMUTLA-95		Residential	697764	7350706
MALOKA KGORO-10019		Residential	691252	7354283
MPHELA-132		Residential	694071	7349025
DOLO-20120		Residential	697330	7346295
MORUDI-10278		Residential	698021	7345307
Tsalebella		Residential	690621	7342897
Modikwe Secondary		Residential	692333	7341141
GTS		Residential	689681	7349746
Morgan		Residential	690199	7348864
KUB (new point)		Residential	691404	7346316
Lang (new point)		Residential	691643	7347092

10.8.3 Monitoring

Dust fallout results

The average monthly DFO results for January 2014 to April 2021 (presented in Figure 10-7 and Figure 10-8 indicates the monthly DFO rate for non-residential and residential area sampling stations respectively. The monitoring network comprises of twenty residential and sixteen non-residential DFO monitoring sites.

The average monthly DFO rates for non-residential and residential areas are below the respective standards at all monitoring points. There was one exceedance of the non-residential standard at TEX.S (1 310 mg/m^2/day in February 2021), however all other non-residential monitoring points were in compliance with the National Dust Control Regulation's non-residential standard of 1 200 mg/m^2/day.

Twelve exceedances of the National Dust Control Regulations residential standard of 600 mg/m^2/day were measured at the residential monitoring locations. Two exceedances were measured at Hans Langa in December 2020 and March 2021. One exceedance was measured at Manamela House No 385 (January 2019), Matso 010289 (December 2019), PAPO-19 (September 2019), GTS (December 2020) and KUB (July 2019). Further, four exceedances were measured at Lang in September 2019, October 2019, July 2020, and December 2020. All other DFO rates remain below the residential area standard of 600 mg/m^2/day.

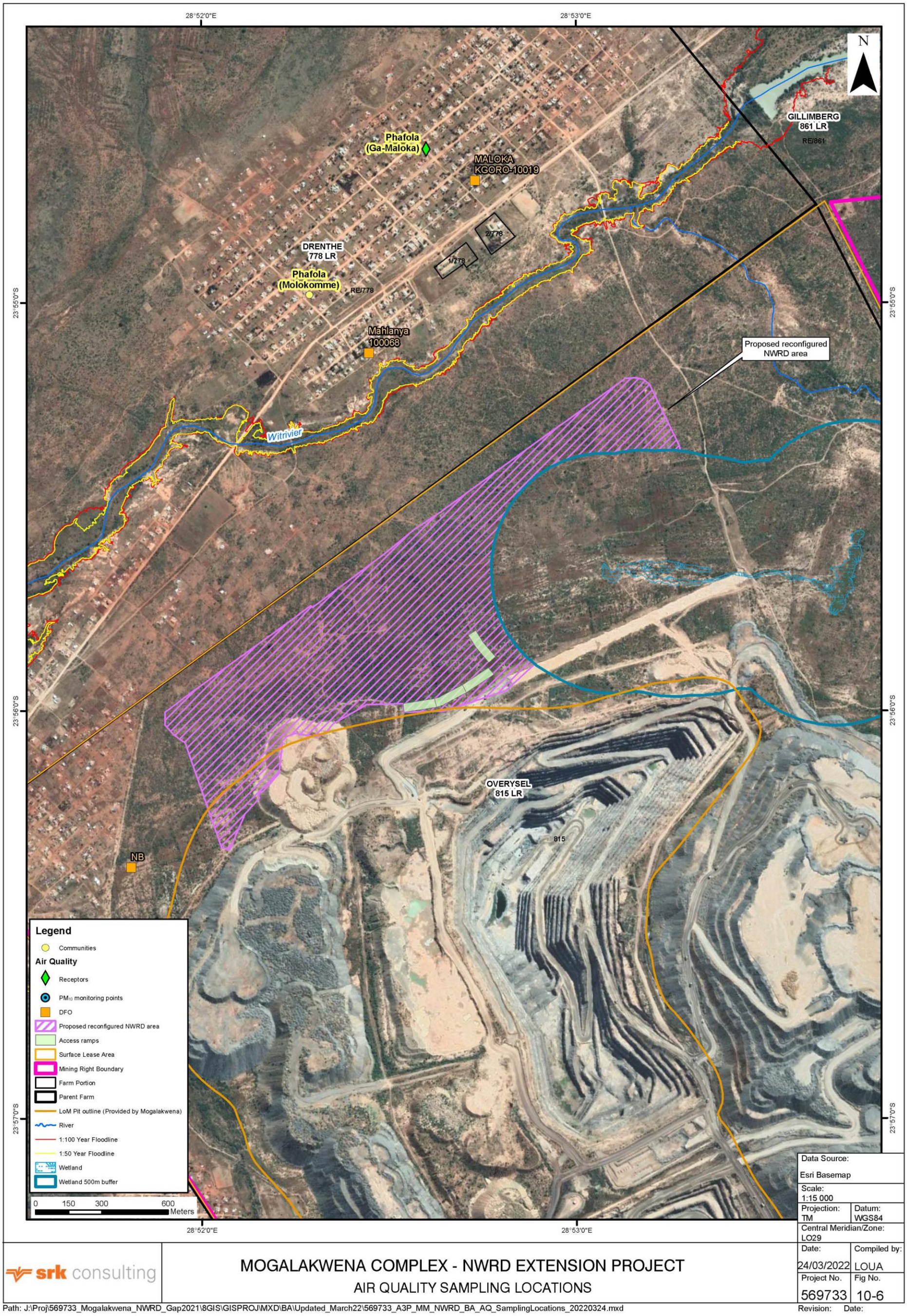


Figure 10-6: Air quality sampling points

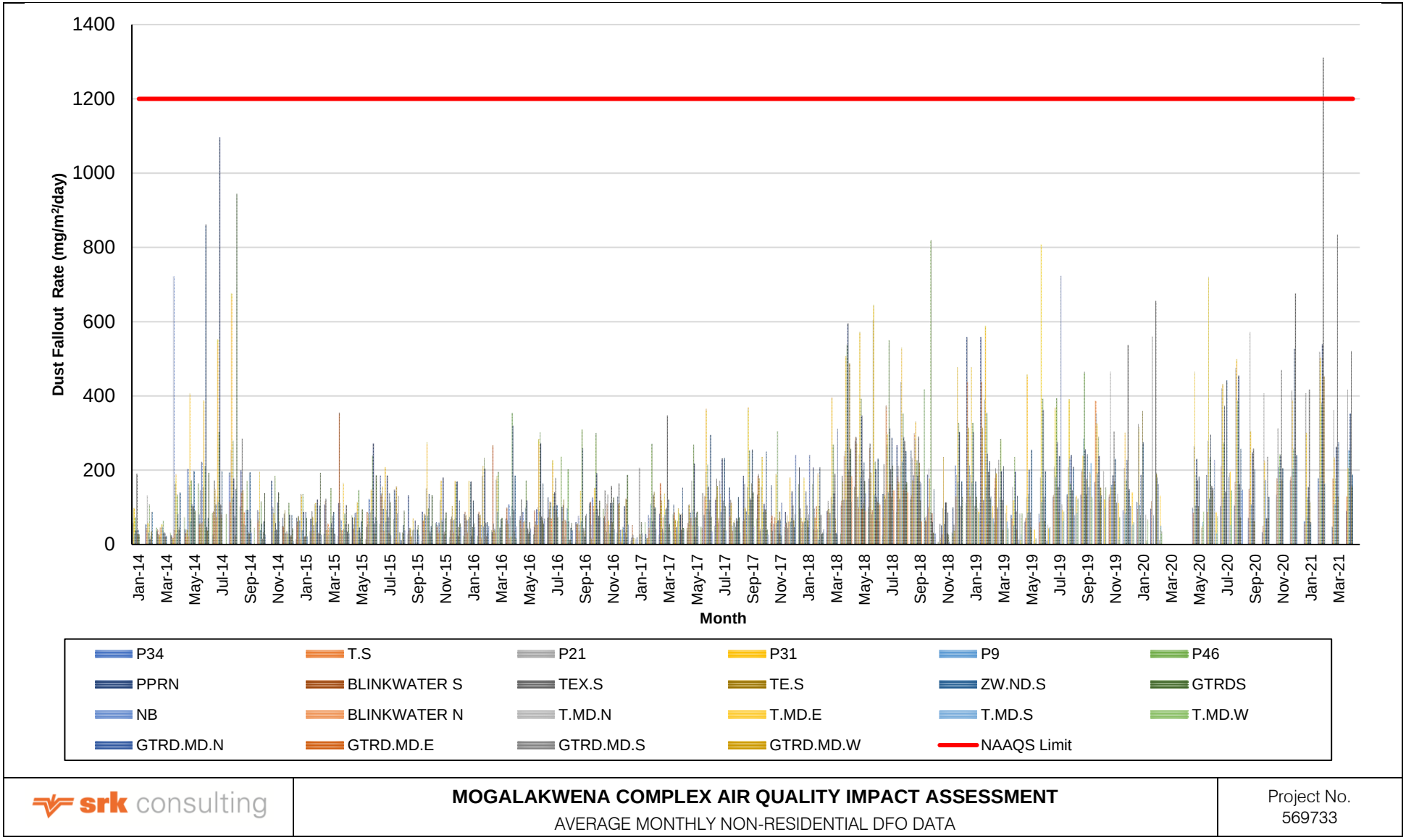


Figure 10-7: Non-residential DFO Monitoring results for the period January 2017 to April 2021

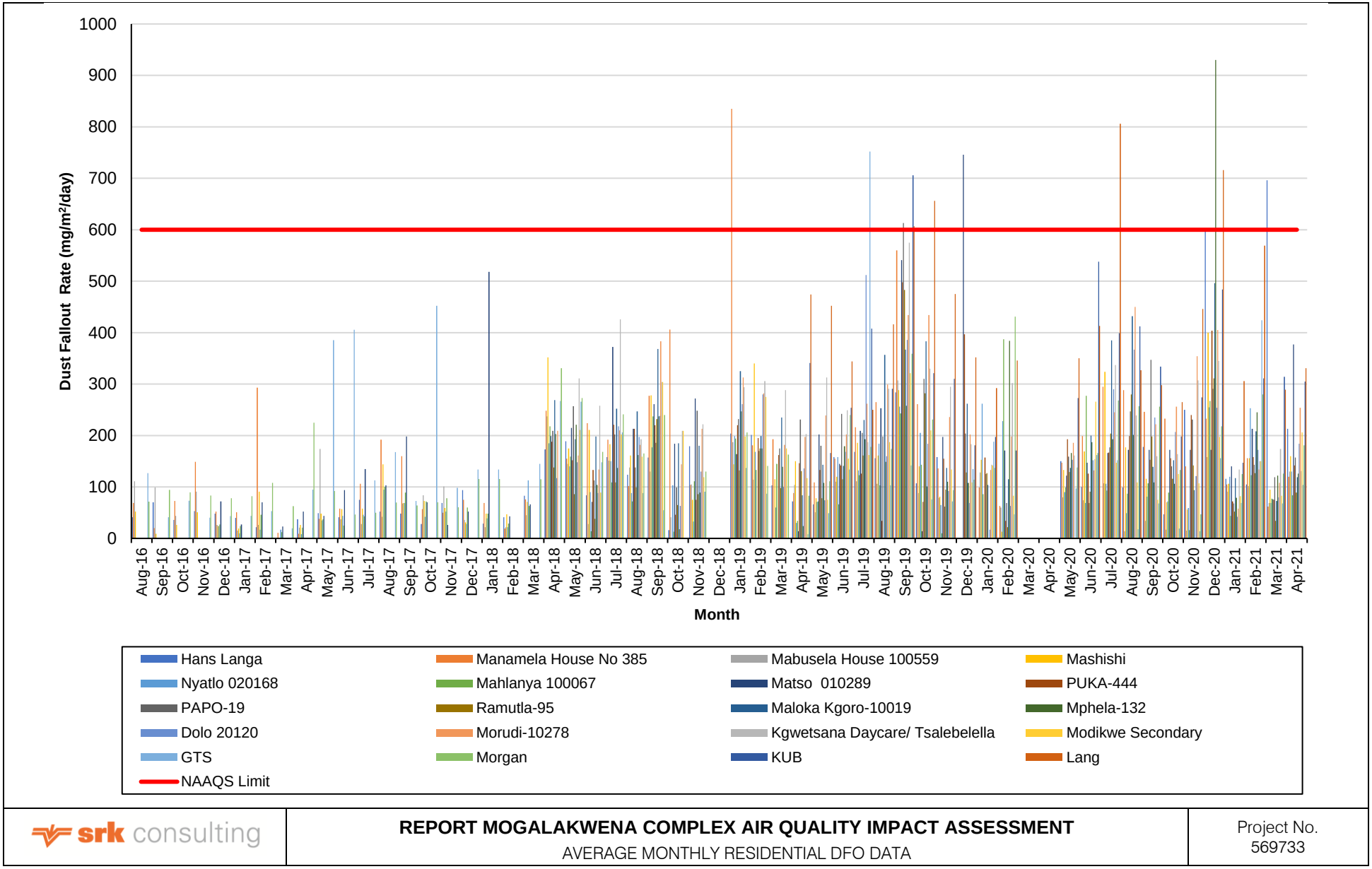


Figure 10-8: Residential dust fall out for period January 2017 to April 2021

Particulate matter

PM_{10} monitoring at the Mogalakwena Complex site was undertaken as part of the ambient air quality monitoring programme up until October 2019. The average daily PM_{10} results are presented in Table 10-11. PM data was sourced from the three on-site PM_{10} monitors located within the Mogalakwena Complex project area. All available PM data from each of the monitoring stations was incorporated into the report, however, there were large data gaps identified in the dataset. The particulate matter monitors located on-site are located in close proximity to emissions sources, hence are considered source monitoring points.

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 75.2 µg/m^3 (6 August 2018), which exceeds the 24-hour PM_{10} standard. There are no other exceedances of the NAAQS limit at this monitor. The PM_{10} concentrations are the highest in 2018.

Average 24-hour PM_{10} concentrations at PM2 ranged from 4.5 µg/m^3 (January) 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 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.

At the PM3 monitoring station, the average 24-hour PM_{10} concentrations range from 5.1 µg/m^3 (April) to 40.1 µg/m^3 (September), and are below the standard of 75 µg/m^3. 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 the highest

Table 10-11: Average daily PM_{10} concentrations for the period (µg/m^3)

Month	PM1	PM2	PM3
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	10.0
June	9.1	11.0	10.3
July	7.2	11.4	11.4
August	14.3	26.6	14.3
September	16.1	11.2	40.1
October	9.0	8.7	28.1
November	7.2	6.6	6.4
December	12.8	8.7	6.1
NAAQS	**75**	**75**	**75**

The percentage data available is presented in Table 10-12. Since inception of PM_{10} monitoring, the percentage available data has varied over the period 2013 - 2019. Data availability should ideally be above 80% for a calendar year. In terms of PM_{10} monitoring at Mogalakwena Complex, there were 18 instances when data availability was below 80%.

Table 10-12: Percentage PM_{10} data availability (%) 2013-2019

Unit	2013	2014	2015	2016	2017	2018	2019
PM1	No data	No data	78	58	7	62	44
PM2	100	83	76	0	5	16	44
PM3	100	62	55	0	8	27	57

10.8.4 Dispersion modelling

Dispersion models are used to calculate 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.

A list of community sensitive receptors in the Mogalakwena Complex area are presented in Table 10-13. Monitoring point receptors highlighted in grey in Table 10-14 have been identified as sensitive receptors in close proximity to the project area. The receptors presented all fall within the dispersion modelling domain, hence the selection.

Table 10-13: Receptors in close proximity to the mine

Receptor	Coordinates		Site Description
	X	Y	
Danisane	692344	7340239	Community
Fothane	687786	7349328	Community
Ga Masenya	691364	7346257	Community
Ga- Molekana	697796	7345368	Community
Ga-Chokoe	689221	7342520	Community
Ga-Lelaka	689238	7343150	Community
Ga-Mabusela	688312	7359662	Community
Ga-Magongoa	700035	7336371	Community
Phafola	691033	7354427	Community
Ga-Matlou	688322	7341856	Community
Ga-Modipana Mosoge	687058	7350656	Community
Ga-Mokaba	697647	7338806	Community
Ga-Pila Sterkwater	684530	7338235	Community
Ga-Seema	690452	7342721	Community
Ga-Tshaba	689934	7349277	Community
Kwakwalata	687016	7349707	Community
Mmalepetleke	694700	7335880	Community
Mamala	688310	7346652	Community
Matopa	688374	7348780	Community
Mesopotamia	688326	7350845	Community
Mmahlogo	685171	7348589	Community
Mosesetjane	697192	7334734	Community
Rooibokfontein	702914	7350610	Community

Receptor	Coordinates		Site Description
	X	Y	
Sandsloot (Ga-Mabusela)	692533	7339218	Community
Sekuruwe	697998	7351215	Community
Tshamahansi	701592	7335615	Community
Witrivier	694204	7356814	Community
Skimming Leruleng	691534	7346694	Community

Table 10-14: Monitoring point receptors

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

Receptor	Coordinates		Site Description
	X	Y	
Tsalebella	690621	7342897	DFO Unit
Modikwe Secondary	692333	7341141	DFO Unit
GTS	689681	7349746	DFO Unit
Morgan	690199	7348864	DFO Unit
KUB (new point)	691404	7346316	DFO Unit
Lang (new point)	691643	7347092	DFO Unit

10.8.5 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 10-13, 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 presented in Table 10-13 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 northwest 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 0.3 µg/m^3 (Rooibokfontein) to 34.9 µg/m^3 (Mesopotamia). 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 falls within the mine boundary, at the proposed PM_{10} generating activities. The predicted annual concentrations range from 0.0 to 5.9 µg/m^3. Predicted concentrations at the sensitive receptors (Table 10-13) indicate that PM_{10} concentrations will decrease further away from the PM_{10} generating activities.

Table 10-15: Predicted mitigated PM_{10} concentrations at the sensitive receptors

Receptors	Annual	24-hour
	µg/m^3	µg/m^3
Danisane	0.2	1.8
Fothane	2.5	16.1
Ga Masenya	0.5	4.4
Ga- Molekana	0.1	0.9
Ga-Chokoe	0.4	3.4
Ga-Lelaka	0.4	3.9
Ga-Mabusela	0.5	4.1
Ga-Magongoa	0.1	1.4
Phafola	2.9	18.7
Ga-Matlou	0.3	3.2
Ga-Modipana Mosoge	3.6	23.2
Ga-Mokaba	0.2	3.3

Receptors	Annual	24-hour
	µg/m³	µg/m³
Ga-Pila Sterkwater	0.3	1.9
Ga-Seema	0.3	3.0
Ga-Tshaba	2.1	16.6
Kwakwalata	2.8	17.2
Mmalepetleke	0.2	1.1
Mamala	0.8	6.3
Matopa	1.9	14.6
Mesopotamia	5.9	34.9
Mmahlogo	1.7	11.9
Mosesetjane	0.1	1.3
Rooibokfontein	0.0	0.3
Sandsloot (Ga-Mabusela)	0.2	1.6
Sekuruwe	0.1	0.6
Tshamahansi	0.1	0.5
Witrivier	0.2	4.6
Skimming Leruleng	0.6	5.2
SA NAAQS	**40**	**75**

The three existing PM_{10} monitors were included as sensitive receptors into the model to determine the cumulative impact at these points. The predicted annual modelled concentrations were added to the average annual monitored concentration to determine the cumulative concentration. The annual cumulative concentration at each of the monitoring points is below the annual NAAQS of 40 µg/m³. The annual predicted percentage increase in annual PM_{10} concentrations at the monitoring points range between 19.4-63%.

Table 10-16: Cumulative PM_{10}

Receptors	Annual Modelled	Average Annual Monitored	Cumulative Concentration	% Increase
	µg/m³	µg/m³	µg/m³	%
PM1	6.3	10.0	16.3	63.0
PM2	1.9	9.6	11.7	19.4
PM3	4.7	11.2	17.7	36.2
Annual NAAQS	**40**	**40**	**40**	-

$PM_{2.5}$

The predicted 24-hour and annual $PM_{2.5}$ concentrations are presented in Table 10-17 for a scenario where management measures are in place. The maximum predicted concentration occurs within the mine boundary.

Similarly, the predicted annual $PM_{2.5}$ concentrations at the sensitive receptors are below annual NAAQS of 20 µg/m³. The maximum predicted annual concentration is located on-site at the proposed activities. The predicted annual concentrations range from 0.0 to 0.7 µg/m³. Predicted concentrations at the sensitive receptors indicate that $PM_{2.5}$ concentrations will decrease further away from the site.

Table 10-17: Predicted mitigated $PM_{2.5}$ concentrations at the sensitive receptors

Receptors	Annual	24-hour
	µg/m³	µg/m³
Danisane	0.0	0.2
Fothane	0.3	1.8
Ga Masenya	0.1	0.5
Ga- Molekana	0.0	0.1
Ga-Chokoe	0.0	0.4
Ga-Lelaka	0.1	0.5
Ga-Mabusela	0.1	0.5
Ga-Magongoa	0.0	0.2
Phafola (Ga-Maloka)	0.3	2.1
Ga-Matlou	0.0	0.4
Ga-Modipana Mosoge	0.4	2.6
Ga-Mokaba	0.0	0.5
Ga-Pila Sterkwater	0.0	0.2
Ga-Seema	0.0	0.3
Ga-Tshaba	0.2	1.9
Kwakwalata	0.3	1.9
Mmalepetleke	0.0	0.1
Mamala	0.1	0.7
Matopa	0.2	1.6
Mesopotamia	0.7	4.0
Mmahlogo	0.2	1.3
Mosesetjane	0.0	0.1
Rooibokfontein	0.0	0.0
Sandsloot (Ga-Mabusela)	0.0	0.2
Sekuruwe	0.0	0.1
Tshamahansi	0.0	0.1
Witrivier	0.0	0.6
Skimming Leruleng	0.1	0.6
SA NAAQS	**20**	**40**

Dust Fallout

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

With management measures in place, the DFO rates at the sensitive receptors are below the Residential Area standard of 600 mg/m²/day, with the highest concentration occurring within the mine boundary. The plume is predicted to be concentrated over the extended NWRD. The predicted concentrations range from 0.7 mg/m²/day (Mosesetjane) to 53.2 mg/m²/day (Mesopotamia). The predicted DFO 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.

The DFO monitoring points in and around the mine were included into the model to determine the cumulative impact of DFO at these points. Similarly, to PM_{10}, the predicted annual modelled DFO rates

were added to the average annual monitored rates to determine the cumulative concentration. The annual cumulative DFO rate at each of the monitoring points are below the Residential Area standard of 600 mg/m^2/day and the Non-residential standard of 1,200 mg/m^2/day. The annual predicted percentage increase in DFO rates range between 0.5 – 203.2%.

10.9 Cultural Heritage

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

An extensive heritage assessment, including the proposed extended and reconfigured NWRD footprint area was undertaken during 2019. The study identified 32 archaeological and heritage sites within the proposed extended NWRD study area as indicated in Figure 10-9 and comprised the sites listed below with new names provided in brackets and the two sites within the proposed extension and reconfiguration of the NWRD over the ore stockpile in **bold**:

- Nine sites containing confirmed graves and burial grounds. See MMEP 13 (MMC 102), MMEP 17 (MMC 103), MMEP 18 (MMC 104), MMEP 21 (MMC 105), MMEP 24 (MMC 107), MMEP 27 (MMC 108), MMEP 31 (MMC 110), MMEP 34 (MMC 111) and MMEP 36 (MMH 116)
- Three sites containing possible graves. See sites MMEP 22 (MMC 106), MMEP 30 (MMC 109) and MMEP 40 (MMC113).
- Twelve homesteads where the potential risk for the presence of unmarked stillborn graves exist. See sites MMEP 11(MMH 102), MMEP 12 (MMH 103), MMEP 14 (MMH104), MMEP 16 (MMH 106), MMEP 19 (MMH 107), MMEP 23 (MMH 109), MMEP 26 (MMH 111 and MMH 112), MMEP 28, MMEP 29 (MMH 113), MMEP 33 (MMH 115), MMEP 35 (MMH 116) and MMEP 39 (MMH119).
- Three Stone Age sites. See sites MMEP 8 (MMH100), MMEP 9 (MMH 101) and MMEP 15 (MMH 105).
- Three sites comprising historic to recent stonewalling. See sites MMEP 20 (MMH 108), MMEP 25 (MMH 110) and **MMEP 37 (MMH 117).**
- One site comprising a single lower grinding stone. See site MMEP 32 (MMH 114).
- One site comprising a rubbing post. See **MMEP 38 (MMH 118).**

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 8 (MMH100), MMEP 15 (MMH 105), MMEP 20 (MMH 108), MMEP 25 (MMH 110), MMEP 32 (MMH 114) and MMEP 37 (MMH 117).

The 2019 heritage assessment was submitted to the South African Heritage Resources Agency (SAHRA), Case ID 14428. SAHRA recommended that the following be considered:

- If there are any new heritages resources are discovered during construction and operation phases of the proposed development, then a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the findings at the expense of the developer;
- If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required at the expense of the developer. Mitigation will only be carried out after the archaeologist or palaeontologist obtains a permit in terms of section 35 of the NHRA (Act 25 of 1999).

10.9.1 Palaeontology study

A palaeontology desktop assessment was undertaken during 2019, the study included area where the proposed NWRD footprint extension and reconfiguration will be located. The study concluded that the proposed NWRD footprint extension area will not impact on palaeontological aspects.

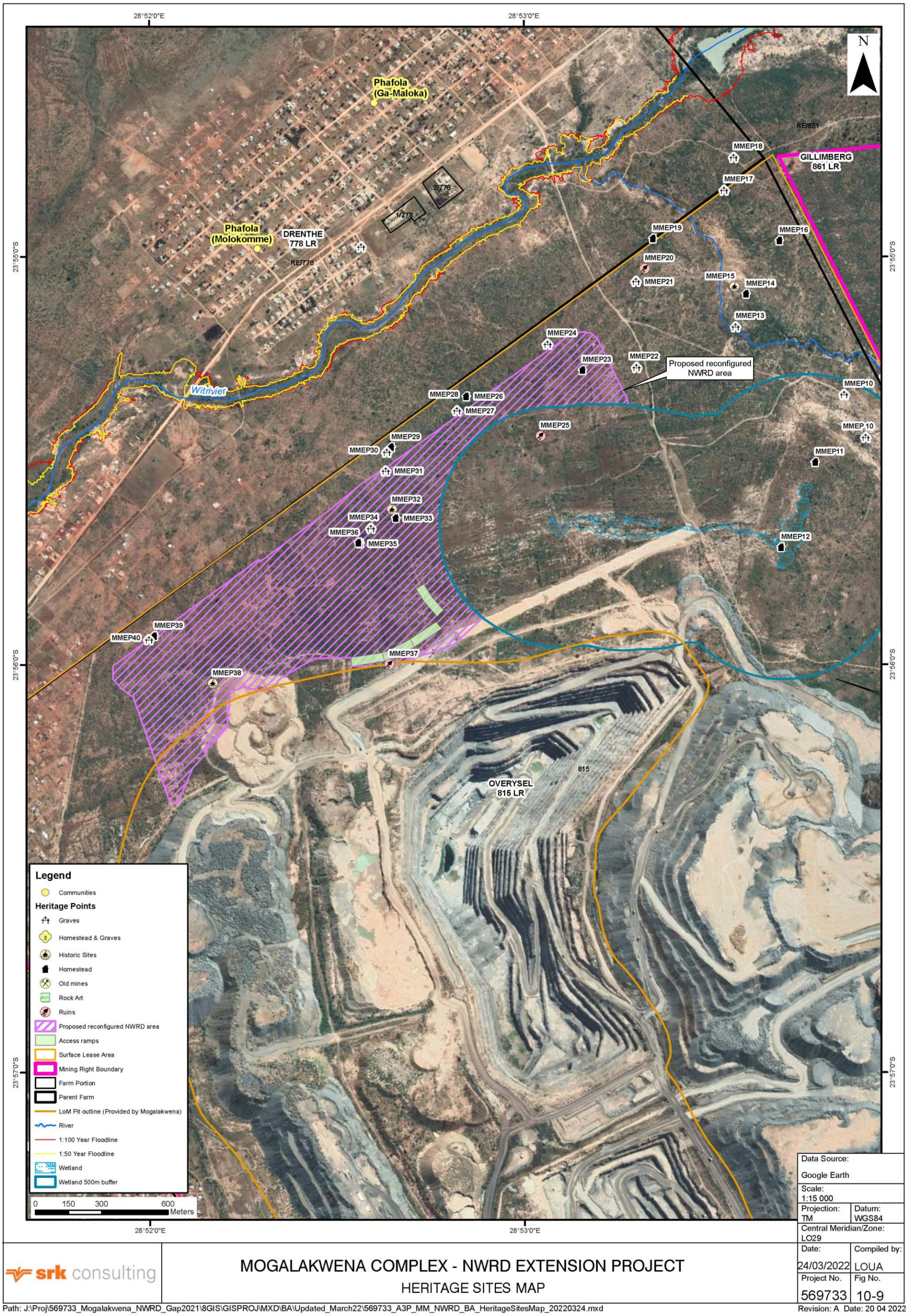


Figure 10-9: Archaeological and heritage sites within the proposed extended NWRD area

10.10 Geohydrology

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

10.10.1 Aquifers

There are three aquifer systems underlying the Mogalakwena Complex 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 Mogalakwena Complex 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 weathered bedrock aquifer extends to a depth of at least 30 -50m within the weathered bedrock units;
- 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.

10.10.2 Groundwater vulnerability

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

10.10.3 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/s. 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

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).

10.10.4 Groundwater levels

The location of the monitored boreholes at Mogalakwena Complex is shown in Figure 10-10 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 Complex, 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.

10.10.5 Hydrocensus

The latest hydrocensus was conducted in June 2018 and four boreholes were identified in the Phafola community north of the proposed extended NWRD.

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.

10.10.6 Groundwater quality

Water quality is monitored at Mogalakwena Complex to compile water quality reports linking mine activities and performance against the WUL conditions. The sample analysis includes all major cations and anions, as well as physical parameters, such as electrical conductivity, pH, total dissolved solids, sulphate and nitrate. Routine monitoring at the mine commenced in 2009. Groundwater monitoring is divided into two groups according to the monitoring borehole locations - the tailings storage facilities and boreholes located around the mine. The points monitored in the vicinity of the proposed project are presented in Figure 10-10. Water quality reports are submitted to DWS as per the WUL.

The following is a summary of the groundwater quality sampling results for mine boreholes located in close proximity to the proposed extended NWRD area. Groundwater quality results were compared with the 2020 Mogalakwena Complex WUL limits and is summarised below:

- Data from the boreholes located in the vicinity of the NWRD authorised and proposed footprint areas which are situated north of North pit include P123, P138, P139, P140 and P141. Refer to Figure 10-10 for the groundwater monitoring point locations.
- AquaEarth Consulting (2020) indicate that no road access was available to monitoring boreholes P138, P139, P140 and P141 resulting in limited water quality monitoring at these boreholes during 2020. AEC have previously noted that P138 has been blocked and P123 no longer exists since no data for this point has been collected since January 2016.
- The historical monitoring borehole P123 median water quality data from August 2010 to January 2016 has been included for background water quality information. Exceedance to the 2020 WUL groundwater quality limits are for water quality parameters electrical conductivity, sodium and chloride.
- Monitoring borehole P138 is situated to the west of waste rock dump W02 in close proximity to the Witrivier tributary. Median values for borehole P138 water quality data, from January 2014 to

March 2019, indicate exceedance to the WUL groundwater quality limits for the following parameters: electrical conductivity, sodium and chloride.

- Data for borehole P139 from June 2014 to February 2020 indicates no exceedance of the median values to the 2020 WUL limits. The chloride median value of 298 mg/l, however, is just below the WUL limit of 300 mg/l.
- Data values for borehole P140 from June 2014 to February 2020 indicates exceedance to the 2020 WUL limit for the median value for electrical conductivity, sodium and chloride.
- Median data values for monitoring point P141, from September 2014 to September 2020 indicate no exceedance of the variables to the 2020 WUL limits.
- In general, the monitoring boreholes within and close to the authorised and proposed extended NWRD footprint area indicate that sodium and chloride concentrations are elevated in comparison to the other WUL parameters analysed and in some boreholes exceed the WUL limits. Salt loading in groundwater indicates a deterioration in groundwater quality. The elevated concentrations of sodium and chloride may be associated with the natural geology in the area as well as anthropogenic activities.

10.10.7 Groundwater Modelling

Itasca Denver Inc (IDI) developed a numerical flow model in MODFLOW, to simulate the contaminant transport from the North Waste Rock expansion using the footprint shown below and extended towards the Witrivier. There was no differentiation between the ore stockpile and waste rock dump. The chloride, and sulphate concentrations were assumed to be constant through time, both at 500 mg/L over LoM for both the existing waste rock dumps and the future NWRD footprint after expansion has occurred. The solutes are loaded through the waste rock at a flow rate equal to 5% of the MAP (the assumed recharge rated to the groundwater system (IDI, 2018).

The results indicated that most of the groundwater contamination is captured in the North pit due to the cone of drawdown that develops from passive dewatering of the pits. However, at some of the downgradient boreholes there were differences in the measured concentrations compared with the simulated concentrations.

The modelling of the Mine Closure by IDI (IDI, 2018) predicted that sulphate and chloride will continue to be transported from the waste rock dumps (and tailings facilities) through the groundwater system and captured in the open pits with the final pit lake quality being from 250 to 500 mg/L for chloride and up to1500 mg/L for sulphate.

Due to the complexity of the aquifer system, the model does not show the subsurface run off that could occur in the shallow alluvial aquifer from the waste rock dump migrating towards the surface water system in a north westerly direction from the NWRD. Communities that could potentially be impacted from the higher sulphate, chloride and nitrate plumes are the Kwakwalata Mesopotamia and Ga Mosege along the Witriver.

The change in footprint to extend and reconfigure the NWRD area does not materially change the impact previously assessed however mitigation includes the extension of the subsurface drains to include the extended and reconfigured area.

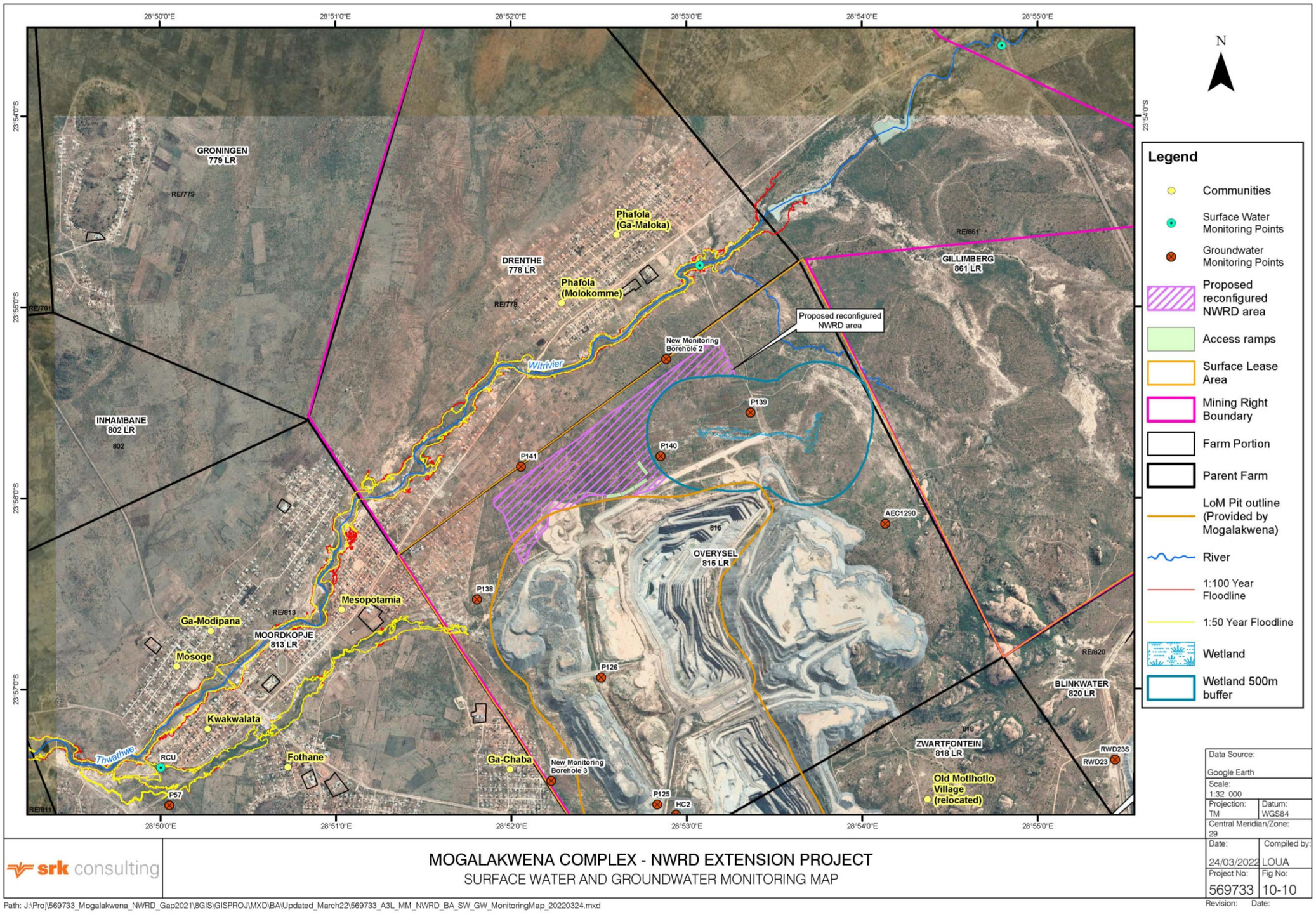


Figure 10-10: Mogalakwena Complex surface water and ground water monitoring points in close proximity to the project.

10.11 Surface water hydrology

The information presented in this section is extracted from the specialist Surface Water study undertaken by SRK in 2021 and update in 2022 .

The Mogalakwena Complex area is situated in quaternary catchment A61G, (Limpopo River Water Management Area A6) (Figure 10-11) approximately 30 km northwest of Mokopane, in the Mogalakwena Local Municipality of the Limpopo Province. There are three main rivers within the Mogalakwena Complex area namely the Sandsloot (Pholotsi) River, Mohlosane River and Witrivier.

10.11.1 Surface water use

Domestic and industrial use

Mogalakwena Complex 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.

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.

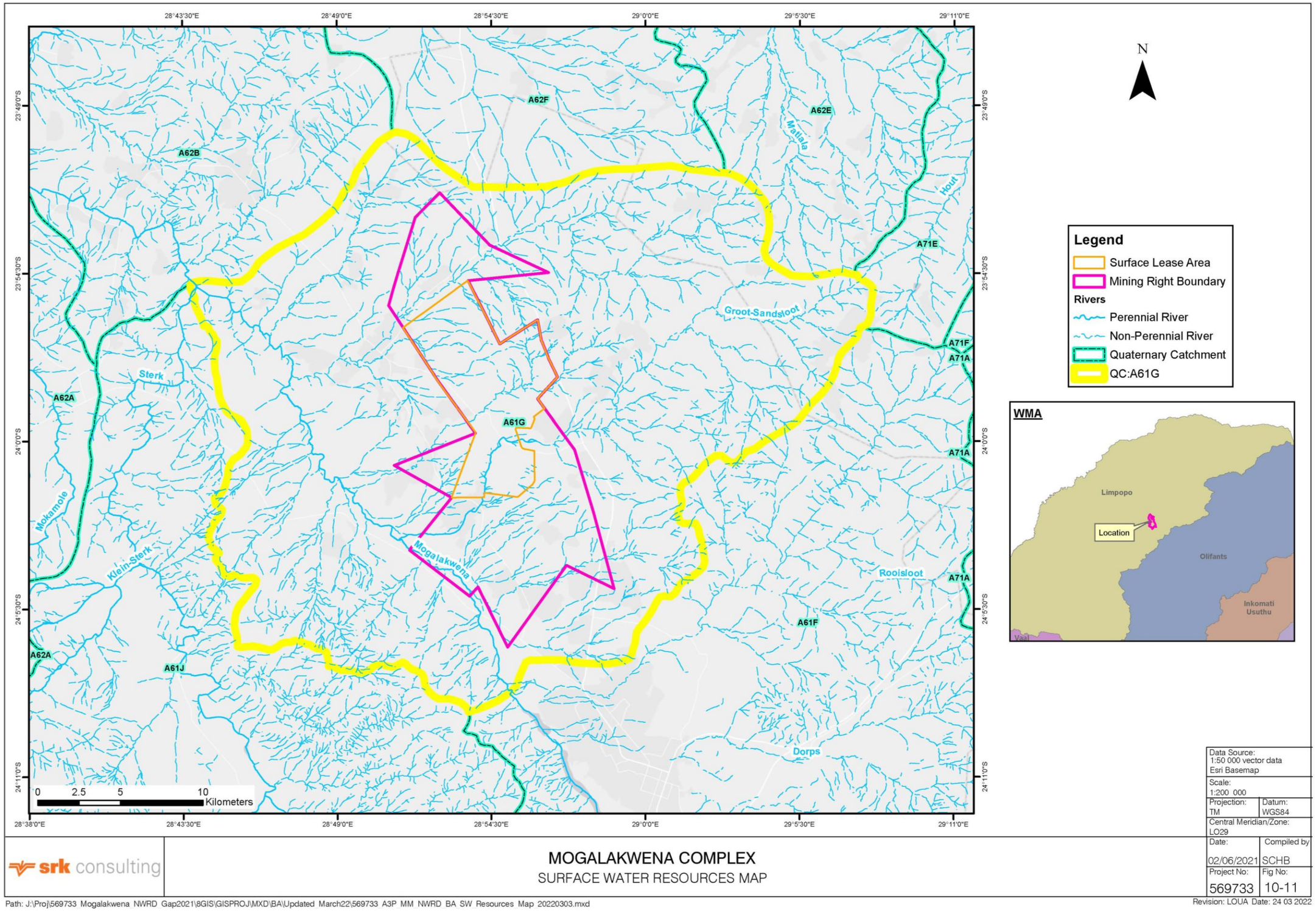


Figure 10-11: Water Management Area

10.11.2 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 10- and the catchment areas are indicated in Figure 10-12.

Table 10-18: Summary of catchment characteristics

Catchment Name	Area (km²)	Longest Watercourse (m)	10:85 Slope (m/m)	Tc (hours)
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

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 to the revised water management area boundary descriptions (Government Gazette No. 35517) in 2012, Mogalakwena Complex 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 Witrivier catchment areas and the associated reduction in the MAR is presented in Table10-19. The proposed NWRD extended footprint development will result in a reduction of MAR because runoff from the mine infrastructure will be collected and contained.

Table10-19: 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%
Witrivier tributary	5.04	0.087	0	0

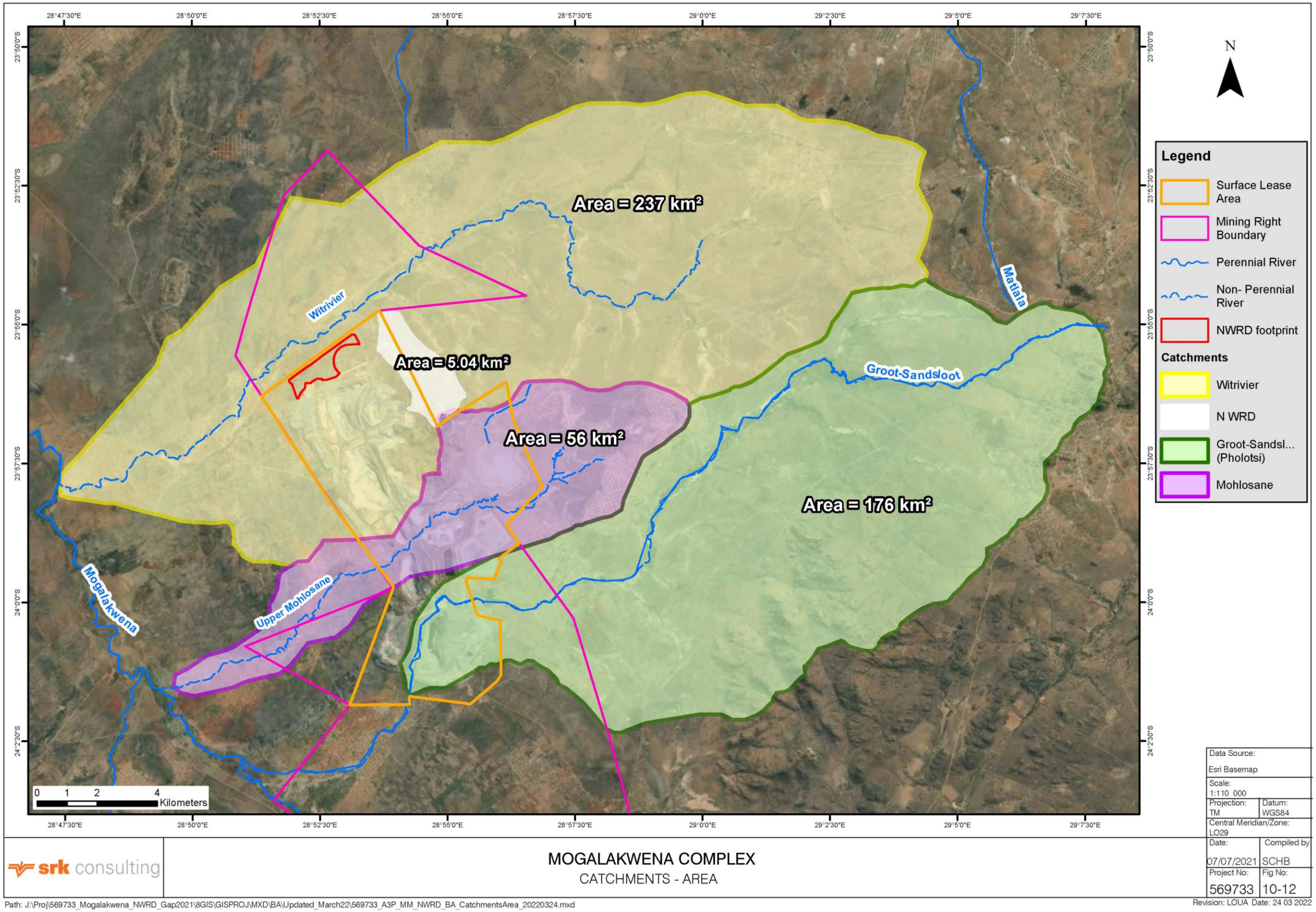


Figure 10-12: Mogalakwena Complex catchment areas

10.11.3 Floodlines

A detailed floodline report was undertaken for the Mogalakwena Complex by Jones and Wagener for the Witrivier. A freshwater ecosystem assessment and wetland delineation was undertaken for the Mogalakwena Complex by Scientific Aquatic Services (SAS). The floodline for the Witrivier (, delineated wetland and 500 m is presented in Figure 10-13.

The Witrivier floodline indicates the following:

- The extended and reconfigured NWRD footprint area of approximately 128 ha, including the stormwater infrastructure shown in Figure 10-13 will be situated outside the 1:100 year floodline and 100 m away from the Witrivier as per GN704;
- The extended and reconfigured NWRD footprint area will not encroach on the tributary of the Witrivier located to the east of the project footprint; and
- The extended and reconfigured NWRD footprint area will not encroach on the 500 m buffer zone of the delineated seep and channelled wetland.

10.11.4 Surface water quality

Aqua Earth Consulting has been tasked by Mogalakwena Complex to compile water quality reports linking mine activities and performance against the Water Use Licence (WUL) conditions relating to surface and groundwater monitoring. Detailed water analysis of the data is provided in the Aqua Earth quarterly and annual reports, which are submitted to DWS.

The sample analysis includes all major cations and anions, as well as physical parameters, such as Electrical Conductivity (EC), pH, Total Dissolved Solids, sulphate (SO_4), Chloride (Cl) 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 associated with the mine. Routine monitoring was initiated in January 2009.

The Witrivier, is a non-perennial river that flows for short periods as a result of high rainfall events. The river flows in a south westerly direction north of the north pit, outside the mine surface lease area and through the community. It is a tributary of the Mogalakwena River. The current downstream monitoring point (RCU) and two proposed new upstream monitoring points are presented in Figure 10-10. Monitoring point RCU is located within the community where subsurface water flow daylights in the riverbed.

Time series graphs of the water quality data for the following parameters have been developed, EC, $N0_3$, Cl and $S0_4$ from early 2009 to end 2020. These parameters may be associated with mining activities; however, upstream monitoring is required in order to compare up and downstream water quality to improve the analysis. The intermittent flow in the rivers causes periodic anomalies/outliers in the data and impacts on the interpretation of the water quality data.

No surface water quality limits are provided in the WUL. The WUL indicates that "*should flow occur, the impacts on the surface water resource shall be considered by comparing the upstream water quality to the downstream water quality as a percentage of change*" (2020 WUL Condition 2.2.2, Appendix IV). The AquaEarth annual surface and groundwater quality monitoring report for November 2019 to October 2020, indicates that no water quality sampling upstream of mining activities on the Witrivier is currently taking place. Therefore, no percentage change from upstream to downstream has been calculated. For this reason, trend graphs have been plotted. It can be seen from the graphs that there is a general increasing trend in the concentrations of EC, $S0_4$ and Cl downstream of mining activities. The $N0_3$ trend, however, is stable. The data indicates possible local mining activity influence on the river during rainfall events (data spikes generally correlate with rainfall) however communities may also contribute to the nitrate load.

Since RCU is the only monitoring point on Witrivier it is recommended that additional upstream monitoring points be included in the monitoring programme before any construction in the area commences.

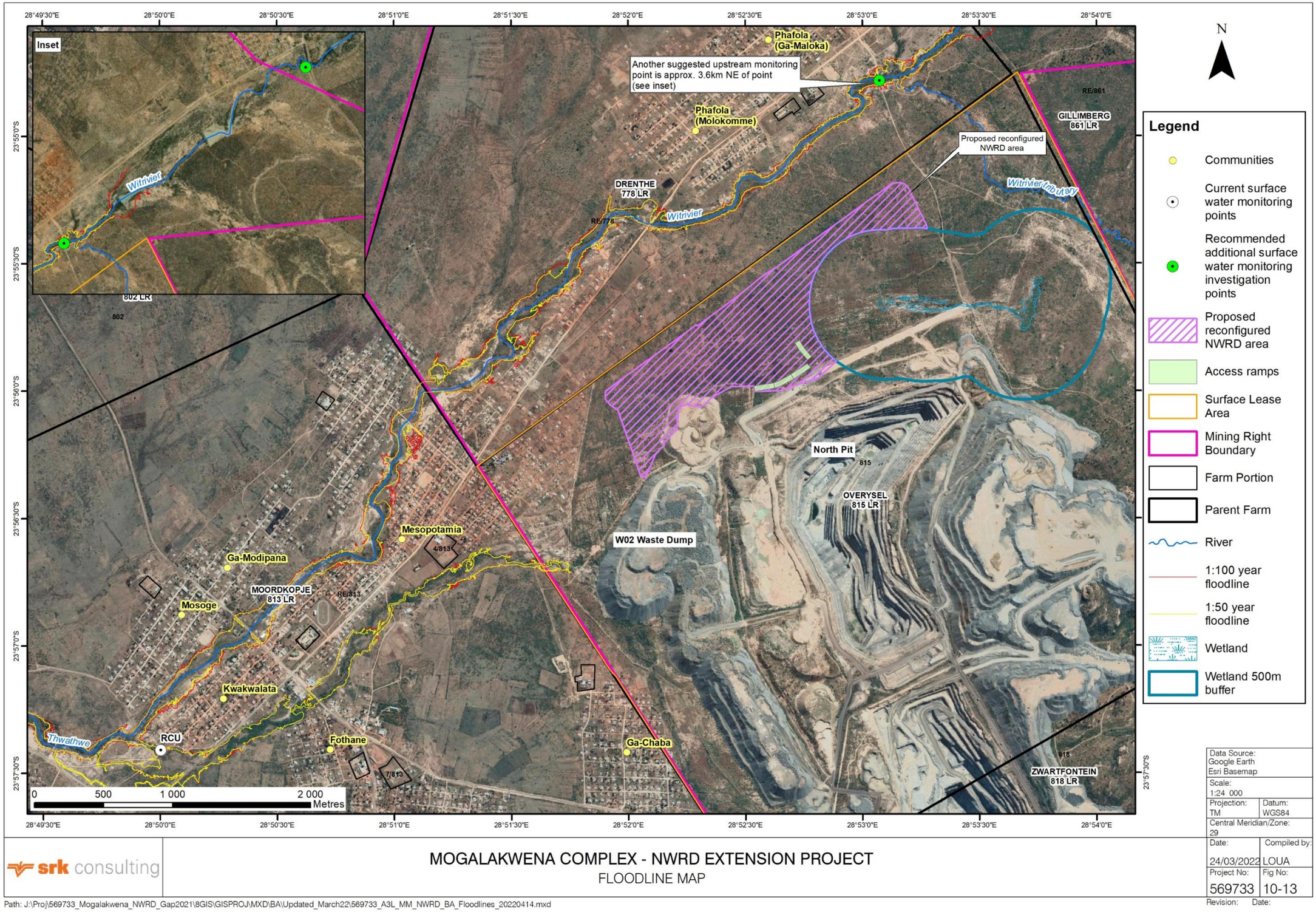


Figure 10-13: Floodlines

10.12 Socio-economic

The information presented in this section is extracted from the Social Impact Assessment compiled by SRK Consulting in 2021.

10.12.1 Local context

The Mogalakwena Complex Area of Influence (AoI) has been updated to reflect communities that may be most impacted by the mine (AAP, 2021). Communities that are most severely impacted by mine operations fall within area 1 (previously known as doorstep communities), with the level of impact gradually reducing as the classification moves to area 2 through to area 5 (i.e., Provincial level).

A total of 23 area 1 communities have been identified, with the majority (19) falling within the Mapela TA. A total of 29 area 2 communities have been identified, with the majority (17) falling within the Mapela TA. These areas, including area 3 (Mokopane) have been adopted by the SIA for indirect project impacts (e.g., employment opportunities).

In order to identify the directly affected communities (for example, communities that are affected by noise or dust), this SIA assumed a 1km buffer area of any proposed new infrastructure. Consequently, the communities to the proposed extension of the NWRD is shown in Figure 10-14 and include:

Phafola (Molokomme (area 1 host community in Mapela));

- Phafola (Ga-Maloka) (area 1 host community in Mapela);
- Mesopotamia (area 1 host community in Mapela);
- Ga-Modipana (area 2 host community in Mapela);
- Ga Chaba (area 1 host community in Mapela);
- Masoge (area 2 host community in Mapela); and
- Kwakwalata (area 2 host community in Mapela).

These communities are located within 3.5km area of the proposed NWRD extension and were identified as sensitive receptors in terms of noise (dB Acoustics, 2021) and air quality (SRK, 2021). This was determined during the latest specialist studies. Therefore, the potential impacts associated with the proposed extended footprint of the NWRD on these communities has been re-assessed as part of this SIA update.

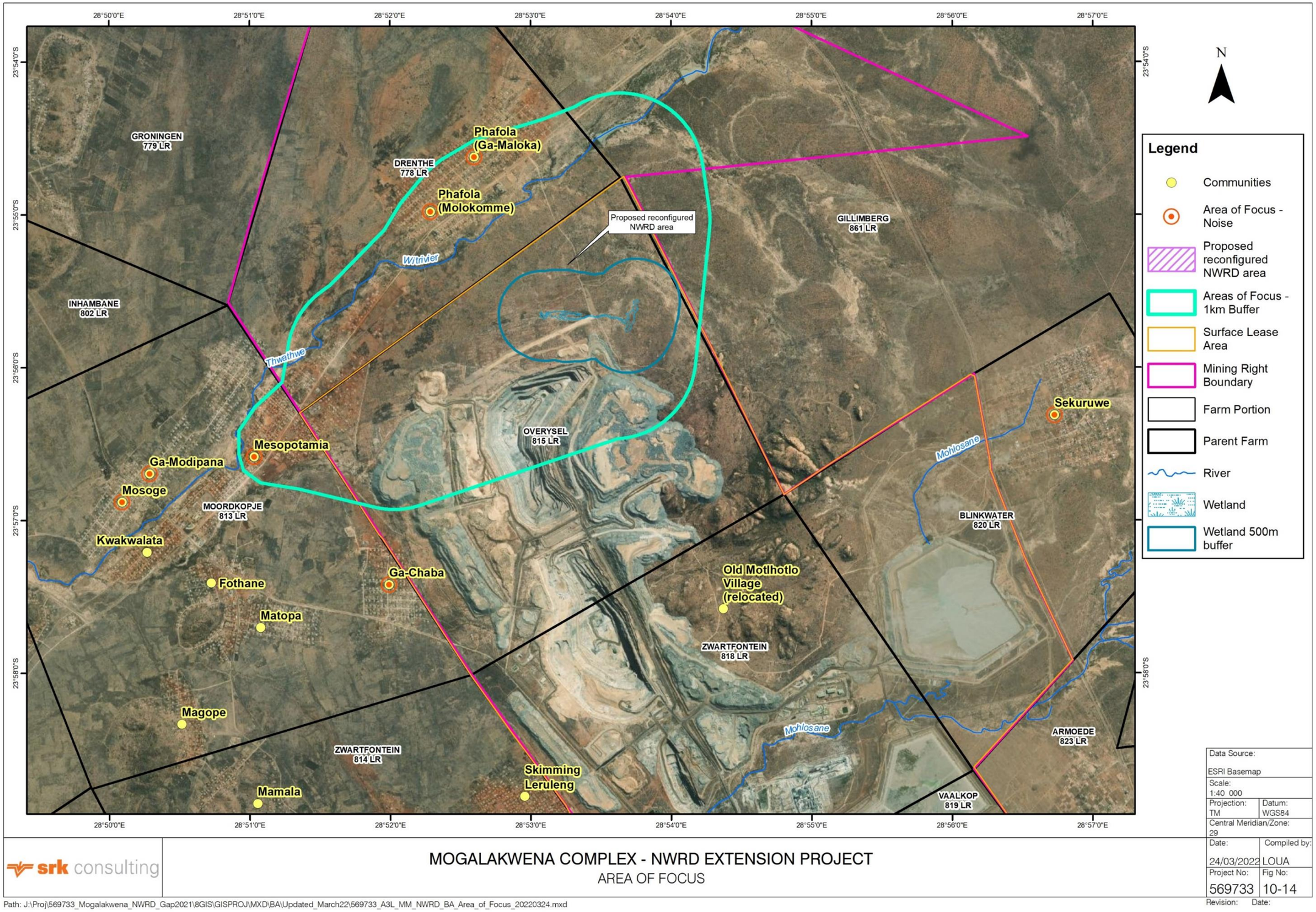


Figure 10-14: Communities located in closure proximity to the proposed project

10.12.2 Geographic location and climate

According to the MLM IDP (MLM, 2021) MLM consists of three proclaimed townships (i.e, Mokopane, Mahwelereng and Rebone) and 178 villages. There are five main clusters, including: Mokopane; Mahwelereng and peri-urban areas; Mapela; Bakenberg; and Rebone.

The villages in the rural areas are closely linked to subsistence farming, with many households dependent on agriculture for their livelihoods (MLM, 2021). Livestock farming is the predominant enterprise within the peri-urban areas. However, there is limited land to carry the current amounts of livestock. According to the MLM IDP (MLM, 2021), overgrazing is evident on communal grazing land compared to privately owned land.

10.12.3 Mogalakwena Local Municipality governance structures

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

As mentioned above, the communities in the MLM are governed by Traditional Councils and Leaders, with both the Mapela- and the Mokopane TA being recognised in terms of the Traditional Leadership and Governance Framework Act, Act 2 of 2005 (Framework Act).

10.12.4 Population size and density

The annual growth rate per annum for the MLM from 2011 to 2016 was 1.34% (Table 10-20). At this rate, it is estimated that the population size in 2021 would be 351,582.

Table 10-20: Population characteristics

	Population size		
	2011	**2016**	**2021**
Limpopo Province	5,404,868	5,799,090	6,222,190 [16]
Waterberg District Municipality	679,336	745,758	818,649 [17]
Mogalakwena Local Municipality	307,682	328,905	351,582[18]

Source: Stats SA, 2012, 2016

10.12.5 Language and ethnic groups

MLM's population is made up of 96.1% black Africans, 2.2% Whites and other population groups making up the remaining 0.8% (Stats SA, 2016). The principal spoken languages in the MLM is Sepedi (73.1%), followed by Xitsonga, (9.1%) and IsiNdebele (6.6%), but Tshivenda (16.5%) is spoken in the Limpopo Province as well (Stats SA, 2016).

[16] Own calculation based on a compound growth rate of 1.42%

[17] Own calculation based on a compound growth rate of 1.88%

[18] Own calculation based on a compound growth rate of 1.34%

10.12.6 Gender and age

The MLM population consists of a majority of males (51.6%) as compared to 48.8% of females (Stats SA, 2016). Within the MLM, 70.5% represent those of working age (15-65 years) whereas this age group is only represented by 57.8% persons in the WDM. MLM has more female headed households (59.4%) as compared to WDM, while the youth population is lower in the MLM at 30.8%. The MLM has a larger percentage of children (0-14 years) as compared to the WDM. A summary of gender and age distribution is provided in Table 10-21 and Table 10-22.

Table 10-21: Gender 2011 and 2016

		2011		2016	
		Male	Female	Male	Female
Limpopo	Waterberg District Municipality	50.5%	48.8%	47.2%	52.8%
	Mogalakwena Local Municipality	46.7%	53.3%	51.6%	48.8%

Source: Stats SA, 2016

Table 10-22: Population age category

		Age group (2016)			
		0-14 (Children)	15-34 (Youth)	35-59 (Adults)	60+ (Elderly)
Limpopo	Waterberg District Municipality	34.4%	34.7%	23.1%	7.7%
	Mogalakwena Local Municipality	39.9%	30.8%	20%	9.4%

Source: Stats SA, 2016

10.12.7 Household income and poverty intensity

Household income[19] is widely distributed across income brackets in the WDM and MLM. Household incomes are illustrated in Table 10-23 and shows that a high percentage (15.4%) of households in MLM have no income. This means that not one person in the household received an income, not even in the form of a pension or social grant and is, therefore, experiencing extreme poverty.

When combining the income brackets three to six in Table 10-23 one can determine that the majority of the WDM (62.9%) and MLM (65.8%) earn between R4,801 and R76,400 per annum. This is 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 R230,000 and R365,000 in 2021.

In the MLM, household income ranges are similar, most of the population falling into the first six income brackets.

[19] 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.

Table 10-23: Municipal population by household income

Income bracket No.	Household income range per annum	% Households in WDM	% Households in MLM
1	None	13.8%	15.4%
2	R1 - R4,800	4.0%	5.2%
3	R4,801 - R9,600	7.9%	10.6%
4	R9,601 - R19,600	19.8%	23.0%
5	R19,601 - R38,200	21.5%	22.1%
6	R38,201 - R76,400	13.7%	10.1%
7	R76,401 - R153,800	8.9%	6.4%
8	R153,801 - R307,600	6.1%	4.4%
9	R307,601 - R614,400	2.9%	1.9%

Source: Stats SA, 2012

10.12.8 Services and infrastructure

Communities in the WDM and MLM were concerned with the cost of electricity, lack of safe and reliable water supply as well as a lack of, or inadequate employment opportunities. Communities within the MLM were similarly concerned about the inadequate roads in their area.

10.13 Access to education

There are 258 schools in the MLM, which is made up of 96 secondary schools, 151 primary schools, nine combined schools and two Further Education Training colleges. Other educational facilities include 176 Early Childhood Development centres, one special school and 47 Adult Basic Education and Training centres. Most of the villages surrounding the operation have one or more primary schools and a secondary school, making education accessible to most 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 (MLM, 2018).

10.14 Health facilities

There are seven district hospitals within the WDM, which includes six private hospitals as well as, one regional and one specialised hospital. The WDM has 61 primary health care facilities and three community health centres (WDM, 2021).

In comparison, the MLM has 33 medical facilities, three hospitals (Mokopane Provincial Hospital in Mahwelereng, Voortrekker Hospital in Mokopane Town and George Masebe Hospital in Bakenberg), 29 clinics, 12 mobile clinics and one health centre (MLM, 2021). Clinics are scattered across the municipal area and are located at Mamaselela, Pholotji, Mahwelereng, Bokwalakwala, Sekuruwe, Tsamahansi, Bakenberg, Dibeng, Mashashane, Jakkalskuil and Lekhureng. Many communities and villages rely on the mobile clinics that are available within the MLM, with more than 80% of the population living within 120 minutes from health facilities (MLM, 2021).

10.15 Transportation infrastructure

According to the Mogalakwena SDF (MLM, 2009) the MLM area has a good road network and 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. The SDF further notes that there are good lateral links between the N11 and the R518.

Even though the roads in the WDM are connected with national, provincial, and district roads, only 16% of the road network is surfaced. Thus, most of the population relies on unsurfaced roads to access socio-economic opportunities. Increased economic activities within the WDM have led to a rapidly degrading road infrastructure (WDM, 2021). The road infrastructure within the MLM closely resembles those of the WDM, with, only 12% of the roads in the municipality being tarred. Main transport routes, including the N11 are tarred and frequently maintained, however, most of the population continues to rely on minor roads with poor stormwater management and poor surface quality, particularly in the rainy season (MLM, 2021).

10.16 Justice and policing

The MLM IDP (2018) 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 MLM only has four police stations namely Gilead, Mahwelereng, Mokopane, and Tinmyne. The MLM (2021) indicated that more than 96% of the population is within a 30-minute drive from a police station. The occurrence of crime is relatively high in the MLM, where Mokopane and Mahwelereng are known as crime hotspots.

10.17 Socio-economic profile

The MLM is situated in an area that is characterised by high levels of poverty and low levels of education and employment. This section discusses the macro-economic context of the proposed project area as well as the current employment levels on a municipal level.

10.17.1 Employment

Census data (Stats SA, 2012) show that only 26.2% of the MLM population aged between 15 and 65 years are employed (Table 10-24). The number of unemployed persons in the MLM was 17.6%.

Table 10-24: Employment status per region

	Employed	Unemployed	Discouraged work-seeker	Other not economically active
Limpopo	27.4%	17.5%	6.3%	48.8%
Waterberg	38.4%	15.0%	3.7%	42.9%
Mogalakwena	26.2%	17.6%	5.6%	50.5%

Source: Stats SA, 2012

10.18 Vulnerability

According to Blaikie. et. al (2004) as quoted by the World Health Organisation's practical guide on environmental health in emergencies and disasters "vulnerability is the degree to which a population, individual or organization is unable to anticipate, cope with, resist and recover from the impacts of disasters". Poverty is a major contributor to vulnerability, and considering high unemployment, and general poverty in the Mogalakwena Complex study area, it is reasonable to conclude that the area is demographically vulnerable. Population growth is expected to increase in areas where new economic development opportunities are available, and this could increase vulnerability, more so if it is coupled with reduced water availability and degradation and loss of land (whether mine-induced or not).

10.18.1 Increase in dust and noise exposure

The Air Quality Assessment (SRK, 2021) at Mogalakwena Complex suggests that the larger context of the mine and its surrounding communities experience a climate described as arid/semi-arid (i.e. dry winters and hot summers, and minimal rainfall). Temperatures are seldom less than 18 degrees Celsius. The prevailing winds are mainly from the east, east-northeast and east- southeast. During the months of May to October, villages to the west of the mine may be impacted as a result of the prevailing winds from the northeast and southeast. This will be a factor when considering the potential dust related impacts resulting from the proposed expansion and reconfiguration of the NWRD.

According to the dust fallout modelling results (SRK, 2021) the proposed NWRD will result in a cumulative increase in dust levels at the following monitoring points: Mabusela House 100559; Manamela House No 385; and Mahlanya 100067. The dust fall out 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.

Communities within the AoI will experience the highest levels of dust fallout, however, the expected dust fall out rates measures well below acceptable standards. These rates are as follows:

- Mesopotamia - 53.2 mg/m^2/day;
- Ga-Modipana Mosoge - 36.4 mg/m^2/day;
- Phafola (Ga-Maloka) (area 1 host community in Mapela) – 32.4 mg/m^2/day; and
- Kwakwalata (area 2 host community in Mapela) – 32.1 mg/m^2/day.

Mining sites and their associated activities could cause pollution or environmental degradation. These are project specific and can range and magnitude, such as noise, odour, dust as vibration. The proposed NWRD is expected to result in more frequent occurrences of traffic when heavy duty vehicles use roads within the vicinity of nearby communities. This may lead to a decrease in the air quality, especially in already affected areas.

Based on the most recent Air Quality Assessment (SRK, 2021) and Noise Impact Assessment (dBAcoustics, 2021) it is, however, expected that there will be an insignificant increase in noise and dust exposure on site due to the associated activities.

It is recommended that Mogalakwena Complex, in alignment with AASW3 requirements, introduce participatory monitoring of community health and safety risks and impacts.

An insignificant increase in dust levels are expected as a result of project activities. The prevailing winds, which are mainly from the northeast and southeast, may result in minor nuisance impacts around Mesopotamia, Ga-Modipana Mosoge, Phafola (Ga-Maloka) and Kwakwalata. Existing dust monitoring points can assist with the monitoring of dust impacts in these areas. Additional monitoring points must be installed at Phafola (Ga-Maloka) and Mesopotamia.

11 Environmental Impact Assessment

This section provides an overview of the impact assessment methodology, 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).

11.1 Approach

11.1.1 Prediction of significant environmental issues

Potential environmental issues or impacts associated with the proposed project were identified 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 the areas where the proposed project will be developed;
- Specialist studies undertaken as part of this project;
- Understanding of the direct and indirect effects of the project as a whole; and
- Legal context.

Environmental and social impacts have been highlighted in Section 11.4 for each environmental aspect considered. In addition to this, the cumulative impacts have been briefly described in Section 11.4.1.

11.1.2 Mitigation of impacts

A detailed assessment was conducted to evaluate possible impacts with input from the project team, existing specialist studies and specialist studies undertaken as part of this project, making use of the impact assessment methodology described in section 11.3.

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 be prevented, then measures need to be put in place to minimise the significance of the impact

The mitigation measures associated with the proposed project have been included Table 11-3 to Table 11-6. Management measures authorised in the 2020 EMPr as well as additional measures identified by specialist during the assessment of the NWRD extension are indicated (**indicated by bold italics**)

11.2 Summary of environmental and social impacts identified

The extension and reconfiguration of the NWRD project fall within the Mogalakwena Complex's mine right and surface right area. The proposed location of the NWRD extension was assessed as part of the environmental authorisation for the original NWRD, stockpiling of ore material and associated infrastructure. Based on the previous studies the impacts associated with the proposed project is considered to be limited.

If managed according to the proposed management measures in Section 12 and Part B, negative impacts associated with construction, operation, closure and post closure phases of the proposed project can be mitigated and positive impacts can be enhanced.

Table 11-1 includes a summary of the expected impacts, identified in the 2019 Expansion project as well as additional activities identified by specialist during the assessment of the NWRD extension (indicated by italics), prior to the implementation of management measures, for the various phases of the proposed project. These impacts have been assessed in line with the impact assessment methodology in Section 11.3.

Table 11-1: 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, alteration of the physical quality of the living environment, impact on health and social well-being of the communities • Loss of cultural heritage due to pre-construction activities such as site clearing and preparation • 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 • *Impact on Bushveld Habitat and the Wet Response Habitat Units due to a lack of identification and relocation of flora to suitable habitat outside the development footprint prior to the construction phase.*
Construction	• *Loss of floral diversity and habitat due to dumping of construction material within areas where no construction is planned, proliferation of alien invasive species at topsoil stockpiles spreading into the surrounding area, compaction of soils outside of the study area and habitat fragmentation.* • *Erosion as a result of poorly managed stormwater runoff resulting in downslope habitat loss* • *Increased risk of uncontrolled fires, hunting and trapping of faunal species and human -wildlife conflicts.* • Loss of cultural heritage due to construction activities such as preparation of footprint area for the dumping of waste rock • 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	• *Ongoing or permanent loss of floral habitat, diversity and increased introduction and proliferation of alien plant species.* • *Loss of floral habitat as well as overall species diversity within the local area, increased erosion as a result of poor stormwater management* • *Potential WRD slope failure resulting in increased footprint and loss of habitat, impacting on floral species* • *Increase in AIP species due to disturbed areas, increases hunting and trapping of faunal species as well as human- wildlife conflicts.* • Possible impacts to groundwater from seepage, reduced recharge of groundwater due to increased run-off, • Increase in ambient noise levels due to the operation of the NWRD • 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 • Dust generation due to mine vehicles travelling on bare roads and waste rock • Sedimentation of watercourses due to operational activities; • Visual impact associated with the operation of the WRD • Loss of cultural heritage due to operational activities such as site dumping of waste rock on the NWRD footprint
Closure/ Rehabilitation	• Increase in ambient noise levels due to the operation rehabilitation machinery • Loss of income to surrounding businesses and mine employees,

Project Phase	Activity
	• 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 • Poor implementation of rehabilitation activities resulting in increased AIP species
Post-closure	• Improvement of noise, air quality, visual and surface water impacts due to limited or no activities taking place at the sites and rehabilitation efforts • Uncontrolled access to rehabilitated sites by animals, vehicles, people will result in compaction and erosion of unprotected/non vegetative sites (over grazing etc.) • Post closure groundwater impacts

11.3 Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of the potential environmental impacts and risks

The impact assessment will focus on the direct and indirect impacts associated with the project. All impacts have been 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 impact assessment Methodology requires 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 11-2.

Table 11-2: 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
	Extent/Scale	**Magnitude**
Severity	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[20], 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

[20] The Loss of Resources aspect will not affect the overall significance rating of the impact.

- 1 0% - 24% - limited loss.

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

The main environmental disturbance/ impact will occur during the pre-construction, construction and operation phase of the project as a result of clearing the area as well as the movement of construction vehicles and trucks on the site on the mine during the establishment of the NWRD.

Since Mogalakwena Complex is already an operational mine there are very few additional environmental and social impacts arising from the proposed NWRD extension project.

Pre-construction	Site clearing and grubbing of the footprint areas associated with the proposed extension and reconfiguration of the NWRD.
	Preparation of the ground and surface water management measures for the NWRD to receive waste rock

The rating of impacts, as per the methodology described in Section 11.3, is also provided. In addition, mitigation measures that may alleviate or result in avoidance of the potential impacts have been included.

The footprint area that will be disturbed in terms of the pre-construction, construction and operation of the proposed extension and reconfiguration of the NWRD is approximately 128 ha which is less than the previously authorised NWRD footprint (130 ha).

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 11.3, 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

Management measures approved in the 2020 EMPr as well as additional measures identified by specialist during the assessment of the NWRD extension are indicated (**indicated by bold italics**)

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 extension of the NWRD.
	Preparation of the ground and surface water management measures for the NWRD to receive waste rock
	Preparation of the wetland protection measures

Table 11-3: Pre-construction impacts applicable to all the proposed expansion activities during site clearing and grubbing of infrastructure areas[21]

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 Phase																	
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 nearby receptors	-	2	3	2	4	2	18	**Low**	• Apply dust suppressants or vegetate bare areas not being used for construction. • Locate soil stockpiles within site boundaries considering the location of potential sensitive receptors and the predominant wind direction. • Set speed limits to minimise the creation of fugitive dust within the project boundary. • Development of routine air quality monitoring program. • ***Install an additional dust fall out monitoring unit between Phafola (Ga-Maloka) and Mesopotamia communities***	2	3	1	4	1	16	**Low**	11.1
Biodiversity Flora	Potential failure to conduct a walkdown of the authorised footprint area, particularly within the Bushveld Habitat and the Wet Response Habitat Units, before construction activities commence where floral SCC, where present, are marked and relocated to suitable habitat outside the development footprint prior to the construction phase. This walkthrough should be conducted during the flowering season (i.e., December – February).	-	4	2	2	6	2	40	**Moderate**	• ***If SCC, that are not RDL species (i.e., LEMA, TOPS and NFA protected species) are encountered and will be affected by the construction activities, these species must, as far as is possible, be relocated to suitable habitat surrounding the disturbance footprint.*** • ***If RDL species are encountered, avoidance is the best mitigation. However, where avoidance is not possible, potential offsets as per SANBIs requirements may be required.*** • ***Permits will be required from LEDET (for provincially protected species, e.g., LEMA protected species) or the DFFE (for nationally protected species e.g., NFA and TOPS species) for protected species that need to be removed, cut, or destroyed before any vegetation clearing may take place.***	3	1	1	4	1	18	**Low**	55.0
	Potential failure to comply with national and regional legislative requirements regarding permit applications, including timeously liaising with national and provincial competent authorities, for the removal / destruction of species listed under: • The list of Schedule 12 (Protected plants) under the Limpopo Environmental Management Act, 2003 (Act 7 of 2003) (LEMA); • - The List of Protected Tree Species (GN 536 OF 2018)	-	4	2	2	6	2	40	**Moderate**	• ***Before any construction activities can occur, a detailed walk down of the area must take place, during which all NFA-protected tree species should be marked and permits applied for to remove / cut / destroy these species.*** • ***Permits from the relevant authorities, i.e., Limpopo Department of Economic Development and Tourism (LEDET) and Department of Forestry, Fisheries, and the Environment (DFFE) should be obtained before removal, cutting or destruction of protected species or TOPS species before any proposed WRD activities may take place.***	3	1	1	4	1	18	**Low**	55.0

[21] Management measures identified in the 2020 EMPr as well as additional measures identified by specialist during the assessment of the NWRD extension are indicated (***indicated by italics***)

	as it relates to the National Forest Act (Act 84 of 1998) (NFA); and • The NEMBA Threatened or Protected Species (TOPS) list (Government Gazette [GN] 29657, as amended in GN R1187 in Government Gazette 30568 of 2007 and again in GN 627 in Government Gazette 43386 of 2020). This will result in unnecessary or unlawful destruction/removal of floral SCC leading to a decline in the numbers of NFA-Protected Tree species (particularly Sclerocarya birrea subsp. caffra, *Elaodendron transvaalse* and *Combretum imberbe*) and/or TOPS-Protected floral species (including Harpagophytum zeyheri subsp. zeyheri) within the study area.																		
	Inconsiderate planning of infrastructure placement and design, leading to the loss of intact floral habitat, as well as unnecessary edge effect impacts (e.g., ongoing alien vegetation spread, increased sediment loads and stormwater runoff) on areas outside of the proposed development footprint.	**-**	4	3	2	6	2	**44**	**Moderate**	• ***Planned footprint area must be optimised, ensuring that the layout is as small as possible and does not encroach upon any sensitive habitat areas.*** • ***Minimise loss of indigenous vegetation where possible through adequate planning and, where necessary, by incorporating the sensitivity of the biodiversity report as well as other specialist studies.*** • ***Design of infrastructure should be environmentally sound, and all possible precautions taken to prevent potential spills and /or leaks. All spills and /or leaks from equipment must be immediately remedied and cleaned up to ensure that these chemicals do not enter the soils.***	3	1	1	4	1	**18**	**Low**	59.1
	Potential failure to draft an Alien and Invasive Plant (AIP) Management/Control plan before the commencement of construction activities may lead to the spread of AIPs.	**-**	4	3	2	8	2	**52**	**Moderate**	• ***Prior to the commencement of construction activities on site, the existing alien and invasive plant control plan for the mine should be updated and implemented throughout all phases of the proposed WRD project:*** ***i) Cleared vegetation and removed soil, containing AIP that will not be used again (e.g., in rehabilitation) should be disposed of at a registered waste facility where alien propagules will not spread further into natural habitat; and*** ***ii) ii) It is highly recommended that the AIP Management/ Control Plan should be implemented by an experienced professional.*** • ***No chemical control of AIPs to take place within the Wet Response Habitat, and only registered chemicals may be used.***	3	2	1	6	1	**27**	**Low**	48.1

	Potential failure to draw up and get approval for the required plans to mitigate WRD impacts before and at the commencement of construction activities: • Failure to draw up and get approval for an Erosion Control Plan; • Failure to draw up and get approval for a Rehabilitation Plan to be implemented before the commencement of WRD expansion. Potential failure to implement a biodiversity action plan (BAP), including the auditing of the BAP. This will result in: • Extensive and unnecessary loss of favourable floral habitat, leading to a decline in floral diversity, including a decline in floral SCC numbers within the study area, including species such as Sclerocarya birrea subsp. caffra, Elaodendron transvaalse, Combretum imberbe) and Harpagophytum zeyheri subsp. Zeyheri. • Inability of vegetation to recover due to a lack of, or untimely, implementation of a well-conceived rehabilitation plan.	-	4	3	2	8	2	**52**	**Moderate**	• ***Ensure that sound environmental management is in place during the planning phase.*** • ***Prior to the commencement of construction activities, the entire construction servitude, including lay down areas, should be fenced off and clearly demarcated.*** • ***Prior to the commencement of construction activities on site, a rehabilitation plan should be developed for implementation throughout the WRD expansion phases (accommodating concurrent rehabilitation).***	3	2	1	6	1	**27**	**Low**	48.1
Biodiversity Faunal	Potential failure to implement measures to manage edge effects - erosion and sedimentation of the surrounding vegetation due to sediment runoff from the WRD. This runoff may be carrying increased sediment loads as well as potential pollutants (Nitrates etc).	-	***4***	3	2	6	2	44	**Moderate**	• ***Suitable measures (berms and trenches) should be implemented to ensure that stormwater runoff from the NWRD does not disperse into the surrounding natural veld.***	2	4	1	4	1	18	**Low**	**59.1**
	Potential failure to develop a rehabilitation plan prior to construction activities.	-	***4***	3	2	6	2	44	**Moderate**	• ***Ensure that a rehabilitation plan has been developed for the closure of the NWRD as well as plans to rehabilitate disturbed areas adjacent the NWRD during the life of mine.***	2	3	1	4	1	16	**Low**	**63.6**
	Failure to develop and implement an AIP control plan prior to construction activities leading to the proliferation of AIP species.	-	***4***	3	2	6	2	44	**Moderate**	• ***An AIP control and management plan must be developed and implemented prior to vegetation clearance and dumping of waste rock taking place.***	2	4	2	4	1	20	**Low**	**54.5**

	Impact on possible grave sites that 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 pre-construction, an appropriately qualified archaeologist shall 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; 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 and the process must be done by a reputable company well versed in the mitigation of graves. If any cultural heritage and archaeological sites are identified during the pre-construction and construction the relevant Mogalakwena Complex chance find procedure must be followed	2	5	2	4	2	22	**Low**	**54.2**
Cultural Heritage	Impact on burial grounds due to the relocation of identified burial grounds associated with the NWRD (refer to Section 10.9). If constructed, these site will have to be relocated to a suitable area.	-	***4***	5	4	8	3	68	**High**	All staff and contractors associated with the development of the proposed NWRD are to be made aware of the locations of the sensitivity 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, 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.	2	5	4	6	2	30	**Moderate**	**55.9**
	Complete destruction of a rubbing post located within the proposed ore stockpile area associated with the North WRD.	-	***3***	5	3	6	3	42	**Moderate**	Prior to the commencement of pre-construction it is recommended that that an assessment of the ethnobotanical resources and natural features with cultural significance be considered. In addition an appropriately qualified archaeologist shall accompany the construction team and indicate where sensitive cultural heritage and archaeological sites are located within the footprint of the NWRD. 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 archaeological recording and intensive walkthroughs. 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**
Noise	Clearing of footprint sites at different expansion footprint areas resulting in an increase in noise levels.	-	***3***	2	1	4	2	21	**Low**	Construction activities at the different mine expansion footprint areas may be carried out during the day and night time provided that the prevailing ambient noise levels at the boundary of the mine are not exceeded.	2	2	1	4	2	14	**Low**	**33.3**

Soils, Land Use and Land Capability	Vegetation clearing within the NWRD footprint and associated roads as part of the site preparation prior to commencement, mining and related activities which will 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 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 erosion and dust emission. This can be achieved by conducting a vegetation assessment. • Soils from the infrastructure footprint must be stripped and stockpiled at a designated area; • Stockpiles must be revegetated to establish a vegetation cover as an erosion control measure; • These stockpiles will always also be kept alien vegetation free to prevent loss of soil quality; Burying or burning of any waste including rubble, domestic waste, empty containers on the site will be strictly prohibited and all construction rubble waste must be removed to an approved disposal site.	1	4	3	6	1	13	**Low**	**75.0**
Surface water	Reduction in water quality due to an increase in turbidity as a result of an increase in erosion from the clearing of areas in close proximity to the watercourses (superficially the Witrivier) and the seep wetlands	-	***3***	4	3	6	2	39	**Moderate**	• All site preparation activities must remain outside of the freshwater systems. This includes the 100m zones of regulations or the 1:100-year floodlines for the Witrivier and the associated tributary (whichever is greatest) and the applicable 500m applicable buffer for the seep wetlands. • The footprint of the proposed infrastructure area must be clearly demarcated and be 500 m away from the delineated wetland which will lead to the reconfiguration of the NWRD footprint. • The 500 m buffer zone from the wetland must be designated as a no-go zone for any pre-construction, construction, operational, closure or post-closure NWRD or other mining activities and should be permanently fenced off. • 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 but will be located outside the 500m wetland buffer zone. • 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	1	4	3	6	1	13	**Low**	**66.7**

									• 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 will continue in line with requirements of the Water Use Licence. • Provide sufficient on-site ablution, sanitation and waste management facilities • Topsoil and subsoil stockpiles must be managed in accordance with the existing approved Environmental Management Programme. • It must be ensured that where berms and/or cut off trenches are developed and appropriately sized around the WRDs they are sufficient in design to capture any sediment and water runoff and stop such spreading into the surrounding soils in line with the requirements of Regulation GN704 of 2016.							

The table below list the main project related activities that will be undertaken during the construction phase of the proposed project.

Construction	Development of the extension of the NWRD such as water management, containment and protection infrastructure

Table 11-4: Construction impacts applicable to all the proposed expansion activities

Aspect	Nature of the impact		Significance of potential impact BEFORE							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	Increase in dust emissions due to the clearing of land for construction	-	2	3	2	4	2	**18**	**Low**	• Apply dust suppressants or vegetate bare areas not being used for construction. • Locate soil stockpiles within site boundaries considering the location of potential sensitive receptors and the predominant wind direction. • Set speed limits to minimise the creation of fugitive dust within the project boundary. • Development of routine air quality monitoring program.	2	3	1	4	1	**16**	**Low**	11.1
Biodiversity Flora	Loss of floral diversity and habitat due to construction activities: i) Dumping of construction material within areas where no construction is planned; ii) Proliferation of alien invasive species at topsoil stockpiles due to pre-construction activities, spreading into the surrounding areas. This could lead to the potential loss of floral species within surrounding habitat areas.	-	4	3	3	6	3	**48**	**Moderate**	• The construction footprint must be kept as small as possible to minimise the impact on the surrounding environment (edge effect management). • Removal of vegetation must be restricted to what is necessary and should remain within the approved development footprint. • If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line. Spill kits should be kept on-site within workshops. In the event of a breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be practiced, preventing the ingress of hydrocarbons into the topsoil. • An AIP control plan must be implemented for areas cleared outside of the authorised footprint area.	3	2	2	4	1	**24**	**Low**	50.0
	Loss of floral diversity and habitat due to potentially poorly managed edge effects such as i) Ineffective rehabilitation of compacted areas, bare soils, or eroded areas leading to ongoing proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas altering the floral habitat; ii) Compaction of soils outside of the study area due to indiscriminate driving of construction vehicles through natural vegetation; and iii) Habitat fragmentation as a result of construction activities leading to loss of floral diversity.	-	4	2	3	8	3	**52**	**Moderate**	• Clearing of vegetation should take place in a phased manner as to keep bare soil areas as small as possible to limit the erosion potential. Additionally, construction personnel and construction vehicles should be kept to the bare minimal per site in order to reduce the construction footprint and potential of soil compaction. • Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal. • Care should be taken during the construction and operation of the proposed development to limit edge effects to surrounding natural habitat. At minimum, this can be achieved by: i) Demarcating all footprint areas during construction activities; ii) No construction rubble or cleared alien invasive species are to be disposed of outside of demarcated areas, and should be taken to a registered waste disposal facility; iii) All soils compacted as a result of construction activities should be ripped and profiled and reseeded; iv) Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas. Any areas that have been left bare because of the construction activities should be rehabilitated using indigenous species.	3	1	2	2	1	**15**	**Low**	71.2

	Loss of floral SCC from the study area for the following reasons: i) Potential failure to monitor relocation success of occurring and potential occurring floral SCC (relocation must have taken place before construction phase); and ii) Harvesting of floral SCC outside of the construction footprint by construction personnel.	-	4	4	2	6	2	**48**	**Moderate**	• No collection of indigenous floral species must be allowed by construction personnel, especially with regards to floral SCC (if encountered). • Edge effect control needs to be implemented by fencing off or demarcating no-go areas to prevent further degradation and potential loss of floral SCC and their habitat outside of the proposed development footprint area.	3	3	1	4	1	**24**	**Low**	50.0
	Loss of floral diversity and habitat due to construction activities: i) Destruction of vegetation due to unplanned fires; ii) Dust generated during construction and operational activities accumulating on the surrounding floral individuals, altering the photosynthetic ability of plants and potentially further decreasing optimal growing/re-establishing conditions.	-	3	3	3	6	2	**36**	**Moderate**	• No illicit fires must be allowed during the construction of the proposed development. • Where possible suppress dust in order to mitigate the impact of dust on flora within a close proximity of construction activities.	2	2	2	4	1	**16**	**Low**	55.6
	Vegetation clearance leading to a loss of faunal habitat within the study area.	-	5	3	2	6	2	**55**	**Moderate**	• The boundaries of the NWRD footprint must be clearly demarcated. • Vegetation clearance must be restricted to the proposed development footprint only. • No vegetation outside of the demarcated boundary must be cleared. • Construction vehicles are to utilise existing roads as far as possible, no off-roading is to be allowed. • Vegetation clearance and ground prep work must take place in a phase manner, working from the southern section adjacent the mine northwards, allowing fauna to flee ahead of activities and not get trapped adjacent the mine.	5	2	1	6	1	**45**	**Moderate**	18.2
	Vegetation clearance leading to a loss of faunal species diversity.	-	5	4	2	6	2	**60**	**Moderate**	• Vegetation should be cleared in a phased manner to allow for any faunal species to vacate the footprint area naturally. • As far as possible vegetation clearance activities should be undertaken in the winter months, as faunal species will not be breeding and there is a lower risk to nesting avifauna.	5	2	1	6	1	**45**	**Moderate**	25.0
Biodiversity Faunal	Decreased habitat availability leading to a loss of potential faunal SCC and SCC foraging grounds.	-	2	2	2	4	3	**16**	**Low**	• Should any faunal SCC be found on site, a suitably qualified specialist must be consulted as to the best way forward. • No hunting or trapping of faunal SCC within the footprint sites or surrounding natural areas. • No vegetation outside of the demarcated footprint must be cleared.	2	2	1	4	1	**14**	**Low**	12.5
	Erosion activities and stormwater runoff impacting adjacent areas leading to habitat alteration and loss of faunal species diversity and abundance.	-	4	4	2	6	2	**48**	**Moderate**	• Stormwater runoff must be managed through the proper construction of berms and swales where necessary. • Erosion inspections should be undertaken frequently, but especially following heavy rains. • All signs of erosion must be rectified immediately.	4	2	1	4	1	**28**	**Low**	41.7
	Increased risk of uncontrolled fires.	-	3	2	2	6	3	**30**	**Moderate**	• No on-site fires are allowed. • Smoking to only take place in designated areas and all smoked cigarettes are to be deposed of at a registered site. Burnt matches and cigarettes are not to be thrown away into the surrounding natural veld, as they pose a fire-starting risk, whilst also polluting the environment.	1	1	1	4	1	**6**	**Low**	80.0

	Hunting and trapping of faunal species.	-	3	3	3	4	3	30	Moderate	• No hunting, trapping or setting of snares by construction personnel is to be allowed. Suitable fines / disciplinary actions for such must be made known and implemented.	2	3	1	4	2	16	Low	46.7
	Human - wildlife conflict.	-	3	3	3	4	3	30	Moderate	• Construction personnel are to be educated about the various faunal species in the area, particularly about venomous spider, snake and scorpion species. • Should any of these species be encountered, these species are to be safely and carefully relocated to the surrounding natural habitat adjacent the development site, should the not move off on their own. • The contact details of a suitably qualified snake handler for the mine must be made available to construction teams should a venomous snake be encountered that needs removal.	2	3	1	4	2	16	Low	46.7
	Potential faunal collision with vehicles/heavy machinery.	-	3	4	2	6	3	36	Moderate	• Construction vehicles are to utilise only designated roads as far as possible, with the exception of heavy machinery being used to clear ground. • Vegetation clearance is to be done in a phased manner to limit vehicle heavy machinery movement ahead of vegetation activities. • Mine vehicles must be limited to only travel 40km/h on designated roads used by contractors or as stipulated within the existing regulations of the mine, as to limit to the probability of roadkill.	2	4	1	4	2	18	Low	50.0
	Construction of NWRD - possible long term impacts due to presence of possible permeable structures (fault zones) 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 • Design and implement clean water/dirty water infrastructure to contain all dirty water runoff from the waste rock dump in appropriately designed facility • Pending the outcome of this investigation, finalise technical design and specifications. • Should design specification change significantly, obtain approval from DWS - Civil Design • Implement groundwater monitoring program	5	2	2	2	1	30	Moderate	62.5
Groundwater	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	• Restrict areas to be cleared of vegetation to minimum and avoid or minimise construction; • Adequate storm water management to be implemented to contain all waste/dirty water;	2	1	1	2	1	8	Low	75.0
	Use, handling, transport and storage of hazardous materials (hydrocarbons & chemicals) - Pollution of soil, surface and groundwater with hazardous materials should spillages occur.	-	3	3	3	4	3	30	Moderate	• Prevention of contamination through hazardous material spills and leaks - Implementation of vehicle maintenance plan. • Effective, timeous spills management and clean-up - Implement a staff and contractor awareness training programme. • Effective mechanical maintenance on all critical equipment to prevent leaks, abnormalities and risk of failure. • Adequate secondary containment measures associated with pollution point sources	2	2	1	2	1	10	Low	66.7

Noise	Construction activities at the NWRD site	-	3	2	1	4	2	**21**	**Low**	• Construction activities at the NWRD 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 of.	2	3	2	4	2	**18**	**Low**	14.3
	Construction of the base of NWRD.	-	4	2	2	6	3	**40**	**Moderate**	• Construction equipment to comply with the IFCs Health and safety requirements.	2	2	2	4	2	**16**	**Low**	60.0
	Noise from the construction of the NWRD and infra-structure because of construction activities such as cranes, people, and generators.	-	4	2	2	6	3	**40**	**Moderate**	• Construction equipment to comply with the IFCs Health and safety requirements. Construction of backup power generators to take place when permitted only.	2	2	2	4	2	**16**	**Low**	60.0
	Noise from traffic to and from the specific sites during the assembling process. Traffic to remain on the roads and at a speed of 40km/h.	-	4	4	2	6	3	**48**	**Moderate**	• Internal roads to be kept in a good condition and all potholes to be repaired.	2	2	2	4	2	**16**	**Low**	66.7
Soils, Land Use and Land Capability	Loss of vegetative cover and topsoil protection - possible erosion, the permanent loss of resource downslope/downstream and impact of sedimentary load on streams and river systems	-	5	5	3	8	5	**80**	**High**	• Minimisation of footprint of impact, use of high floatation tires on all construction vehicles, removal and storage of all utilisable soil and the re-vegetation and/or rock cladding /cover to all stored materials (more than three years). Use of vetiver grass as an erosion prevention medium ahead of clearing where erosion is a considered risk.	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**	• Restriction/Minimisation of movement and servicing of vehicles, spillage from haulage systems and vehicles and bunding of all services areas.	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	-	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 (NWRD).	-	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 upslope of dirty water runoff and use vegetative cover (Vetiver 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	-	5	5	2	4	5	**55**	**Moderate**	• Strip soils with vegetative cover in tacked (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
Social	Reduced air quality and increase in dust (site)	--	4	1	1	6	2	**32**	**Moderate**	• Install an additional dust fall out monitoring unit between Phafola (Ga-Maloka) and Mesopotamia communities • Incorporate activities associated with the expanded NWRD into the site Community Health and Safety Management Plan • Include participatory monitoring of community health and safety risks and impacts in management plans • Maintain current dust management monitoring measures as per the EMPr • Ensure dust levels are below the respective standards • Raise awareness amongst surrounding communities on the available grievance mechanisms	2	1	1	4	1	**12**	**Low**	62.5

										• Implement dust suppression methods for vehicles such as dampening the roads • Dust must be monitored in line with the current monitoring programme at Mogalakwena Complex (i.e. monthly) • 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 directions								
Surface water	Deterioration of surface water quality due to erosion, spillages and accidental discharges at the crossings	-	4	2	1	6	3	**36**	**Moderate**	• Construction should take place in the low flow period (dry season). • Emergency action plans should be drawn up to deal with spillages • Stormwater infrastructure (paddocks, cut off berms and trenches) should be designed and constructed to accommodate the 1:50 year storm event and ensure that the infrastructure can accommodate sediment capture.	2	2	4	4	2	**20**	**Low**	44.4
	Increased erosion from areas of exposed soils during site clearing	-	4	2	1	6	3	**36**	**Moderate**	• Clearing of vegetation should be limited to the minimum area safe for construction and operation	3	2	1	4	2	**21**	**Low**	41.7
		-	4	1	1	4	1	**24**	**Low**	• Activities should be limited to months of low rainfall (dry season) to reduce probability of potential impact	2	4	2	2	2	**16**	**Low**	33.3
	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
		-	2	2	1	2	2	**10**	**Low**	• Hazardous substances and potentially polluting materials should be stored in appropriately bunded areas located outside of the riparian zone	2	2	4	4	2	**20**	**Low**	50.0
Visual	Visual impact associated with the construction of the WRD	-	5	5	3	6	4	**70**	**High**	• Undertake gradual clearing of land/vegetation • Ensure harvesting of plants from this area and preserve in the nursery for rehabilitation purposes, where practical. • Adhere to the management measures regarding dust provided by the air quality specialist. • Undertake progressive rehabilitation of the NWRD if practically possible. • Plant vegetation such as trees and shrubs on periphery of villages directly next to the proposed NWRD to provide a screen/buffer of direct views towards these structures. 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. • Consider shaping the NWRD according to visibility modelling to preserve views of the Mohlotlo Mountain where possible and if practical and safe to do so.	4	5	2	6	3	**52**	**Moderate**	-34.6

The table below list the main project related activities that will be undertaken during the operational phase of the proposed project.

Operation	Deposition of waste rock on the NWRD:

Table 11-5: Operational impacts applicable to all the proposed expansion activities

Aspect	Nature of the impact		Significance of potential impact BEFORE							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
			P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
Operational Phase																		
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 the open and bare areas such as the WRD	-	3	4	2	4	2	30	Moderate	• Pave or 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; • 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 of 3% 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 WRDs 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; and • Development and implementation 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	1	2	1	14	Low	53.3
Biodiversity Flora	Ongoing or permanent loss of floral habitat, diversity and potentially occurring SCC due to increased introduction and proliferation of alien plant species due to a lack of maintenance activities, or poorly implemented and monitored AIP Management programme, leading to ongoing displacement of natural vegetation outside of the footprint area.	-	4	4	3	6	2	52	Moderate	• ***Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b and 2 AIP species (as listed in the NEMBA Alien species lists, 2016), in line with the NEMBA Alien and Invasive Species Regulations (2014) (section 3.5 of this report)*** • ***Ongoing alien and invasive plant monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas.*** • ***Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it.*** • ***All cleared plant material to be disposed of at a licensed waste facility, which complies with legal standards.***	3	3	2	4	1	27	Low	48.1
	Loss of floral habitat, SCC, as well as overall species diversity within the local area: due to i) Degradation of favourable habitat and limited potential for floral re-establishment; and ii) On-going disturbance during operational phase may lead to erosion and sedimentation of surrounding floral habitat.	-	3	3	2	8	2	39	Moderate	• ***It must be ensured that no additional natural areas are further impacted or cleared during the operational phase.***	2	4	1	2	1	14	Low	64.1
	Erosion as a result of poorly managed stormwater runoff	-	4	4	3	6	2	52	Moderate	• ***Minimise the risk of erosion by limiting the extent of disturbed vegetation and exposed soil (where possible)***	3	3	2	4	1	27	Low	48.1

	resulting in downslope habitat loss:. - Where alien plant propagules are present within the WRD material, increased runoff from these slopes can result in the spread of alien plants into the surrounding habitat. - Erosion and runoff will lead to downslope habitat disturbance creating the ideal platform for the proliferation of alien plants, which will lead to the alteration of the floral communities.									• ***Manage the spread of AIP species which may affect remaining natural habitat within surrounding areas.***								
	- Potential WRD slope failure resulting in increased footprint and loss of habitat, impacting on floral species: Slope failure will result in the loss of downslope habitat and an increase in the footprint size of the WRD. The loss of habitat in the areas adjacent to the WRD will lead to the loss of floral species. - Increased sediment runoff and dispersion from the WRD due to increased heights as WRD expansion progresses during operational activities. This may result in the smothering of the surrounding vegetation, hindering plant growth and impacting on habitat availability for faunal species.	**-**	4	3	3	8	3	**56**	**Moderate**	• ***Ensure appropriate, frequently reviewed slope management programmes are enforced***	3	2	2	6	1	**30**	**Moderate**	46.4
Biodiversity Faunal	Proliferation of AIP species in the disturbed areas and areas adjacent the NWRD.	**-**	4	5	2	8	3	**60**	**Moderate**	• ***Ensure AIP control plan is implemented and that AIPs are suitably controlled and managed.***	4	4	2	6	2	**48**	**Moderate**	20.0
	Potential faunal collision with vehicles.	**-**	3	4	2	6	3	**36**	**Moderate**	• ***Operational vehicles are to utilise only designated roads. No driving through the surrounding habitat is to be permitted.*** • ***Mine vehicles must be limited to only travel 40 km/h on designated roads used by contractors or as stipulated within the existing regulations of the mine, as to limit to the probability of roadkill.***	2	4	2	6	2	**24**	**Low**	33.3
	Dumping of waste rock outside of the designated footprint area leading to further habitat loss.	**-**	4	4	2	6	3	**48**	**Moderate**	• ***No vegetation clearance is allowed outside of the demarcated footprint areas. Disturbed areas beyond the footprint are to be suitably rehabilitated in accordance with the rehabilitation plan.*** • ***Weekly inspections of the WRD footprint must be made to ensure that no dumping outside of the demarcated area has occurred. Where this has occurred, this mut be rectified and the habitat rehabilitated.***	3	4	1	6	2	**33**	**Moderate**	31.3
	Hunting and trapping of faunal species.	**-**	3	4	2	4	3	**30**	**Moderate**	• ***No hunting, trapping or setting of snares by operational personnel is to be allowed. Suitable fines / disciplinary actions for such must be made known and implemented.***	2	4	2	4	2	**20**	**Low**	33.3
	Human - wildlife conflict.	**-**	3	3	3	2	3	**24**	**Low**	• ***Operational personnel are to be educated about the various faunal species in the area, particularly about venous spider, snake and scorpion species.*** • ***Should any of these species be encountered, these species are to be safely and carefully relocated to the surrounding natural habitat adjacent the development site, should the not move off on their own. The contact details of a suitably qualified snake handler for the mine must be made available to operational teams should a venomous snake be encounter that needs removal.***	2	3	4	2	2	**18**	**Low**	25.0

	Increased risk of uncontrolled fires.	-	3	4	2	6	3	36	Moderate	• ***No on-site fires are allowed.***	2	4	1	4	1	18	Low	50.0
	Potential waste or toxic spills from heavy machinery and mine vehicles.	-	3	4	2	6	3	36	Moderate	• ***Any waste or toxic spills from vehicles or mining infrastructure must be dealt with immediately in accordance with the waste management plan.*** • ***All mine vehicles and machinery are to be regularly inspected and maintained.***	2	4	1	4	2	18	Low	50.0
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 hydrocensus annually within 1 km radius annually to identify and quantify groundwater users in close proximity to the mine; • 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; • 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.	5	4	3	4	3	55	Moderate	15.4
	Deterioration of groundwater quality and quantity due to densification of informal settlements surrounding mine. Cumulative impact potential with further deterioration in water quality and quantity due to mining activities.	-	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; • Annual hydrocensus within 1 km radius to quantify impacts of densification on groundwater resources.	4	5	3	6	3	56	Moderate	34.1
	Potential contamination of shallow groundwater resources from the effectiveness of the preparation of the base of the NWRD	-	5	4	2	6	2	60	Moderate	• 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 WRD as to reduce run-off	2	3	1	4	2	16	Low	73.3
	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
Noise	Increase traffic along the access road		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
	Increase in noise associated with the dumping of waste rock at the NWRD		3	4	2	6	2	36	Moderate	• The dumping of wase 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
	Noise breaks from the NWRD activities may create an increased noise level.	-	4	4	2	6	3	48	Moderate	• Noise levels may not exceed the threshold value (before a noise disturbance may be created) of 7.0dBA at the MRA	2	4	1	4	2	18	Low	62.5
	Traffic noise is created by vehicle movement where mechanical noise, rattles, and road surface play an important role on the noise levels along	-	4	2	2	6	3	40	Moderate	• Access roads to waste rock dump and on the dump to be kept in good order at all times.	2	4	1	4	2	18	Low	55.0

	roads or some distance from roads.																		
	Tipping of waste rock activities (boulders running down the side of the waste rock) may give rise to site-specific increase in the noise levels.	-	4	2	2	6	3	40	Moderate	• Install a soft berm at the toe of the dump to prevent boulders from rolling away.	2	2	2	4	2	16	Low	60.0
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. Manage vegetative/rock cladding and impacts of dirty water/dust ingress.	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 (down stream and down wind) contamination/impacts by dust and dirty water.	-	5	5	3	8	5	80	High	• Construct stockpiles upslope of stormwater runoff, 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, by-products (Tailings and waste rock) from pipelines and pumps, hydrocarbons and/or reagents from vehicles and conveyancing systems, mechanical infrastructure and stormwater runoff.	-	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/prevention of spillage from waste delivery, pipelines and conveyancing systems and haulage, and controlled maintenance of vehicles.	3	4	2	4	2	30	Moderate	57.1
Social	Increased community and employee exposure to hazards and risks	-	3	4	2	6	3	36	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 • Recruit and/or train staff who will be responsible for the implementation of health and safety in line with the Community Health and Safety Management Plan • Minimize transmission of communicable diseases (e.g. Covid 19, HIV/Aids) that may be associated with the influx of temporary or permanent project labour by referencing existing Health Impact Assessments and updating the site Community Health and Safety Management Plan and Covid 19 Action Plan • Incorporate project activities into the Mogalakwena Complex Emergency Response Plan and Community Health and Safety Management Plan • Keep First Aid supplies on site • Undertake induction training as well as regular refresher training sessions on health and safety for employees • Include the respective contractors (if applicable to the project) in the health and safety training • Inform the employees of the emergency response plan in conjunction with the training	2	4	2	6	3	24	Low	33.3
	Reduced air quality and increase in dust (site)	-	4	4	2	8	5	56	Moderate	• Install an additional dust fall out monitoring unit between Phafola (Ga-Maloka) and Mesopotamia communities	3	4	2	4	4	30	Moderate	46.4

									• Incorporate activities associated with the expanded NWRD into the site Community Health and Safety Management Plan • Include participatory monitoring of community health and safety risks and impacts in management plans • Maintain current dust management monitoring measures as per the EMPr • Ensure dust levels are below the respective standards • Raise awareness amongst surrounding communities on the available grievance mechanisms • Implement dust suppression methods for vehicles such as dampening the roads • Dust must be monitored in line with the current monitoring programme at Mogalakwena Complex (i.e. monthly) • 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 directions								
	Anticipated increases in noise and nuisance effects	-	4	4	2	4	4	**40**	**Moderate**	• Incorporate activities associated with the expanded NWRD into the site Community Health and Safety Management Plan • Implement Environmental, Health and Safety Guidelines in line with AASW3 as well Mogalakwena Complex's Noise Impact Management Plan • Noise must be monitored on a quarterly basis	3	4	2	4	3	**30**	**Moderate**	25
	Decrease in physical and mental health	-	3	4	2	4	3	**30**	**Moderate**	• Incorporate activities associated with the expanded NWRD into the site Community Health and Safety Management Plan • Continue with dust and noise monitoring in line with existing and proposed new measures • Incorporate project activities into the Mogalakwena Complex emergency response plan	2	4	2	2	3	**16**	**Low**	46.7
	Changing feelings in relation to the project	-	3	2	2	6	3	**30**	**Moderate**	• Engage with established community platforms, to monitor changes and manage perceptions/ expectations as per the most recent Mogalakwena Complex Stakeholder Engagement Plan • Include participatory monitoring of community health and safety risks and impacts in management plans	2	2	2	4	3	**16**	**Low**	46.7
	Continued pressure on social networks	-	3	2	2	6	3	**30**	**Moderate**	• Ensure that transparent communication methods are used throughout the project • Ensure compliance with the Stakeholder Engagement Plan and Contractor Management Plan	2	2	2	4	3	**16**	**Low**	46.7
	Continued social differentiation and inequality	-	3	2	2	6	4	**30**	**Moderate**	• Engage with community leadership indicating that the project is an extension of current mining activities • Inform communities about the ways AAP is assisting with socio-economic development and their Social and Labour Plan commitments • Ensure that transparent communication methods are used throughout the project • Ensure compliance with Stakeholder Engagement Plan, Socio-Economic Development Plan and Contractor Management Plan • Update commitments register on a regular basis	2	1	2	2	3	**10**	**Low**	66.7
		-	4	2	2	6	4				3	1	2	4	3	**21**	**Low**	47.5

	Limited employment creation and benefits							**40**	**Moderate**	• Emerging employment opportunities as part of general mining activities 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 • Update commitments register on a regular basis • Mogalakwena Complex 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 to limit opportunities for conflict situations. Mogalakwena Complex'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 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 • Ensure compliance with Stakeholder Engagement Plan, Socio-Economic Development Plan and Contractor Management Plan								
Surface water	Potential flooding of existing crossing especially culverts	-	3	3	2	6	2	**33**	**Moderate**	• Stormwater culverts at watercourse crossings should be designed and constructed to accommodate the 1:50 year storm event	2	3	2	4	2	**18**	**Low**	45.5
	Reduced availability of water to downstream water users due to changes in water quality	-	3	3	2	4	3	**27**	**Low**	• 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 • Paddocks and cut off berms and trenches should be constructed to minimise uncontrolled runoff from the site entering the clean water system • ***Paddocks must be monitored and cleared as needed*** • ***The installation of adequate underdrains must be considered in order to control potential impacts from seepage associated with the WRD. In addition, this must include a seepage monitoring plan, which outlines the frequency of record-taking (recommended is monthly) and a procedure for action in the event of seepage taking place.*** • ***Water quality, with special mention of pH, dissolved salts and specific problematic chemical constituents of concern need to be managed, and monitored in order to ensure that reasonable water quality occurs downgradient of the areas where waste rock material has been deposited.*** • ***Management of water quality must be done by monitoring water quality on the Witrivier in support of Resource Quality Objectives of rivers in the region.*** • ***The toxicological risk to the receiving environment should be monitored by using acute toxicity assessment principles. If screening assessments indicate that there is a significant risk to biota, this should be further refined with tests run according to the Direct Estimate of Ecological Effect Potential (DEEEP) Method.***	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 and cut off berms and trenches must be monitored and cleared as needed	3	2	1	4	1	21	Low	30.0
	Increased risk of flooding due to WRD failure	-	3	1	2	8	1	33	Moderate	• ***During normal operations dirty water should be contained in the paddocks designed to handle the 1:50 year event and enable settlement of solids in the contained water prior to reuse, such as for dust suppression***	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
Visual	Visual impact associated with the operation of the WRD	-	5	4	2	4	2	50	Moderate	• Undertake gradual clearing of land/vegetation • Ensure harvesting of plants from this area and preserve in the nursery for rehabilitation purposes, where practical. • Adhere to the management measures regarding dust provided by the air quality specialist. • Undertake progressive rehabilitation of the NWRD if practically possible. • Plant vegetation such as trees and shrubs on periphery of villages directly next to the proposed NWRD to provide a screen/buffer of direct views towards these structures. 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.	4	2	2	4	1	32	Moderate	36.0

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 26.6 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.

Table 11-6: Closure/rehabilitation phase impacts applicable to all the proposed expansion activities

Aspect	Nature of the impact	Significance of potential BEFORE impact							Mitigation Measures	Significance of potential impact AFTER mitigation							Degree of mitigation (%)
		P	D	E	M	LoR	Significance			P	D	E	M	LoR	Significance		
Closure/Rehabilitation Phase																	
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 the open and bare areas such as the NWRD	-	3	2	2	4	1	24	Low	• Demolish all infrastructure and rehabilitate on the footprint exposed by demolition activities. • Revegetate all open and bare areas to reduce windblown dust; • Effective and expedient rehabilitation of dust and other emissions sources. • Continuation of the ambient air quality monitoring program.	3	2	2	6	1	30	Moderate	25.0
Biodiversity Flora	Ineffective implementation of rehabilitation activities: Permanent loss of floral habitat, floral diversity and floral SCC due to loss of favourable habitat to reinstate floral SCC. Higher likelihood of edge effect impacts on adjacent and nearby natural vegetation of increased sensitivity.	-	3	3	2	6	2	33	Moderate	• ***All infrastructure footprints that will be decommissioned should be concurrently rehabilitated in accordance with a rehabilitation plan compiled by a suitable specialist.*** • ***Regular dust suppression must be undertaken on bare soils during the closure and decommissioning phase.*** • ***Storm water management measures should be maintained until rehabilitation is complete.*** • ***All disturbed areas should be ripped to alleviate compaction,*** • ***Erosion control measures are to be implemented to mitigate downslope sedimentation and the hindrance of revegetation/ rehabilitation activities.*** • ***All rehabilitated areas should be rehabilitated to a point where natural processes will allow the ecological functioning and biodiversity of the area to be re-instated.*** • ***Rehabilitation efforts must be implemented for a period of at least five years after decommissioning. A mix of indigenous grass seeds can be used during rehabilitation activities to re-establish a protective cover, in order to minimise soil erosion and dust emissions.*** • ***Contractors will not be allowed to harvest any natural resources.***	2	2	1	4	1	14	Low	57.6
	Potentially poorly implemented and monitored AIP Management programme, leading to the reintroduction and proliferation of AIP species within the area. Potential failure to monitor rehabilitation as per the Biodiversity Action Plan set out for the mine.	-	4	3	2	8	3	52	Moderate	• ***AIP control plans should be implemented to ensure continued control of AIP species within the study are and surrounding areas*** • ***Follow up with alien and invasive plant control measures for a period of 5 years post-closure*** • ***No dumping of litter must be allowed on-site. As such it is advised that vegetation cuttings be carefully collected and disposed of at a separate waste facility.*** • ***Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC or suitable habitat for such species outside of the proposed development footprint***	3	2	1	6	1	27	Low	48.1

	Potential poor monitoring of relocated SCC resulting in the loss of SCC from the study area and poorly reinstated and represented floral SCC within rehabilitated areas.	-	4	3	2	6	2	44	Moderate	• ***Monitoring of rescued and relocated floral SCC, particularly the NFA and LEMA protected species recorded within the study area, should continue during the operational and maintenance phase until it is evident that the species have successfully.*** • ***As far as possible, no collection of floral SCC or medicinal floral species within the study area or adjacent natural habitat must be allowed during the operational phase of the development established***	3	2	1	4	1	21	Low	52.3
Biodiversity Faunal	Failure to implement and manage a suitable rehabilitation plan. Proliferation of alien and invasive plant species leading to ongoing faunal habitat loss. Improper revegetation of the NWRD leading to permanent loss of habitat and food resources.	-	4	4	2	8	3	56	Moderate	• ***Ensure sound implementation of alien and invasive plant control plan.*** • ***Where soils have been compacted, they are to be ripped and where necessary reprofiled.*** • ***Cleared and bare areas are to be rehabilitated and revegetated using an appropriate seed mix that is in line with the current species composition of the vegetation type.***	2	4	1	4	2	18	Low	67.9
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 • Place potentially leachate generating materials as low as possible in the mining pit to prevent leachate generation and movement	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
Social	Increased community and employee exposure to hazards and risks	+	3	4	3	6	2	39	Moderate	• Appoint a rehabilitation specialist to implement the requirements of the Closure and Rehabilitation Plan • Consider surrounding land uses and design post-mining land use options to support and enhance long-term development options for the community. • Proactively engage stakeholders on social mine closure criteria • Ensure compliance with Anglo American Mine Closure Standard and Mine Closure Toolkit	4	5	3	8	1	64	High	64.1
	Loss of employment during decommissioning	-	5	5	3	6	5	70	High	• It is proposed that Mogalakwena Complex's 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 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 Mogalakwena Complex, but to gain experience at Mogalakwena Complex which they would then be able to use for future opportunities • The Zimele team's scope must be expanded to ensure they are creating lasting socio-economic opportunities for the community beyond mine closure • Ensure compliance with Anglo American Mine Closure Standard and Mine Closure Toolkit	4	5	3	4	3	48	Moderate	31.4
Surface water	Infrastructures 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

	The WRD and the associated infrastructure 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
Visual	Visual impact associated with the closure of the NWRD	-	5	5	3	6	4	70	High	• Adhere to the management measures regarding dust provided by the air quality specialist. • Appoint a rehabilitation specialist to implement the requirements of the Closure and Rehabilitation Plan	4	4	2	4	1	40	Moderate	42.9
Post-Closure Phase																			
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
Groundwater	Post closure impacts associated with waste disposal activities	-	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
	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. • Modelling of pit lake including backfill scenarios as identified by groundwater specialist. • 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, hydropedological 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

11.4.1 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 11-.

Table 11-7: 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.

11.5 Cumulative impacts

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 are generally uncertain and therefore 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. Due to the scale of the proposed project and its locality within an existing disturbed operational area it is anticipated that the additional impacts generated from these projects will be minimal and will therefore not add significantly to the overall cumulative impact of Mogalakwena Complex on the surrounding area.

From a social perspective communities positioned around the Mogalakwena Complex already experience impacts as a result of mining activities. The extension of the NWRD may lead to an insignificant increase in existing noise and dust levels. None the less, these impacts will be cumulative to what is already experienced by local communities.

12 The possible mitigation measures that could be applied and the level of risk

The proposed NWRD Extensions Project will occur within the Mogalakwena Complex area, which has largely already been affected by current mining activities. Previous specialist studies assessed potential environmental and social impacts which identified appropriate mitigation and management measures to avoid and /or minimise the identified impacts associated with the NWRD Extensions Project area.

The mitigation hierarchy was applied throughout the BA 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 Impact Assessment Phase, the findings and recommendations of the previous specialist studies and specialist studies specifically undertaken for this project 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

13 Motivation where no alternative sites were considered

Please refer to Section 8.

14 Statement motivating the alternative development location within the overall site

Please refer to Section 8.

15 Assessment of each identified potentially significant impact and risk

Refer to Section11.4. It is not anticipated that the proposed project will result in any significant increase as a result of the project as the proposed NWRD extension and reconfiguration will be developed as part of the authorised NWRD.

16 Summary of specialist reports

The EAP has worked closely with specialists to determine the baseline conditions which will assist in identifying risks and impacts as part of the extension and reconfiguration of the NWRD project. Having worked on other environmental authorisation processes at Mogalakwena Complex the EAP and the specialists have extensive knowledge of the site.

As part of the 2020 EMPr various specialist studies were conducted which covered the proposed NWRD extension area to the south. The specialist studies including the impact assessment and mitigation measures, which have been reviewed and updated where required, include the following:

- Air Quality
- Biodiversity and Wetlands
- Closure
- Noise
- Visual
- Cultural Heritage
- Soils, land capability and land use
- Geohydrological
- Surface water
- Socio-economic

16.1 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. Specialist recommendations which specifically informed the final site layouts or designs are listed in Table 16-1.

Table 16-1: 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 BAR report (mark with an X where applicable)	Reference to applicable section of the report where the specialist recommendations have been included
Biodiversity	• It is recommended that the monitoring of the Witriver is included as part of the programme for the Mogalakwena Complex • Implement floral monitoring plan as indicated in 27.5.6.	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 authorised. Refer to Section 11.4 for the management measures for each of the project phases.
Freshwater ecosystem	• It is recommended that the footprint of the NWRD avoids encroaching within the 1:100-year floodline of the Witriver and the tributary to the NE and 500m from the delineated wetland. • Where berms and/or cut off trenches are developed and appropriately sized around the NWRD they are sufficient in design to capture any sediment and water runoff and stop such spreading into the surrounding soils in line with the requirements of Regulation GN704 of 2016. • The installation of adequate underdrains in order to control potential impacts from seepage associated with the WRD. • Development of a seepage monitoring plan, which outlines the frequency of record-taking (recommended is monthly) and a procedure for action in the event of seepage taking place.	X	
Groundwater	• Proposed ground water protection measures (protection measures to be implemented for the NWRD extension).	X	

Surface water	• The NWRD has been positioned within the investigation area to avoid encroachment on the watercourse western side of the investigation area (the NWRD extension will not encroach on the watercourse to the western side of the NWRD) as well as to avoid the delineated wetland in the east. • Surface water protection measures (protection measures to be implemented for the NWRD extension). • Additional upstream monitoring points on the Witrivier should be included in the monitoring programme before any construction in the area commences. • Mogalakwena Complex to manage dirty water runoff emanating from the NWRD and the mining activities in the area to reduce potential impact on the Witrivier.	X	

17 Environmental impact statement

This section provides an overview of the impact assessment methodology, 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).

17.1 Summary of the key findings of the environmental impact assessment

This BAR and the EMPr serve to identify the potential impacts associated with the extension and reconfiguration of the NWRD project. In accordance with the relevant environmental legislation, reasonable measures to mitigate the potential impacts arising from the proposed activities have been assessed and the significance of each of these impacts under both the pre- and post-mitigation scenarios identified and detailed.

The methodology utilised to undertake the impact assessment has incorporated, amongst other skills, professional experience, relevant literature and local knowledge of the site and surrounding area.

It is the EAP's opinion that based on the process that has been followed and the findings of the impact assessment, in conjunction with the proposed mitigation measures, that no unmanageable adverse impacts are expected to occur.

17.2 Final site map

A map which superimposes the proposed extended and reconfigured on the environmental sensitivities of the proposed location of the infrastructure is provided in Appendix F.

17.3 Summary of the positive and negative impacts and risks of the proposed activity and identified alternatives

Refer to Section 11.4 for positive and negative impacts identified for the proposed project.

18 Proposed impact management objectives and the impact management outcomes for the inclusion in the EMPr

Impact management objectives are provided in Table18-1. The impacts associated with the proposed project and the identified management measures are provided in Section 11.4. 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 Complex will aim to achieve the management objectives associated with the proposed protection measures to be implemented for the NWRD extension project.

Table18-1: Impact management objectives

Aspect	Objective
Social	• To maximise opportunities for local residents where possible during construction and operation of the proposed projects • To facilitate employment of local labour on the mine • To avoid creating unrealistic expectations • To address ongoing legacy issues and to actively work on restoring trust between the mine and the surrounding communities
Surface and Ground Water	• Monitor surface water and groundwater quality during the life of the mine and post closure in line with the current monitoring programmes in place at Mogalakwena Complex
Air Quality	• To restore the PM_{10} monitoring capabilities at the mine such that PM_{10} levels can be monitored to ensure that the levels at the key receptor sites are within guideline levels. • Continue to implement the dust monitoring programme.
Cultural Heritage	• To ensure that heritage resources are not damaged by any activities associated by the project as well as the mining activities as a whole, unless the relevant processes in line with the National Heritage Resources Act has been followed.
Biodiversity	To demonstrate active stewardship of land and biodiversity by: • Identifying and removing relevant species if necessary; • Protected species which may be affected due to the expansion activities must be relocated, where possible; • Implementing the Alien Invasive Plan (AIP) to control AIP during all phases of the project and mining as a whole
Freshwater ecosystem	• To implement and maintain the wetland recommended protection measures to: o avoid encroaching within the 1:100-year floodline of the Witriver and tributary to the NE and 500m from the delineated wetland. o appropriately design berms and/or cut off trenches to capture any sediment and water runoff from the NWRD and stop such spreading into the surrounding soils in line with the requirements of Regulation GN704 of 2016. o install adequate underdrains in order to control potential impacts from seepage associated with the NWRD. o develop a seepage monitoring plan, which outlines the frequency of record-taking (recommended is monthly) and a procedure for action in the event that seepage into the environment occurs.
Soils and Land Capability	• To manage soil contamination by implementing the current standards/procedures in place at Mogalakwena Complex which include:

Aspect	Objective
	○ Inspection and maintenance plans for mine vehicles and equipment ○ A leak/spill procedure ○ Emergency Preparedness Response ○ Hazardous Waste Management
Noise	• To minimise adverse noise impacts from construction and operation • To respond with corrective action to public complaints about noise

19 Aspects for inclusion as conditions of Authorisation

Over and above the management measures detailed Section 11.4, the following conditions should be included in the authorisation:

- The EMPr must be audited in line with the NEMA Regulation 34 timeframes (every 5 years) or every two years which is within the same timeframe as the 2020 EMPr, whichever is appropriate at the time;
- Mogalakwena Complex 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 project layout as represented in this report must be subjected to review and revision if required;
- The process for the relocation of graves must be followed prior to the development of the NWRD extension and reconfiguration;
- Monitoring of surface and groundwater will be undertaken in line with the monitoring programmes as detailed in the approved WUL; and
- Environmental monitoring to be carried out during the different phases of the project as detailed in Section 27.5.

20 Description of any assumptions, uncertainties and gaps in knowledge

The following assumptions, limitations and constraints highlighted and considered as part of the BA for the proposed Projects:

Table20-1: 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 activities will be constructed in line with the designs.
Air Quality	The following assumption were applied to the air quality study: • All ambient air monitoring results received by SRK from AAP are assumed to be correct prior to SRK analysing and interpreting the data. All data is checked by SRK and any anomalous or erroneous results are highlighted and excluded to ensure good data is used for the study. The following limitations were applied to the air quality study: • Modelled meteorological data was purchased from Lakes Environmental (Lakes) as suitable meteorological data for air dispersion modelling purposes were not available. The Lakes data file is designed to simulate or predict meso-scale atmospheric circulation using the MM5 model (NCAR, 2013). • Ambient air quality baseline and emissions monitoring have not been undertaken as part of this assessment. SRK have relied on ambient air quality data collected by the client.

Study	Assumption/limitation/constraint
	• Three particulate matter (PM) monitors located on-site are in close proximity to emissions sources, hence these are considered source monitoring points. Data from these source monitoring points were used to undertake the cumulative impact assessment undertaken. • This assessment is limited to assessing the impacts associated with the proposed Mogalakwena Complex operations and its additional impact on the air quality in the surrounding area. A cumulative assessment was undertaken by using existing monitoring data obtained for the PM1, PM2 and PM3 monitoring stations. • Any impacts relating to health have not been included in the scope of this 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 were 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. • All information used to assessed the impacts the NWRD extension will have on the surrounding areas was gathered and collected as part of the 2019 Environmental Authorisation and approved in 2020. No site visit was undertaken to verify modelled outcomes .
Biodiversity	• The biodiversity desktop assessment is confined to the study area and does not include detailed results of the surrounding areas or adjacent properties, although ecologically important or sensitive areas according to the desktop databases of the surrounding areas have been included on the relevant maps; • It is important to note that although all of the data sources used do provide useful and often verifiable, high-quality data, the various databases do not always provide an entirely accurate indication of the actual site characteristics at the scale required to inform an environmental process and must be 'ground-truthed'. However, this information is useful as background information to the study and, based on the desktop results, sufficient decision making can take place with regards to the proposed extension of the NWRD if considered together with the ground-truthed results of the biodiversity assessments (Part B and C) (Appendix E); and • The field assessment was undertaken during late autumn early winter (25-27 May 2021). The field assessment aimed to determine the ecological status of the habitat associated with the study area, and to "ground-truth" the results of the desktop assessment. • With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most faunal communities have been accurately assessed and considered and the information provided is considered sufficient to allow informed decision making to take place and facilitate integrated environmental management; • Due to the nature and habits of most faunal taxa, the high level of surrounding anthropogenic activities, it is unlikely that all species would have been observed during a field assessment of limited duration. Therefore, site observations were compared with literature studies where necessary; • This assessment was limited to the study area only and did not consider the surrounding properties;

Study	Assumption/limitation/constraint
	• Sampling by its nature, means that not all individuals are assessed and identified. Some species and taxa within the footprint area may therefore have been missed during the assessment; and • A field assessment was undertaken from the 25th to the 27th of May 2021 (late autumn earl winter season), to determine the faunal ecological status of the study area, and to "ground-truth" the results of the desktop assessment. A more accurate assessment would require that assessments take place in all seasons of the year. However, on-site data was significantly augmented with all available desktop data and specialist experience in the area, and the findings of this assessment are considered to be an accurate reflection of the ecological characteristics of the study area.
Freshwater ecosystem	• Heritage sites were historically identified within the study area associated with the proposed Mogalakwena NWRD, during the field assessment no auguring could be done within these areas and their associated buffer (50m). As such, verification points for freshwater ecosystems were located outside of this buffer but as close as possible to the areas identified for ground truthing during the desktop assessment for the purpose of collecting sufficient data to enable informed decision making; • All freshwater ecosystems associated with the proposed Mogalakwena NWRD expansion project, where access was possible, were ground-truthed, however freshwater ecosystems within 500 m of the proposed Mogalakwena NWRD expansion project were delineated in fulfilment of GN509 of the NWA using various desktop methods including use of topographic maps, historical and current digital satellite imagery and aerial photographs. Desktop delineations were ground-truthed where feasible; • Due to high levels of disturbance within parts of the study area, relating to recent veld fires, areas cleared for dirt roads and presence of topsoil stockpiles, vegetation was not always a reliable indicator of the presence of freshwater ecosystems throughout the study area. As such, in highly disturbed areas, the vegetation indicator may have affected the accuracy of the delineation; • The delineations as presented in this report are regarded as a best estimate of the temporary boundaries based on the site conditions present at the time of assessment; • Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies due to the use of handheld GPS instrumentation may occur. If more accurate assessments are required, the freshwater ecosystems will need to be surveyed and pegged according to surveying principles and with survey equipment; • The freshwater ecosystems in the surrounding area are largely non-perennial systems that only become active in response to extreme rainfall events. Given the absence of such events, most areas currently show terrestrial characteristics and as such temporary zone delineation of these systems proved difficult in some areas. To mitigate this limitation, satellite imagery over time was used to verify boundaries. Despite this, the delineations as presented in this report are regarded as a best estimate of the boundaries based on the site conditions present, as observed during the site assessment and are deemed accurate enough to guide the authorisation process; • Wetland, riparian and terrestrial ecosystem zones create transitional areas where an ecotone is formed as vegetation species change from terrestrial to obligate/facultative species. Within this transition zone, some variation of opinion on the freshwater ecosystem boundary may occur. However, if the DWAF (2008) method is followed, all assessors should get largely similar results; • With regards to data sources used to provide background information on the sensitivity of the assessed areas, it is important to note that although all data sources provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the study area's actual site characteristics at the scale required to inform the environmental authorisation processes; • With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked. A more reliable assessment of the biota would require seasonal sampling, with sampling being undertaken under both low flow and high flow conditions. However, it is expected that the existing activities have been accurately assessed and considered, based on the field

Study	Assumption/limitation/constraint
	observations and the consideration of existing studies and monitoring data in terms of aquatic, riparian and wetland ecology.
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. • 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
Cultural 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. • All information used to assess the impacts the NWRD extension will have on the surrounding areas was gathered and collected as part of the 2019 Environmental Authorisation and approved in 2020. No site visit was undertaken to verify modelled outcomes . • Cultural heritage specific engagements were not undertaken, therefore possible intangible or natural heritage resources may not be adequately recorded.
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 area 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.) • All information used to assess the impacts the NWRD extension will have on the surrounding areas was gathered and collected as part of the 2019 Environmental Authorisation and approved in 2020. No site visit was undertaken to verify modelled outcomes .
Social	The following assumptions and limitations apply to this updated desktop SIA: • As mentioned in section 10.12, no second round stakeholder engagement specific to the SIA was undertaken. This is not seen as a major limitation since extensive stakeholder engagements took place during the 2019 environmental authorisation process for the Mogalakwena Mine Expansion project. Comments from the public participation process conducted as part of the Basic Assessment process will further inform the report.

Study	Assumption/limitation/constraint
Surface water	• SRK assumes that the data provided by Mogalakwena Complex is correct. The surface water report was based on preliminary designs and mitigation measures may have to be reviewed depending on final design. • 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 following assumptions and limitations are relevant to the study: • The viewshed illustrates the area from which the proposed extended NWRD are likely to be visible. It does not take local undulations, existing vegetation and man-made structures into account; • No site visit was undertaken to verify modelled outcomes. • Viewshed modelling was done at existing heights of established infrastructure. • 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. • 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 height of the NWRD extension.

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

21.1 Reasons why the activity should be authorised or not

The environmental authorisation process associated with the proposed project was undertaken in terms of the relevant environmental authorisation requirements as detailed in Section 6. The environmental authorisation process was underpinned by a stakeholder engagement process with consultation undertaken through various forms of engagement as detailed in Section 9.

During the consultation process, comments which are received will be captured in the CRR (Template provided in Appendix C).

In terms of the locality of the proposed project, 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 project, appropriate additional mitigation measures were developed to be implemented to reduce the impacts on the environment, as detailed in Section 11. 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 E.

In addition, since Mogalakwena Complex 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 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 existing approved management measures as well as identified additional management measures in Section 11;
- The proposed project is unlikely to result in the generation of any significant cumulative impacts when managed in accordance with the management measures specified in Section 11; and
- Should the proposed project not be implemented, Mogalakwena Complex will continue to operate as it currently operates however space for disposal of waste rock will become limited which will result in

the operations having to either reduce the rate of mining (which would have a negative socio-economic impact) or investigate other immediate waste rock disposal alternatives.

22 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

During the liability assessment undertaken for the authorisation of the Mogalakwena Complex Expansion project in 2019, both the planned waste rock dump and ore stockpile were included in the quantum for the project. This included an area of 130 ha for the waste rock dump and 80 ha for the stockpile (total area of 210 ha). During the biodiversity assessment associated with the proposed extension and reconfiguration of the NWRD, a wet response habitat was identified within the NWRD originally approved NWRD and ore stockpile area. Subsequently, a freshwater ecosystem assessment delineated the wet response habitat as a seep wetland with a channelled outflow. The footprint for the proposed NWRD has consequently been reconfigured to include a 500 m wetland protection buffer resulting in a total extended and reconfigured footprint area of approximately 128 ha, including water management infrastructure.

Using the footprint associated with the proposed extended and reconfigured NWRD of 128 ha, and excluding all other infrastructure costed for in 2019 (as a provision for this has already been made), the estimate of liability for the smaller facility in 2022 terms (i.e. using a Master Rate adjusted to 2022) is R24 431 960.71 (excluding allowance). This is a decrease of R11 031 921.59 pre-allowances and an overall decrease of R30 383 566.86 after allowance.

SRK is therefore of the opinion that even after the Master Rate for Component 8A and 14 has been adjusted to reflect rates in 2022, the liability for the proposed facility decreases as a result of the reduction in footprint.

As the liability has reduced through the extension and reconfiguration of the waste rock dump and ore stockpile, particularly as a result of the reduction in footprint, SRK is of the opinion that additional provision in the form of a Bank Guarantee is not required for the change to the proposed project.

23.1 Explain how the 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 2022.

23.2 Confirm that this amount can be provided for from operating expenditure

Additional provision in the form of a Bank Guarantee is not required for the change to the proposed project based on the information provided above.

24 Specific Information required by the competent Authority

24.1 Compliance with the provisions of sections 24(4)(a) and (b) read with section 24 (3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998). the BAR report must include the:

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

Based on the updated review of the potential environmental, social and economic impacts associated with the proposed project, the social impact will not significantly change as a result of the proposed project as the identified impacts can be mitigated to medium and low providing that the identified mitigation measures are implemented. The positive social impacts can be enhanced especially if the mitigation measures of the SIA and EMPr are implemented.

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

The heritage sites associated with this project were identified as part of the 2020 EMPr .Grave relocation will have to be undertaken in line with the requirements of Section 36 of the NHRA as part of the development authorised NWRD footprint and archaeological sites may require mitigation in line with the requirements of Section 35 of NHRA as part of the development of the extended and reconfigure NWRD. If it is not possible to preserve graves 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.

25 Other matters required in terms of sections 24(4)(a) and (b) of the Act

The impact assessment undertaken as part of the 2020 EMPr specific to the NWRD has been updated to reflect potential impacts that may arise from the extension of the NWRD footprint and additional management measures developed to address these identified impacts (Part A - Section 11.4) however these impacts were generally found to be low to moderate due to the fact that the proposed project will is an extension and reconfiguration to the authorised NWRD within the existing mining right area in an already transformed area at Mogalakwena Complex. Therefore, the proposed project will not result in additional significant impacts posing a threat on the environment.

Part B: Environmental Management Programme Report

26 Draft environmental management programme

The structure of the EMPr in terms of Appendix 4 of the 2014 NEMA Regulations, as amended is provided in Table 26-1.

Table 26-1: 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	2.1
	(ii) the expertise of the EAP, including a curriculum vitae;	2.2 and Appendix A
(1)(b)	A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description	5
(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;	Appendix F
(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-	11
	(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 -	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	

Appendix 4	Legislated requirements as per the NEMA GNR 982 in Appendix 4	Relevant Report Section
(1)(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	27
(1)(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	
(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-	27.6
	(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	27.6.1 and 27.6.2
	(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	27.7
(2)	Where a government notice gazette by the minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	Noted

26.1 Details of the EAP

Refer to Section 2.1 for the details of the EAP.

26.2 Description of the aspects of the activity

The requirement to describe the aspects of the activity that are covered by the environmental management programme is included in Part A, Section 5.

26.3 Composite map (sensitivity map)

The environmental sensitivities associated with the project is included in Appendix F and include sites of cultural heritage, noise sensitive receptors and air quality.

26.4 Description of the impact management objectives including the management statements

26.4.1 Determination of closure objectives

The closure objectives detailed in Section 26.5.1 are based on an extensive environmental database and baseline information gathered during the LoM so far, as well as existing environmental baseline studies.

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, 2018 , 2019 and 2020. The nature of the risks requiring mitigation were used to inform the closure objectives.

26.4.2 Volumes of rate of water use required for the operation

The proposed extended NWRD water requirements for construction will not require additional water supply, all required water will be within the WUL authorised limits . Water for dust suppression will however be required which will be sourced from existing process water sources under the current approved WUL.

26.4.3 Has a water use licence been applied for

A Water Use Licence Application was submitted to DWS in October 2019 and was approved in December 2020 (WUL No. 07/A61G/ABCGIJ/9887) for the NWRD and ore stockpile footprint area of 210 ha as a Section 21(g) water use defined in the NWA as “disposing of waste in a manner which may detrimentally impact on a water resource.

An updated NWRD design report will be submitted to the DWS for approval in terms of the WML, however, no additional WUL Application will be required as the existing NWRD footprint and the approved ore stockpile area are authorised under an existing Section 21(g) water use in the current Mogalakwena Complex WUL and a 500 m buffer zone around the delineated wetland will be adhered to. Therefore, no further water uses will be triggered in terms of the NWA.

26.4.4 Impacts to be mitigated in their respective phases

The impact assessment in Section 11 details the potential impacts associated with proposed NWRD Extension during the pre-construction, construction, operational and closure and rehabilitation phases.

26.4.5 Impact management outcomes

In addition to the implementation of the management measures detailed in Section 18 the compliance standards that are applicable to the identified impacts and as part greater impacts generated by Mogalakwena Complex are included in Table 26-2.

Table 26-2: Compliance Standards to be achieved with regards to social and environmental aspects

Environmental aspect	Phase/Time period	Standard to be achieved	Compliance with relevant legislation and 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; and • Waste Management;	• Manage soils, if contaminated, 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. • National Dust Control Regulations • SANS 10103 - Acceptable Ambient Noise Levels • National Environmental Management: Biodiversity Act • National Environmental Management: Air Quality Act • National Environmental Management Act

Environmental aspect	Phase/Time period	Standard to be achieved	Compliance with relevant legislation and standards
	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
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	• Regulation 704 Use of Water for Mining and Related Activities • Compliance with the conditions in the WUL Anglo American Policies and Guidelines to manage and remediate spills. • 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. • National Dust Control Regulations
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 • Responding to complaints and implementing a grievance mechanism with regards to groundwater. • Compliance to WUL	• Anglo American Policies and Guidelines to manage and remediate spills. • Compliance with the conditions in the 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.	• National Dust Control Regulations • Anglo Air Quality Performance Standards.
Noise	Continuous during construction,	To minimise noise impacts on sensitive receptors by:	• National Dust Control Regulations • SANS 10328 of 2008

Environmental aspect	Phase/Time period	Standard to be achieved	Compliance with relevant legislation and standards
	operations and closure.	• 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.	
Cultural Heritage	Continuous during construction, operations and closure.	To avoid impacts to cultural heritage resources and enhance cultural significance where possible. Where previously unknown cultural heritage resources are discovered during the project, implement the Mogalakwena Complex chance find procedure.	• National Heritage Resources Act, 1999 • NHRA GNR 548 • AASW 3.0 4H
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

26.4.6 Impact management actions

Refer to Section 27.

26.5 Financial Provision

Refer to Section 23.

26.5.1 Closure Objectives

Closure objectives for Mogalakwena Complex 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 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.

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, 2018, 2019 and 2020. For purposes of this report. These risks and the mitigation thereof informed the development of the closure objectives.

26.5.2 Consultation with landowners and interested and affected parties

The objectives in relation to closure and rehabilitation as detailed in Section 26.5.1 is being made available for landowner and public consultation as part of the public participation process detailed in Section 9.

26.5.3 Rehabilitation Plan

The final rehabilitation plan for Mogalakwena Complex 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 26.5.1.

26.6 Closure Actions

The rehabilitation actions that the operation intends undertaking at the end of the life of the extended and reconfigured NWRD 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.

26.6.1 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.

26.6.2 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.

26.6.3 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 Complex area.

26.7 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 project nor has it been undertaken for the larger mining right area, for purposes of current planning and liability costing for the 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 Mines[22], 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 project is similar to that which already exists for the operational infrastructure, the PCLU for the project is aligned with the above. It is likely that on closure of the NWRD it will present few sustainable land use options to the communities.

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 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.

27 Mechanisms for monitoring compliance with and performance assessment against the environmental management programme

Internal and external environmental monitoring is undertaken on an ongoing basis at Mogalakwena Complex as required in the relevant authorisations, permits and licences. Details associated with the compliance monitoring is provided in the sections below.

27.1 Monitoring of Impact Management Actions

A performance assessment against this BA/EMPr, will be undertaken every second year to assess the compliance against the management measures included in Section 11.4.

[22] Now known as Minerals Council South Africa

27.2 Monitoring and Reporting Frequency

Environmental monitoring for the proposed project will be undertaken in line with the current environmental monitoring programme in place at Mogalakwena Complex. This monitoring includes:

- Surface water monitoring – monthly
- Groundwater monitoring – quarterly
- Air quality (dust fallout and PM) – monthly
- Noise monitoring – quarterly

The team at Mogalakwena Complex (refer to 2.3) ensure that the monitoring programme is implemented in line with the requirements of the approved EMPrs. Various sub-consultants are appointed to undertake the environmental monitoring on behalf of Mogalakwena Complex.

27.3 Responsible Persons (Roles and Responsibilities)

The responsible persons for the implementation of the management measures and the monitoring of environmental compliance at Mogalakwena Complex is provided in Table 2-5.

27.4 Time Period for Implementing Impact Management Actions

The development of the extended NWRD are aligned with the planned LoM of Mogalakwena Complex. The time period for the implementation of the management actions associated with the development of the extended NWRD will be aligned with the different phase of the activities as detailed in 11.4.

27.5 Specific environmental monitoring requirements

This section details the existing and proposed specific environmental monitoring requirements associated with the project and includes the monitoring of the following:

- Surface and ground water;
- Biomonitoring;
- Air quality;
- Noise;
- Soils;
- Flora monitoring; and
- Post Rehabilitation monitoring.

Figure 27-1 illustrates the current monitoring taking place within the vicinity of the proposed project.

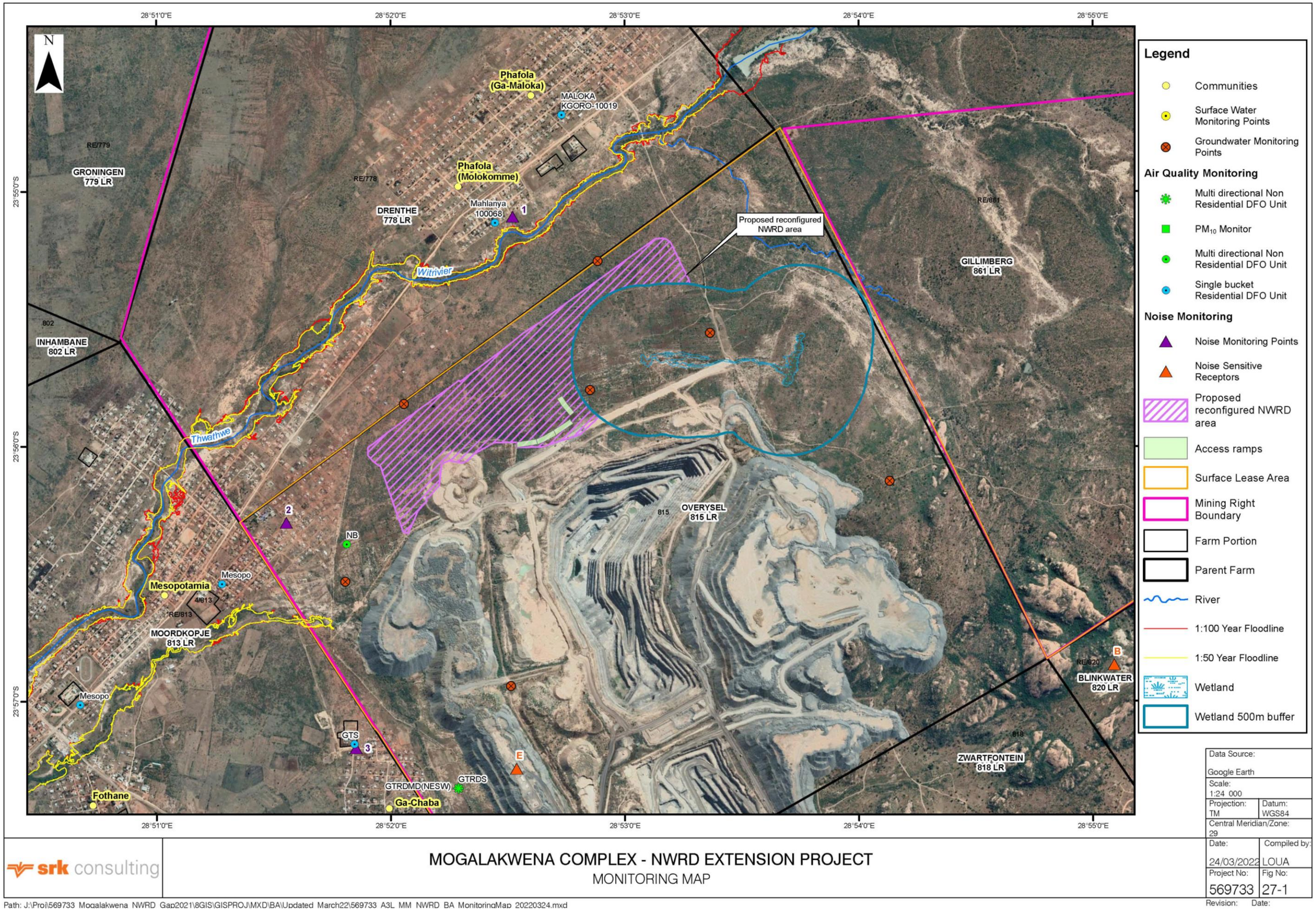


Figure 27-1: Current monitoring taking place in the vicinity of the proposed project

27.5.1 Surface and groundwater

Mogalakwena Complex has an extensive monitoring program which 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 Complex 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).

Mogalakwena Complex'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 guide the 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 Complex 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 Complex'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.

Surface and groundwater monitoring will be undertaken in line with the requirements specified in the WUL, which includes additional monitoring points identified specifically for the NWRD in the 2020 WUL.

27.5.2 Biomonitoring

Stream assessment scoring system (SASS5) aquatic biomonitoring is not undertaken at Mogalakwena Complex due to the intermittent flows experienced in the rivers only during rainfall events and the main river flow being subsurface. Mogalakwena Complex requested that the biomonitoring conditions within the 2007 WUL be removed and this was granted by the Department in 2010. As a result, biomonitoring has not been conducted regularly at Mogalakwena Complex, however, habitat assessments of the rivers have been undertaken during specialist field investigations. As per the 2020 WUL Amendment meeting held on 14 May 2021, DWS indicated that Mogalakwena Complex must comply with Appendix IV, Condition 2.3.1, which indicates that Mogalakwena Complex must develop a site-specific programme for

monitoring mine impact on the biological systems in the water environment. This programme must be submitted to DWS.

27.5.3 Air quality monitoring

Air quality at Mogalakwena Complex 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 10-10 and shown in Figure 10-6.

27.5.4 Noise monitoring

The location of the monitoring points is listed in Table 10-5 and shown in Figure 10-5

The Noise Impact Management Plan for the proposed project is shown in Table 27-1.

Table 27-1:Noise monitoring plan for the mine proposed 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.

27.5.5 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

27.5.6 Floral Monitoring

A floral monitoring plan must be designed and implemented throughout all phases of the proposed mining project, should it be authorised. The following points aim to guide the design of the monitoring plan, and it must be noted that the monitoring plan must be continually updated and refined for site-specific requirements:

- Permanent monitoring plots must be established within (target area) and surrounding (reference area) all rehabilitated areas. These plots must be designed to accurately monitor the following parameters:
    - Species diversity and species abundance;
    - Recruitment of indigenous species and of alien and invasive species, including alien vs Indigenous plant ratios;
    - Erosion levels and the efficacy of erosion control measures; and
    - Vegetation community structure including species composition and diversity which should be compared to pre-development conditions and work towards the post-closure objective.

- Monitoring of all the natural areas should continue throughout the operational phase to ensure these systems are not adversely affected by associated activities;
- The rehabilitation plan must be continuously updated (i.e., adaptive management) in accordance with the monitoring results to ensure that optimal rehabilitation measures are employed. Adaptive management is an integral part of any rehabilitation plan as it assesses monitoring results to allow rehabilitation measures to be revisited and to be adapted accordingly;
- Results of the monitoring activities must be considered during all phases of the proposed project and action must be taken to mitigate impacts as soon as negative effects from mining activities become apparent; and
- The method of monitoring must be designed to be subjective and repeatable to ensure consistent results.

27.5.7 Closure and post closure monitoring period

A post closure monitoring 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.

27.5.8 Continuous maintenance

The mine undertakes continuous maintenance on infrastructure that has the potential to affect the environment. This maintenance will be extended to include infrastructure associated with this project.

27.5.9 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 within the same timeframe as the 2020 EMPr.

27.6 Environmental Awareness Plan

The proposed project will utilise the existing Mogalakwena Complex SHE Department Environment – Competence, Training and Awareness Procedure attached in Appendix G.

27.6.1 Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work.

The proposed project will utilise the existing Mogalakwena Complex SHE Department Environment – Competence, Training and Awareness Procedure attached in Appendix G.

27.6.2 Manner in which risks will be dealt with in order to avoid pollution or the degradation to the environment

The proposed project will utilise the existing Mogalakwena Complex SHE Department Environment – Competence, Training and Awareness Procedure attached in Appendix G.

27.7 Specific information required by the Competent Authority

The following information will be required by the competent authority:

- Quantum of Financial Provision – to submitted annually
- Environmental Audit Report on the authorised BAR and EMPr – Every two years or as per auditing timeframe indicated in authorisation(s).

28 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: June 2022

I Michelle Miles 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: June 2022

29 Declaration

I Franciska Lake herewith declare that:

- all reasonable measures have been taken to identify potential I&APs for purposes of conducting public participation on the application;
- as far as is reasonably possible and taking into account the specific aspects of the application,

  (a) information containing all relevant facts in respect of the application or proposed application has been made available to potential I&APs;

  (b) participation by potential or registered I&APs has been facilitated in such a manner that all potential or registered I&APs have been provided with a reasonable opportunity to comment on the application or proposed application;
- the public participation plan as agreed with the competent authority, has been adhered to and indicate any deviations from such agreed plan where relevant; and
- reports and documents submitted for decision-making purposes must contain the public participation plan as required in Annexure 2 of GN605 (Disaster Management Act (57/2002): Directions Regarding Measures to Address, Prevent and Combat the Spread of COVID-19 Relating to National Environmental Management Permits and Licences.

Signature of the EAP

DATE: June 2022

I Michelle Miles herewith declare that:

- all reasonable measures have been taken to identify potential I&APs for purposes of conducting public participation on the application;
- as far as is reasonably possible and taking into account the specific aspects of the application,

  (a) information containing all relevant facts in respect of the application or proposed application has been made available to potential I&APs;

  (b) participation by potential or registered I&APs has been facilitated in such a manner that all potential or registered I&APs have been provided with a reasonable opportunity to comment on the application or proposed application;
- the public participation plan as agreed with the competent authority, has been adhered to and indicate any deviations from such agreed plan where relevant; and
- reports and documents submitted for decision-making purposes must contain the public participation plan as required in Annexure 2 of GN605 (Disaster Management Act (57/2002): Directions Regarding Measures to Address, Prevent and Combat the Spread of COVID-19 Relating to National Environmental Management Permits and Licences.

Signature of the EAP

DATE: June 2022

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Appendices

Appendix A: Curricula Vitae and qualifications of the EAP

Appendix B: Windeed

Appendix C: Public Participation Documentation

Appendix D: DEA Screening Tool Report

Appendix E: Specialist Studies

Appendix F: Sensitivity Map (Final Site Map)

Appendix G: SHE Department Environment – Competence, Training and Awareness Procedure