THARISA ADDITIONAL WASTE ROCK STORAGE ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME

Prepared for: Tharisa Minerals (Pty) Ltd

DMRE NW/30/5/1/2/3/2/1/358EM

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REPORT SIGN OFF AND APPROVALS

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EXECUTIVE SUMMARY

INTRODUCTION

This Executive Summary provides a synopsis of the Environment Impact Assessment Report compiled and distributed for review and comment as part of the Scoping and Environmental Impact Assessment process (S&EIA) that is being undertaken for an integrated Environmental Authorisation process at the Tharisa Mine.

PROJECT BACKGROUND

Tharisa Minerals (Pty) Ltd (Tharisa) is an opencast mining operation that produces chrome and platinum group metal (PGMs) concentrates. The mine has been operational since 2008. The opencast mine is located on farms 342 JQ and Elandsdrift 467 JQ, south of the Marikana Town, in the North West Province.

Mining is undertaken in two mining sections, namely the East Mine and West Mine, using conventional open pit truck and shovel methods. The two mining sections are separated by the perennial Sterkstroom River and the D1325 (Marikana Road). Waste rock from the open pit areas is stockpiled on Waste Rock Dumps (WRDs) and some in-pit dumping of waste rock has taken place at the East Mine. Key existing mine infrastructure includes haul roads, run-of-mine, a concentrator complex, various product stockpiles, topsoil stockpiles, WRDs, Tailings Storage Facilities (TSFs) and supporting infrastructure such as offices, workshops, change house and access control facilities. Tharisa holds the following Environmental Authorisations (EAs) and licenses:

- A Mining Right (MR) (Reference No.: 358 MR) issued by the Department of Minerals and Energy (DME) (currently the Department of Mineral Resources and Energy (DMRE)) on 19 September 2008 and amended in July 2011;
- An approved (Environmental Management Programme (EMPr) (Reference No.: NW 30/5/1/2/3/2/1/358EM) issued by the DME (currently the DMRE) on 19 September 2008;
- An EA (Ref No.: NWP/EIA/159/2007) issued by the Northwest Department of Agriculture, Conservation and Environment (DACE) (currently the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT) on 23 October 2009;
- An EA (Ref No.: 14/12/16/3/3/2/408) issued by the Department of Environmental Affairs on 15 November 2012;
- An EA (Ref No.: NWP/EIA/50/2011) issued by the Northwest DACE (currently the DEDECT) on 29 April 2015;
- An addendum to the Environmental Impact Assessment (EIA) and EMPr (Ref No.: NW/30/5/1/2/3/2/1/358EM) issued by the Department of Mineral Resources (DMR) (currently the DMRE) on 24 June 2015;
- An addendum to the EIA and EMPr (Ref No.: NW/30/5/1/2/3/2/1/358EM) issued by the DMR (currently the DMRE) on 14 Aug 2020 - Waste Water Treatment Plant;
- An addendum to the EIA and EMPr (Ref No.: NW/30/5/1/2/3/2/1/358EM) issued by the DMR (currently the DMRE) on 08 Aug 2021 – Fuel & Waste storage capacity increase;
- A Section 24G EA (Ref No.: NW/30/5/1/2/3/2/1/358EM) issued by the DMRE on 10 AUG 2021; and
- An amended Integrated Water Use Licence (IWUL) ((Licence No. 03/A21K/ABCGIJ/1468) issued by the Department of Water and Sanitation (DWS) in November 2020.

As part of its on-going mine planning, Tharisa has identified the need for additional waste rock storage on site (referred to as the proposed Project). In this regard, Tharisa is making an application to the Department of Mineral Resources and Energy (DMRE) for an integrated EA and update of the mine's current EMPr. The following activities are now proposed:

- The expansion of the existing and approved Far West WRD 1 by a footprint of 109 ha. The expanded area will be referred to as the West Above Ground (OG) WRD. Portions of the West OG WRD will be located on backfilled areas of the West Pit; and
- The establishment of a waste rock dump (referred to as the East OG WRD) on backfilled portions of the East Pit. The proposed East OG WRD will cover an area of approximately 72 ha.

SUMMARY OF AUTHORISATION REQUIREMENTS AND ENVIRONMENTAL PROCESS

The proposed Project will require an integrated EA and an amendment to Tharisa's current EMPr. The proposed Project includes listed activities under the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations, 2014[1] (published under Government Notice Regulation (GN R) 982 of 4 December 2014), (EIA Regulations, 2014), and waste management activities listed under the National Environmental Management Waste Act, 59 of 2008 (NEM:WA). Under both the EIA Regulations, 2014 and the NEM:WA, listed activities are prohibited from commencing until written authorisation is obtained from the competent authority, which in this case is the North West Province office of the DMRE. The project requires an integrated EA in terms of Section 24 of NEMA and Section 45 of NEM:WA from the North West Province office of the DMRE. In terms of the Section 102 of the Mineral and Petroleum Resources Development Act (MPRDA), an EMPr may not be amended or varied without the written consent of the Minister of Mineral Resources.

The MPRDA, NEMA and NEM:WA require that an applicant submit the relevant environmental reports required in terms of NEMA. The EIA Regulations, 2014 promulgated in terms of NEMA set out the assessment process and reporting requirements where authorisation is required. Prior to the commencement of the proposed Project the following is required:

- An amended EMPr in terms of Section 102 of the MPRDA from the Department of Mineral Resources and Energy (DMRE);
- An EA in terms of the NEMA for activities in Listing Notice 1 (GNR 983 of 2014) and Listing Notice 3 (GN R 985 of 2014) from the DMRE. The EIA Regulations being followed are Government Notice Regulation (GNR) 982 of 4 December 2014. Listed activities triggered as a result of the project are outlined in Section 3.1; and
- A Waste Management Licence in terms of the National Environmental Management: Waste Act, 59 of 2008 (NEM:WA) for waste activities in Category B (GN R 921 of 2013).

A S&EIA process is required to inform the proposed Project and meet regulatory requirements listed above.

In addition, the proposed Project also requires authorisation from the DWS for specific water uses listed under Section 21 of the NWA. This Report does not address the requirements of a water use licensing process. This will be handled as part of a separate process with the DWS.

[1] EIA Regulations means the Environmental Impact Assessment Regulations, 2014, published under Government Notice No. R. 982 in Government Gazette No. 38282 of 4 December 2014, as amended by GN R. 619 of 2016 in Government Gazette No. 40041 of 03 June 2016; GN R. 326 in Government Gazette No. 40772 of 7 April 2017; GN R. 706 in Government Gazette No. 41766 of 13 July 2018; GN R. 599 in Government Gazette No. 43358 of 29 May 2020; GN R. 517 in Government Gazette No. 44701 of 11 June 2021; and GN R. 1816 in Government Gazette No. 45999 of 03 March 2022.

SLR Consulting (South Africa) (Pty) Ltd (SLR), an independent firm of Environmental Assessment Practitioners (EAPs), has been appointed by Tharisa to manage the S&EIA process for the proposed Project.
This S&EIA process does not address occupational health and safety legislative requirements.

PROJECT ALTERNATIVES

The Tharisa Mining Right boundary has significant space constraints due to the existing infrastructure. Tharisa Mine is also bordered by other mining companies (Western Platinum Mine, Marikana Platinum Mine and Samancor) on the West, North and Eastern boundaries of the Tharisa Mining Right area. The N4 and farming community of Buffelspoort is located to the South of the Tharisa Mine. As such the location of the additional WRDs is dictated by the space available within the mining right area.

To minimise the extent of the project disturbance, portions of the project footprint will be located on previously disturbed areas and over backfilled portions of the pits. It follows that no location alternatives for the proposed Project could be considered (or were possible).

The following technology/ activity alternatives were considered as part of the proposed Project. These includes the following:

- **Trucking waste rock to a different location:** Open pit mining consists primarily of the removal of topsoil and overburden, drilling and blasting of ore, and the transportation of waste rock by haul trucks. Transportation of waste rock is cyclic in nature and requires the dispatch of a large number of trucks per month. Reducing the cycle time for transportation of waste rock results in increased productivity and reduces the operational costs. The proximity of the proposed Project to the open pits allows for increased productivity, minimisation of transportation costs as well as minimisation of noise and traffic impacts associated with transportation of waste rock;
- **Alternative mining technique (underground mining):** Underground mining is used to extract ore from below the surface of the earth safely, economically and with as little waste as possible. Underground mining is practical when the ore body is too deep to mine profitably by open pit. The target ore body for underground mining has not been reached for Tharisa, as such underground mining, as an alternative mining technique is not considered feasible; and
- **Waste rock backfill of open pits:** Tharisa has approval for partial backfilling of the open pits with waste rock, this is currently undertaken concurrently with mining. The waste rock backfill of open pits at Tharisa mine will soon reach its maximum capacity.

It follows that no activity/technology alternative have been considered for the proposed Project.

PUBLIC PARTICIPATION COMPLETED TO DATE

The public participation process was initiated in 2021. The public participation completed to date has been aimed at the identification of Interested and Affected Parties (I&AP) and informing I&APs about the proposed Project. Informing I&APs about the proposed Project has been done through the dissemination of information sharing material (advertisements, site notices, flyers, and background information document (BID)) and through focussed and public meetings. I&APs will continue to be involved throughout the environmental authorisation process.

The Scoping Report was distributed for a 30-day comment period from 18 May to 17 June 2022 in order to provide I&APs with an opportunity to comment on any aspect of the project. The updated Scoping Report was made available to the DMRE for decision-making purposes. The DMRE accepted the Scoping Report on 12 October 2022 with the following conditions (a copy of the acceptance letter is included in Appendix C):

- The expansion of the Far waste rock dump which is closer to the community will only be considered once the neighbouring community of Mmaditlhoka village has been relocated away from the site.
- For the duration that the community is still located where it is currently, the expansion of the far waste rock dump should be put on hold from the mine's operation due to the environmental and social impacts already affecting the said community.

The EIA and EMPr Report was made available for review and comment for a period of 30 days (26 October 2022 to 25 November 2022) at the following venues: Lapologang Piet Retief School; Mmadikhlokwa Community Hall; Piet Retief Primary school; Rustenburg Community Centre; Rustenburg Local Municipality; Bokamoso Community Hall and the SLR data-free website **https://slrpublicdocs.datafree.co/en/public-documents/Tharisa-WRD** and website: **https://www.slrconsulting.com/en/public-documents/public-documents/Tharisa-WRD**.

For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time due to pending relocation processes. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process due to pending relocation processes. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available.

BASELINE BIOPHYSICAL ENVIRONMENT AFFECTED BY THE PROPOSED PROJECT

Local Geology

Tharisa Mine is located on the south western limb of the BIC in the Marikana section. The Marikana section is separated from the Brits section to the east by the Wolhulterskop fault and the Rustenburg section to the west by the Spruitfontein upfold (see Figure 10 2). The target ore body is the Middle Group (MG) Chromitite Layers (MG1 –MG4). The MG Chromitite Layers outcrop on the farm 342 JQ striking roughly east - west and dipping at 12-15° to the north. Towards the western extent of the outcrop, the stratigraphy typically narrows, and the dip is steeper, with a gentle change in strike to north west- south-east. The entire MG package is developed over a true thickness of 47 m on the eastern portion of 342 JQ and thins to 25 m to the west near the Spruitfontein upfold.

Topographical Environment

In general, the area surrounding the Tharisa Mine comprises flat plains with a gentle slope (1%) towards the north. The Magaliesberg Mountain range lies approximately 2 km to the south of the mine. Peaks in this part of the Magaliesberg Mountain range rise to approximately 1 400 mamsl.

The natural topography immediately surrounding the Tharisa Mine has been largely influenced by the following activities and features (refer to Map 2):

- Mining activities associated with the surrounding Marikana Platinum Mine to the west, Western Platinum Mine to the north and Samancor Western Chrome Mine to the east.
- Community related activities associated with the Bokamoso community (located east of Far East WRD.
- The perennial Sterkstroom River, located between East Mine and West Mine, flowing in a northerly direction adjacent to the D1325 (Marikana Road).
- The N4 located immediate south of the Tharisa Mine together with farming related activities.

The proposed Project area associated with East OG WRD and West OG WRD, has been altered due to the existing open cast mining related activities associated with the West and East mine. The natural topography associated with West OG WRD has been disturbed and altered as a result of the existing mining activities associated with West Mine and community related activities (particularly Maditlhokwa).

Climate

The area experiences hot temperatures during summer, with maximum of 36.4°C for the month of October. Winter temperatures are relatively low especially in the months of May to July. Precipitation is important to air pollution studies since it represents an effective removal mechanism for atmospheric pollutants and inhibits dust generation potentials. Monthly rainfall for the Project site (based on WRF data for 2019 – 2021) is given in Figure 4. Months wherein the most rain occurred stretched from October to April. The total annual rainfall for the Project site is given to range between 873 mm and 939 mm.

The period wind field and diurnal variability in the wind field are shown in Figure 5. The average wind field is predominately from the south and north, with calm conditions 7.6% of the time. The daytime wind field is mainly from the north, ranging between north-west to north-east with 5.1% calm conditions. During the night, the wind field shifts to the south and south-southwest with less frequent winds from the south-easterly sector. The frequency of night-time calm conditions increases to 10.3%.

A distinct seasonal variation in the wind field in visible from Figure 6. During summer, the wind field is varied between most direction with more frequent winds from the north-eastern sector. The wind field shifts to south during autumn, with more frequent southerly winds during winter. During spring, the northerly winds increase with frequent north to north-east winds.

Air quality

The closest residential developments to Tharisa Mine and the proposed Project consist of the Maditlhokwa and Lapologang communities, with the town of Marikana approximately 1.5 km to the north of the mining rights boundary. Individual farmsteads also surround the project area.

Mining and processing activities, farming and residential land-uses occur in the region. These land-uses contribute to baseline pollutant concentrations via vehicle tailpipe emissions, household fuel combustion, biomass burning and various fugitive dust sources. Long-range transport of particulates, emitted from remote tall stacks and from large-scale biomass burning in countries to the north of South Africa, has been found to contribute to background fine particulate concentrations within the South African boundary (Andreae, et al., 1996; Garstang, Tyson, Swap, & Edwards, 1996; Piketh, Annegarn, & Kneen, 1996).

Tharisa Mine has a dustfall monitoring network in place and does passive sampling of NO_2 and SO_2 (Map 8). Data analysed for the ambient air quality is limited to the period January to March 2021 and January to March 2022. Both NO_2 and SO_2 are screened against Nartional Ambient Air Quality Standards (NAAQS) while dustfall is screened against the National Dust Control Regilations (NDCR).

It should be noted that the ambient measurements account for all emission contributions in the region, not just the mine.

Soils and land capability

The entire footprint area of the East Above Ground WRD is located in a disturbed area as a result of the ongoing open pit mining and waste rock dumping activities. Whereas a significant portion of the West Above Ground WRD footprint area has also been subjected to significant disturbance as a result of similar mining activities. The soil form associated with the disturbed areas was classified as a Witbank soil form while the excavated areas where no soil exist were classified as Cullinan soil form. The remaining patches of natural soils within the West Above Ground footprint area were classified as Acardia (black turf) soil form. The Witbank soil form is considered to be of very low agricultural potential due to the soils having been subjected to physical disturbance because of human interventions.

Biodiversity

The study area is located within two vegetation types, namely the Marikana Thornveld in the east and the Moot Plains Bushveld in the east, i.e., the reference vegetation types. Overall, the habitat within the study area was characterised by transformed areas (because of mining activities) in which vegetation cover ranged from almost absent to low. When vegetation was present, it was generally dominated by alien and invasive plant (AIP) species and/or native pioneer species that favour disturbed habitats. Given the level of transformation within the study area because of mining activities, the presence of indigenous vegetation[2] was confirmed to be absent.

Surface Water

The perennial Sterkstroom flows from the Buffelspoort Dam, south of the N4, through the mining operations, between the East and West mining areas. Two unnamed non-perennial tributaries of the Brakspruit originate in the north-west of the mine and drain the western side of the Mining Right area. Mining of the west pit has taken place within the headwaters of these tributaries. The eastern mining area is drained by two non-perennial drainage lines that formed a tributary to the Maretlwane. Mining of the East Pit has taken place within the headwaters of these drainage lines. In the south eastern corner of the mine, a tributary of the Elandsdriftspruit which originated just south of the mine, falls within the footprint of TSF 2. The diversion of this tributary was included in the approved EIA and EMP report (Metago, 2008).

None of the proposed WRDs will intersect perennial or non-perennial drainage lines at the Tharisa Mine. In this regard, the East OG WRD is approximately 260 m from the Sterkstroom and the West OG WRD is approximately 267 m South from tributaries of the Brakspruit.
Water from the Sterkstroom River is used by the surrounding community for domestic purposes such as washing and bathing, livestock watering and for agricultural purposes. An irrigation canal flows from north to south, along the eastern boundary of TSF1. There are no users of this irrigation canal downstream of the TSF.

2 **The NEMA definition of indigenous vegetation**: "Indigenous vegetation: refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding 10 years.

Freshwater ecosystems

A site assessment was undertaken on 26th April 2022 towards the end of the summer rainfall period to verify the Ecostatus of the identified freshwater ecosystems within 500 m of the study area, and to confirm the absence of freshwater ecosystems within the study area. The proposed WRDs will be within existing disturbed (open cast mining) areas, and therefore no freshwater ecosystems occur directly within the study area. However, two valley bottom wetlands are located immediately north of the proposed West Above Ground WRD, and an estimated 1 km reach of the Sterkstroom River is located approximately 235 m west of the East Above Ground WRD.

The wetlands were previously assessed by SAS (2013) and found to be moderately modified at the time; however, the ecological integrity of the wetlands has subsequently decreased and at the time of this assessment in May 2022, were found to be seriously modified (channelled valley bottom wetland) and critically modified (unchanneled valley bottom wetland).

The Sterkstroom River was previously assessed by SAS (2013) and The Biodiversity Company (TBC). During all assessments undertaken, including this assessment, the river is deemed to be moderately modified. The outcome of the assessments is summarised in the table below:

Groundwater

The Tharisa Mine is underlain by a shallow upper weathered aquifer and a deeper fractured aquifer. The weathered overburden is highly variable in thickness from 3 m to more than 30 m based on existing borehole logs and evidence of borehole depths. The deeper fractured bedrock aquifer is characterized by very low matrix permeability, poorly connected joints/fractures and dolerite/diabase dykes (that may act as barriers to groundwater flow).

The majority of the groundwater in the broader region is used in the form of third-party boreholes. Most of the boreholes are used for domestic and agricultural (livestock and irrigation) purposes. The weathered aquifer, as well as the alluvial aquifer along the Sterkstroom River, supports most irrigation and domestic water-supply boreholes throughout the region (SLR, 2014). Boreholes (community boreholes/third party) located within the Tharisa Mining Right area are used for domestic purposes and agricultural purposes (livestock and irrigation).

Noise

Tharisa Mine is located in a district where the character of ambient noise is already affected by industrialisation and economic activity, which over time, has resulted in an increase in road traffic noise and noise generated by intensive mining activities. Road traffic noise emanates from the N4 and secondary roads, such as the D1325 between Buffelspoort and Marikana. The N4 has a wide noise footprint. It has a significant impact on people living within a zone of approximately 1.2 km either side of the road and is clearly audible in most of the study area. In addition, mining noise affects communities in the immediate surroundings of mines.

Visual

The combination of the mining, agricultural, open land and communities, create the sense of place for the study area. It comprises a variety of land uses common to the sub-region resulting in a landscape that exhibits little positive character, due to major evidence of alteration and degradation of its original natural features. The resultant sense of place is weak and of mixed character.

The proposed Project occurs in landscape rated low in visual resource value. The development of the WRDs within the MRA and immediately adjacent to current mining activities, will not cause major changes to the existing mixed character of the landscape

Heritage/cultural and palaeontological resources

According to the SAHRIS Palaeo sensitivity, the area proposed for development is underlain by sediments of zero palaeontological sensitivity. As such, it is very unlikely that the proposed establishment of additional waste rock storage will impact on significant palaeontological heritage and no further assessment of impacts to palaeontological heritage is recommended.

In the assessment completed by Pistorius (2009) for the Tharisa Mine, it is noted that the following heritage resources that exist within the mine area: Stone walled settlements which date from the Late Iron Age; Historical structures such as farmhouses with outbuildings, agricultural infrastructure and the van Rensburg School (now called the Retief Primary School); At least six graveyards as well as objects with heritage significance such as outdated and discarded agricultural implements.
None of these known sites is anticipated to be impacted by the proposed creation of waste rock storage areas.

Socio-Economic

The Tharisa Mine is located in the Bojanala District Municipality and Rustenburg Local Municipality of the North West Province. The nearest formal towns to the mine are the towns of Marikana and Mooinooi, located approximately 4 km north west and 6 km south east of the Tharisa Mine, respectively. Smaller communities such as Lapologang village (480 m south of West Pit), Mmaditlhokwa/Silver City (immediately north of West Pit) and Buffelspoort (450 m south of the N4) are located in close proximity to the mine. Various other clusters of land dwellers/informal settlements are in the located in the general vicinity as well.

The District Municipality can largely be classified as rural with very low population densities that make the provision of basic services very difficult and expensive. It is estimated that the district has the following dwelling types: very formal- 19.24%, formal – 50.05%, informal- 29.45%, traditional- 0.58 % and other dwelling types- 0.67%. The Local Municipality has high proportional and actual number of households residing in informal dwellings, as compared to other local municipalities. Within the Local Municipality, it is estimated that as much as 30% of households are residing in informal dwellings.

Land Use

Based on the observations during the site assessment, the dominant land uses within the proposed WRD footprint areas are mining related activities. No agricultural activities were observed in the immediate vicinity of the footprint areas.

IMPACT ASSESSMENT

A summary of the potential significant impacts identified is provided in the table below. The level of residual risk after management or mitigation, associated with the proposed Project, is also estimated. A detailed impact assessment is provided in Appendix E.

Activity	Potential impact	Significance If not mitigated	Significance If mitigated
Establishing waste rock over backfilled portions	Loss and sterilisation of mineral resources	**Medium**	**Low**

Activity	Potential impact	Significance If not mitigated	Significance If mitigated
of the East Pit (East OG WRD and West OG WRD).			
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Simulated PM10 daily ground level concentrations (GLCs), with current mitigation measures in place, are in non-compliance with the NAAQS over a portion of the Maditlhokwa Community and to the north-east of the mining rights boundary, but at no other AQSRs. Annual average GLCs are within compliance with the NAAQS at all AQSRs, except at Maditlhokwa Community. Simulated PM2.5 daily ground level concentrations (GLCs), with current mitigation measures in place, are in non-compliance with the NAAQS for an area to the north-east of the mining rights boundary (mostly over the WRD), but not at any AQSRs. Over an annual average the GLCs are within the NAAQS at all AQSRs.	**High**	**Medium**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	PM10 daily GLCs, for unmitigated activities, are likely to exceed the NAAQS for a distance of up to 3.5 km from the mining rights boundary on the eastern side and for about 1 km to the west and north. $PM_{2.5}$ daily GLCs, for unmitigated activities, are likely to exceed the NAAQS for a few hundred meters outside mining rights boundary	**High**	**Medium**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Soil Compaction	**Medium**	**Very Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Impacts on Water Quality- In the absence of pollution containment measures the intensity of the potential impact is expected to be high	**High**	**Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Dewatering and loss of yield from I & AP boreholes in close proximity to mining developments (South of West Pit) due to maximum impact ZOI	**High**	**Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Dewatering and loss of yield from boreholes downstream of mining developments (Marikana Informal settlement) due to maximum impact ZOI	**High**	**Low**
Establishing waste rock over backfilled portions	Drawdown effect on the Sterkstroom due to open pit dewatering from East and West Pit.	**High**	**Low**

Activity	Potential impact	Significance If not mitigated	Significance If mitigated
of the East Pit (East OG WRD and West OG WRD).			
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Existence of hydraulic connections between the East Pit and Samancor Underground and groundwater leakage into East Pit.	**Medium**	**Very Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Contamination to groundwater and surface water systems due to Nitrate migration from current and new mine residue facilities	**Medium**	**Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss of floral habitat and diversity	**Medium**	**Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss of habitat and species diversity in the Transformed Habitat	**Medium**	**Very Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss of faunal habitat and species diversity	**Medium**	**Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss of faunal habitat and species diversity	**Medium**	**Very Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	The significance of construction phase noise impacts on nearby NSRs is considered medium (without mitigation). Due to the close proximity to the NSRs (assuming no NSRs are relocated), it is unlikely the significance will reduce unless the Mmaditlhokwa and Lapologang communities can be relocated.	**Medium**	**Medium**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	The significance of operation phase noise impacts on nearby NSRs is considered high	**High (H)**	**Medium**

Activity	Potential impact	Significance If not mitigated	Significance If mitigated
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	The significance of closure and decommissioning phase noise impacts on nearby NSRs (**assuming no NSRs are relocated**) is considered medium	**Medium**	**Medium**
All activities involving employment and procurement of goods and services	Procurement of local goods and services by the mine, employees and contractors will stimulate local business and create opportunities for entrepreneurship.	**Medium +**	**Medium +**

CLOSURE LIABILITY CALCULATION

The current financial closure liability associated with the proposed additional Waste Rock Storage facilities (as of July/August 2022) is R 61 452 044.40 (including VAT). This amount has been calculated at Current Value (CV) as of 13 October 2022.

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APPENDICES

ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
AEL	Atmospheric Emissions Licence, i.t.o. NEM:AQA
AQIA	Air Quality Impact Assessment
AQMP	Air Quality Management Plan
BIC	Bushveld Igneous Complex
BID	Background Information Document
BMR	Base Metals Refinery
CARA	Conservation of Agricultural Resources Act, 43 of 1983
CBA	Critical Biodiversity Area
CEC	Cation Exchange Capacity
DACE	North West Department of Agriculture, Conservation an Environment
DEDECT	North West Department of Economic Development, Environment, Conservation and Tourism
DFFE	Department of Environment, Forestry and Fisheries (formerly Department of Environmental Affairs (DEA))
DWS	Department of Water and Sanitation
DME	Department of Minerals and Energy
DMR	Department of Mineral Resources
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation, i.t.o. NEMA
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioners Association of South Africa
EC	Electrical Conductivity
ECA	Environment Conservation Act, 1989 (No. 73 of 1989)
EIA	Environmental Impact Assessment
EIA Regulations, 2014	Environmental Impact Assessment Regulations, 2014
EMPr	Environmental Management Programme
ESA	Ecological Support Areas
GDP	Gross Domestic Product
GN	Government Notice
GVA	Gross Value Added
HC	Hydrocarbon
HIA	Heritage Impact Assessment
I&AP	Interested and Affected Party
IAIAsa	International Association for Impact Assessment South Africa

Acronym / Abbreviation	Definition
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IFC	International Finance Corporation
IWUL	Integrated Water Use Licence
IWULA	Integrated Water Use Licence Application
IWWMP	Integrated Wastewater and Water Management Plan
Listing Notice 1, 2014	Environmental Impact Assessment Regulations Listing Notice 1, 2014
Listing Notice 2, 2014	Environmental Impact Assessment Regulations Listing Notice 2, 2014
Listing Notice 3, 2014	Environmental Impact Assessment Regulations Listing Notice 3, 2014
mamsl	Metres Above Mean Sea Level
MPRDA	Minerals and Petroleum Resources Development Act, 28 of 2002
MQF	Magaliesberg Quartzite Formation
NAAQS	National Ambient Air Quality Standard
NDCR	National Dust Control Regulations, 2013
NDP	National Development Plan 2030
NEMA	National Environmental Management Act, 107 of 1998
NEM: AQA	National Environmental Management: Air Quality Act, 57 of 2003
NEM: BA	National Environmental Management: Biodiversity Act, 10 of 2004
NEM:WA	National Environmental Management: Waste Act, 59 of 2008
NFA	National Forest Act, 84 of 1998
NFEPA	National Freshwater Ecosystem Priority Areas, 2011
NGP	New Growth Path (2011)
NHRA	National Heritage Resources Act, 25 of 1999
NPAES	National Protected Areas Expansion Strategy, 2008
NTS	Non-Technical Summary
NWA	National Water Act, 36 of 1998
PAH	Polycyclic Aromatic Hydrocarbon
PGM	Platinum Group Metals
PM	Particulate Matter
PMR	Precious Metals Refinery
Pr. Sci. Nat.	Professional Natural Scientist
PSDF	Provincial Spatial Development Framework
GDS	Quarter Degree Squares
RE	Remaining Extent
RLS	Rustenburg Layered Suite

Acronym / Abbreviation	Definition
RMF	Regional Maximum Flood
ROM	Run of Mine
S&EIA	Scoping and Environmental Impact Assessment
SACAD	South African Conservation Areas Database, 2017
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resource Information System
SAMRAD	South African Mineral Resources Administrative System
SANBI	South African National Biodiversity Institute
SANS	South African National Standards
SAWS	South African Weather Services
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SG	Surveyor General
SLR	SLR Consulting (South Africa) (Pty) Ltd
SVOC	Semi-volatile Organic Compound
TDS	Total Dissolved Solids
Tharisa	Tharisa Minerals (Pty) Ltd
TSF	Tailings Storage Facility
VOC	Volatile Organic Compound
WBPA	Waterberg-Bojanala Priority Area
WHO	World Health Organization
WRD	Waste Rock Dump
WUL	Water Use Licence, i.t.o. NWA
WULA	Water Use Licence Application

Tharisa Additional Waste Rock Storage Environmental Impact Assessment and Environmental Management Programme

INTRODUCTION

PROJECT BACKGROUND

Tharisa Minerals (Pty) Ltd (Tharisa) is an opencast mining operation that produces chrome and platinum group metal (PGMs) concentrates. The mine has been operational since 2008. The opencast mine is located on farms 342 JQ and Elandsdrift 467 JQ, south of the Marikana Town, in the North West Province.

Mining is undertaken in two mining sections, namely the East Mine and West Mine, using conventional open pit truck and shovel methods. The two mining sections are separated by the perennial Sterkstroom River and the D1325 (Marikana Road). Waste rock from the open pit areas is stockpiled on Waste Rock Dumps (WRDs) and some in-pit dumping of waste rock has taken place at the East Mine. Key existing mine infrastructure includes: haul roads, run-of-mine, a concentrator complex, various product stockpiles, topsoil stockpiles, WRDs, tailings storage facilities (TSFs) and supporting infrastructure such as offices, workshops, change house and access control facilities.

Tharisa holds the following environmental authorisations (EAs) and licenses:

- A Mining Right (MR) (Reference No.: 358 MR) issued by the Department of Minerals and Energy (DME) (currently the Department of Mineral Resources and Energy (DMRE)) on 19 September 2008.
- An approved Environmental Management Programme report (EMPr) (Reference No.: NW 30/5/1/2/3/2/1/358EM) issued by the DME (currently the DMRE) on 19 September 2008.
- An EA (Ref No.: NWP/EIA/159/2007) issued by the Northwest Department of Agriculture, Conservation and Environment (DACE) (currently the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT) on 23 October 2009.
- An EA (Ref No.: NWP/EIA/50/2011) issued by the Northwest DACE (currently the DEDECT) on 29 April 2015.
- An addendum to the Environmental Impact Assessment (EIA) and EMPr (Ref No.: NW/30/5/1/2/3/2/1/358EM) issued by the Department of Mineral Resources (DMR) (currently the DMRE) on 24 June 2015.
- An addendum to the EIA and EMPr (Ref No.: NW/30/5/1/2/3/2/1/358EM) issued by the DMR (currently the DMRE) on 14 Aug 2020 - Waste Water Treatment Plant.
- An addendum to the EIA and EMPr (Ref No.: NW/30/5/1/2/3/2/1/358EM) issued by the DMR (currently the DMRE) on 08 Aug 2021 – Fuel & Waste storage capacity increase.
- A Section 24G EA (Ref No.: NW/30/5/1/2/3/2/1/358EM) issued by the DMRE on 10 AUG 2021; and
- An amended Integrated Water Use Licence (IWUL) ((Licence No. 03/A21K/ABCGIJ/1468) issued by the Department of Water and Sanitation (DWS) in November 2020.

As part of its on-going mine planning, Tharisa has identified the need for additional waste rock storage on site. In this regard, Tharisa is making an application to DMRE for an integrated EA and update of the mine's current EMPr.

The following activities are now proposed:

- The expansion of the existing and approved Far West WRD 1 by a footprint of 109 ha. The expanded area will be referred to as the West Above Ground (OG) WRD. Portions of the West OG WRD will be located on backfilled areas of the West Pit; and
- The establishment of a waste rock dump (referred to as the East OG WRD) on backfilled portions of the East Pit. The proposed East OG WRD will cover an area of approximately 72 ha.

SLR Consulting (South Africa) (Pty) Ltd (SLR), an independent firm of Environmental Assessment Practitioners (EAPs), has been appointed by Tharisa to manage the Scoping and Environmental Impact Assessment (S&EIA) process required to inform the proposed Project and meet regulatory requirements.

SUMMARY OF AUTHORISATION REQUIREMENTS AND ENVIRONMENTAL PROCESS

The proposed Project will require an integrated EA and an amendment to Tharisa's current EMPr. The proposed Project includes listed activities under the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations, 2014[3] (published under Government Notice Regulation (GN R) 982 of 4 December 2014), (EIA Regulations, 2014), and waste management activities listed under the National Environmental Management Waste Act, 59 of 2008 (NEM:WA). Under both the EIA Regulations, 2014 and the NEM:WA, listed activities are prohibited from commencing until written authorisation is obtained from the competent authority, which in this case is the North West Province office of the DMRE. The project requires an integrated EA in terms of Section 24 of NEMA and Section 45 of NEM:WA from the North West Province office of the DMRE. In terms of the Section 102 of the Mineral and Petroleum Resources Development Act (MPRDA), an EMPr may not be amended or varied without the written consent of the Minister of Mineral Resources.

The MPRDA, NEMA and NEM:WA require that an applicant submit the relevant environmental reports required in terms of NEMA. The EIA Regulations, 2014 promulgated in terms of NEMA set out the assessment process and reporting requirements where authorisation is required. Prior to the commencement of the proposed Project the following is required:

- An amended EMPr in terms of Section 102 of the MPRDA from the Department of Mineral Resources and Energy (DMRE);
- An EA in terms of the NEMA for activities in Listing Notice 1 (GNR 983 of 2014) and Listing Notice 3 (GN R 985 of 2014) from the DMRE. The EIA Regulations being followed are Government Notice Regulation (GNR) 982 of 4 December 2014. Listed activities triggered as a result of the project are outlined in Section 3.1; and
- A Waste Management Licence in terms of the National Environmental Management: Waste Act, 59 of 2008 (NEM:WA) for waste activities in Category B (GN R 921 of 2013).

A Scoping and Environmental Impact Assessment (S&EIA) process is required to inform the proposed Project and meet regulatory requirements listed above.

[3] EIA Regulations means the Environmental Impact Assessment Regulations, 2014, published under Government Notice No. R. 982 in Government Gazette No. 38282 of 4 December 2014, as amended by GN R. 619 of 2016 in Government Gazette No. 40041 of 03 June 2016; GN R. 326 in Government Gazette No. 40772 of 7 April 2017; GN R. 706 in Government Gazette No. 41766 of 13 July 2018; GN R. 599 in Government Gazette No. 43358 of 29 May 2020; GN R. 517 in Government Gazette No. 44701 of 11 June 2021; and GN R. 1816 in Government Gazette No. 45999 of 03 March 2022.

In addition, the proposed Project also requires authorisation from the Department Water and Sanitation (DWS) for specific water uses listed under Section 21 of the NWA. This Report does not address the requirements of a water use licensing process. This will be handled as part of a separate process with the DWS.

SLR Consulting (South Africa) (Pty) Ltd (SLR), an independent firm of Environmental Assessment Practitioners (EAPs), has been appointed by Tharisa to manage the S&EIA process for the proposed Project.
This S&EIA process does not address occupational health and safety legislative requirements.

CONDITIONS OF THE ACCEPTANCE OF THE SCOPING REPORT

The Department of Mineral Resources and Energy accepted the scoping report on 12 October 2022 with the following conditions:

- The expansion of the Far waste rock dump which is closer to the community will only be considered once the neighbouring community of Mmaditlhoka village has been relocated away from the site.
- For the duration that the community is still located where it is currently, the expansion of the far waste rock dump should be put on hold from the mine's operation due to the environmental and social impacts already affecting the said community.

The EIA and EMPr Report was made available for review and comment for a period of 30 days (26 October 2022 to 25 November 2022) at the following venues: Lapologang Piet Retief School; Mmadikhlokwa Community Hall; Piet Retief Primary school; Rustenburg Community Centre; Rustenburg Local Municipality; Bokamoso Community Hall and the SLR data-free website https://slrpublicdocs.datafree.co/en/public-documents/Tharisa-WRD and website: **https://www.slrconsulting.com/en/public-documents/public-documents/Tharisa-WRD**. This report has been updated to include comments and responses received during the review period.

For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time due to pending relocation processes. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process due to pending relocation processes. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available.

OBJECTIVES OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

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

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

- Determine the nature, significance, consequence, extent, duration, and probability of the impacts occurring to inform identified preferred alternatives.
- Determine the degree to which these impact, can be reversed, may cause irreplaceable loss of resources, and can be avoided, managed, or mitigated.
- Identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment.
- Identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity.
- Identify suitable measures to manage, avoid or mitigate identified impacts.
- Identify residual risks that need to be managed and monitored.

STRUCTURE OF THIS REPORT

This document has been prepared strictly in accordance with the DMRE EMPr Report template format and was informed by the guidelines posted on the official DMRE website, which is in accordance with the requirements of the MPRDA. In addition, this report complies with the requirements of the EIA Regulations, 2014. The table below provides a summary of the requirements, with cross references to the report sections where these requirements have been addressed.

Table 1: Report requirements

EMPr report requirement as per the DMR template	EMPr report requirements as per the 2014 NEMA regulations	Reference in the EMPr report
Part A of DMR report template	**Appendix 3 of the NEMA regulations**	**Section/Appendix**
The EAP who prepared the report	Details of the EAP who prepared the report	Section 1.1
Expertise of the EAP	Details of the expertise of the EAP, including curriculum vitae	Section 1.1, 1.2and Appendix A
Description of the property	The location of the activity, including - the 21 digit Surveyor General code of each cadastral land parcel. Where available the physical address and farm name. Where the required information is not available, the coordinates of the boundary of the property or properties	Section 2
Locality plan	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 a linear activity, a description, and coordinates of the corridor in which the proposed activity or activities is to be undertaken or on land where the property has not been defined, the coordinates within which the activity is to be undertaken	Map 2
Description of the scope of the proposed overall activity	A description of the scope of the proposed activity, including all listed and specified activities triggered	Section 3

EMPr report requirement as per the DMR template	EMPr report requirements as per the 2014 NEMA regulations	Reference in the EMPr report
Description of the activities to be undertaken	A description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for and a description of the associated structure and infrastructure related to the development	Section 3.2
Policy and legislative context	A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context	Section 4
Need and desirability of the proposed activity	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 location	Section 5
Motivation for the preferred development footprint within the approved site including	A motivation of the preferred development footprint within the approved site including	Section 7
A full description of the process followed to reach the proposed development footprint within the approved site	A full description of the process followed to reach the proposed development footprint within the approved site	Section 5 and 7
Details of the development footprint alternatives considered	Details of all the alternatives considered	Section 7.1
Details of the public participation process followed	Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs	Section 8
Summary of issues raised by IAPs	A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them	Section 8.1
Environmental attributes associated with the development footprint alternatives	The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	Section 9
Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts including the degree of the impacts	The impacts and risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts can be reversed, may cause irreplaceable loss of resources and can be avoided, managed and mitigated	Section 10and Appendix E

EMPr report requirement as per the DMR template	EMPr report requirements as per the 2014 NEMA regulations	Reference in the EMPr report
Methodology used in determining the nature, significance, consequence, extent, duration and probability of potential environmental impacts and risks	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks	Section 11
The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternative will have on the environment and the community that may be affected	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	Section 12, 17 and Appendix E
The possible management actions that could be applied and the level of risk	The possible management actions that could be applied and level of residual risk	Table 43
Motivation where no alternative sites were considered	If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such	Section 14
Statement motivating the alternative development location within the overall site	A concluding statement indicating the preferred alternatives, including preferred location within the approved site	Section 15
Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (in respect of the final site layout) through the life of the activity	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structure and infrastructure will impose on the preferred location through the life of the activity including a description of all environmental issues and risks that were identified during the environmental impact assessment process and 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 management actions	Section 16
Assessment of each identified potentially significant impact and risk	An assessment of each identified potentially significant impact and risk including cumulative impacts, the nature, significant and consequence of the impact and risk, the extent and duration of the impact and risk, the probability of the impact and risk occurring, the degree to which the impact can be reversed, the degree to which the impact and risk may cause irreplaceable loss of a resources and the degree to which the impact and risk can be mitigated.	Section 12, 17 and Appendix E

EMPr report requirement as per the DMR template	EMPr report requirements as per the 2014 NEMA regulations	Reference in the EMPr report
Summary of specialist reports	Where applicable the summary of the findings and recommendations of any specialist report complying with Appendix 6 of these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report	Section 18
Environmental impact statement	An environmental impact statement which contains a summary of the key findings of the environmental impact assessment, a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers and a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives	Section 19
Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation	Section 20
Final proposed alternatives	The final proposed alternatives which respond to the impact management actions, avoidance, and management actions identified through the assessment	Section 21
Aspects for inclusion as conditions of authorisation	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	Section 22
Description of any assumptions, uncertainties and gaps in knowledge	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and management actions proposed	Section 23
Reasoned opinion as to whether the proposed activity should or should not be authorised	Reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation	Section 24
Period for which environmental authorisation is required	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised	Section 25
Undertaking	An undertaking under oath or affirmation by the EAP in relation to the correctness of the information provided in the reports, the inclusion	Section 26

EMPr report requirement as per the DMR template	EMPr report requirements as per the 2014 NEMA regulations	Reference in the EMPr report
	of comments and inputs from stakeholders and I&Aps, the inclusion of inputs and recommendations from the specialist reports where relevant and 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	
Financial provision	Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts	Section 26
Deviation from the approved scoping report and plan of study	An indication of any deviation from the approved scoping report, including the plan of study, including any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and a motivation for the deviation	Section 28
Other information required by the competent authority	Any specific information required by the competent authority.	Section 29
Other matter required in terms of section 24(4)(a) and (b) of the Act	Any other matter required in terms of section 24(4)(a) and (b) of the Act	Section 29.2
Part B of the DMR report template	**Appendix 4 of the NEMA regulations**	**Section/Appendix**
Details of EAP	Details of the EAP who prepared the EMPr and the expertise of that EAP to prepare the EMPr, including a curriculum vitae	Section 30.1
Description of the aspects of the activity	A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description	Section 30.2
Composite map	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	Section 31
Description of impact management objectives including management statements	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 planning and design, pre-construction activities, construction activities, rehabilitation of the environment after construction and where applicable post closure; and where relevant, operation activities	Section 32
The determination of closure objectives		Section 32.1

EMPr report requirement as per the DMR template	EMPr report requirements as per the 2014 NEMA regulations	Reference in the EMPr report
The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity	-	Section 32.2
Potential acid mine drainage	-	Section 32.3
Steps taken to investigate, assess and evaluate the impact of acid mine drainage	-	Section 32.4
Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage	-	Section 32.5
Measures that will be put in place to remedy any residual or cumulative impact that may result from acid mine drainage	-	Section 32.6
Volumes and rate of water use required for the mining	-	Section 32.7
Has a water use licence been applied for?	-	Section 32.8
Impacts to be mitigated in their respective phases	-	Section 32.9
Impact management outcomes	A description and identification of impact management outcomes required for the aspects contemplated in paragraph	Section 33
Impact management actions	A description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes be achieved, and must, where applicable, include actions to avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; comply with any prescribed environmental management standards or practices; comply with any applicable provisions of the Act regarding closure, where applicable comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable	Section 34
Financial provision		Section 35

EMPr report requirement as per the DMR template	EMPr report requirements as per the 2014 NEMA regulations	Reference in the EMPr report
Mechanism for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon	The method of monitoring the implementation of the impact management actions	Section 36
	The frequency of monitoring the implementation of the impact management actions	
	An indication of the persons who will be responsible for the implementation of the impact management actions	
	The time periods within which the impact management actions must be implemented	
	The mechanism for monitoring compliance with the impact management actions	
	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations	
Environmental Awareness Plan	An environmental awareness plan describing the manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work; and risks must be dealt with in order to avoid pollution or the degradation of the environment	Section 37
Specific information required by the competent authority	Any specific information that may be required by the competent authority	Section 38
Undertaking	-	Section 39

PART A – SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1. CONTACT PERSON AND CORRESPONDENCE ADDRESS

The details of the independent EAP that prepared the report is provided in the section below.

1.1 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

SLR has been appointed as the independent EAP to undertake the S&EIA for the proposed Project. The details of the EAP project team that that were involved in the preparation of this S&EIA report are provided in Table 2 below. The qualifications and experience of the project team are included in Table 2.

Table 2: Details of the Environmental Assessment Practitioner

General		
Organisation	SLR Consulting (South Africa) (Pty) Ltd	
Postal Address	PO BOX 1596, Cramerview, 2060	
Tel No.	(011) 467 0945	
Name	Role and Tasks	Email
Natasha Smyth	Project Director, reviewer, and Technical Support (EAPASA [4]Registration: 2020/3035) - Management of the S&EIA process, including process review.	nsmyth@slrconsulting.com
Rob Hounsome	Project Director - Report and process reviewer	
Chané Coetzee	Project Manager (EAPASA Registration: 2019/1441) - Management of the S&EIA process, including process review, specialist study review and report compilation	ccoetzee@slrconsulting.com

SLR has no vested interest in the proposed Project other than contractually agreed payment for consulting services rendered as part of the S&EIA process. An undertaking by SLR declaring its independence, as required in terms of the Environmental Impact Assessment Regulations, 2014 (Government Notice [GN R] 982 of 2014) (EIA Regulations, 2014) promulgated in terms of the National Environmental Management Act, 1998 (No. 107 of 1998), is provided in Section 39.

1.2 QUALIFICATIONS AND EXPERIENCE OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

Natasha Smyth, the Project Director, holds an Honours degree in Geography and Environmental Management and has approximately 13 years of relevant experience. She has managed and assisted in a wide range of projects for major and small-scale minerals developments throughout South Africa, as well as in Namibia and Zambia. Her areas of expertise include EIAs, Environmental Compliance and Monitoring and Environmental Due Diligence. She is a member of the International Association for Impact Assessment (IAIA). She is also a Registered EAP with Environmental Assessment Practitioners Association of South Africa ((EAPASA) (EAPASA Registration: 2020/3035)).

Rob Hounsome, the Project Director, and reviewer is the Managing Director of the SLR Group of Companies in Africa. He has 28 years of wide-ranging experience in Environmental and Social advisory and consulting in 41 countries across the globe. Rob has a particular interest in advising on complex environmental and social issues in developing countries and in assessing, monitoring, and managing the impacts of development directly, indirectly, and cumulatively on the natural environment and people. His experience has ranged from

[4] Environmental Assessment Practitioners Association of South Africa

supporting National Government and International Agencies with the development and application of customised environmental planning and assessment tools through to completing ESDD's and ESIA's in accordance with requirements of National Governments, Industry Associations, and various funding agencies including major International Finance Institutes, Equator Principle Banks, and/or PE and Legal Firms. In addition, he has completed many research and consultancy technical assignments in the fields of Climate Change and Pollution & Waste. Rob has worked extensively in the Mining, Oil & Gas, Manufacturing/Industrial and Infrastructure sectors and with finance clients.

Rob has lectured and supervised Masters-level research students at Universities in South Africa, Sweden and the U.K., has facilitated multiple Environmental capacity building programmes across Africa and has presented keynote addresses to a number of international conferences on diverse subjects such as Environmental Assessment, Climate Change, Sustainability and Waste.

Chané Coetzee, the Project Manager, holds an Honours degree in Geography and has approximately 10 years of relevant experience. She has experience in coordinating and managing various Environmental and Social studies in the mining, infrastructure, and energy sectors. Her key experience includes the management and compilation of local and international Environmental and Social Impact Assessments and various Management Plans, in compliance with in-country and international standards.

Projects that she has been engaged in are located in South Africa, Zimbabwe, Democratic Republic of Congo, Mozambique, Mali, and Ghana. She is also a Registered EAP with the EAPASA (EAPASA Registration: 2019/1441).

2. DESCRIPTION OF THE PROPERTY

This section provides details of the project location and properties.

2.1 OVERVIEW

Tharisa is an opencast mining operation that produces chrome and PGMs concentrates. The mine has been operational since 2008. The opencast mine is located on farms 342 JQ, Rooikoppies 297 JQ and Elandsdrift 467 JQ, south of the Marikana Town, in the North West Province of South Africa (see Figure 1 and Figure 2 for regional and local setting maps, respectively).

Mining is undertaken in two sections, namely the East Mine and West Mine, using conventional open pit truck and shovel methods. The two mining sections are separated by the perennial Sterkstroom River and the D1325 (Marikana Road). Waste rock from the open pit areas is stockpiled on WRDs. Some in-pit dumping of waste rock has taken place at the East mine. Key existing mine infrastructure includes: haul roads, run-of-mine, a concentrator complex, various product stockpiles, topsoil stockpiles, WRDs, TSFs and supporting infrastructure such as offices, workshops, change house and access control facilities.

Tharisa holds existing EAs and licenses under the MPRDA, the NEMA and the NWA. Tharisa holds an EIA and EMPr approved in terms of the MPRDA and the NEMA in 2008 (Metago, 2008). The approved EMPr for Tharisa Mine was amended in 2014 (SLR, 2014) to cater for changes to the pit, TSF and WRD's; a chrome sand drying plant and other operational and surface infrastructure changes. The mine also holds an amended IWUL approved in terms of the NWA.

As part of on-going mine planning, Tharisa has identified the need for additional waste rock storage on site (referred to as the proposed Project). In this regard, Tharisa is making an application to the DMRE for an integrated EA and update of the mine's EMPr and is proposing the following:

- The expansion of the existing and approved Far West WRD 1 by a footprint of 109 ha. The expanded area will be referred to as the West Above Ground (OG) WRD. Portions of the West OG WRD will be located on backfilled areas of the West Pit; and
- The establishment of a waste rock dump (referred to as the East OG WRD) on backfilled portions of the East Pit. The proposed East OG WRD will cover an area of approximately 72 ha.

2.2 DESCRIPTION AND LOCATION OF ACTIVITY

This Section provides details of the project location and properties.

2.2.1 Property description

A description of the properties on which the Tharisa Mine and proposed Project are located is provided in Table 3 below.

Table 3: Description of the property

Description	Details
Farm name	• Existing mining operations - 342 JQ and Elandsdrift 467 JQ. • proposed Project - 342 JQ, within boundary of existing Mining Right Area.

Description	Details
Application area (ha)	The existing Mining Right Area covers an area of approximately 5 516 ha. The total application area is approximately 181 ha. Of the total application area approximately 1 ha will be located on undisturbed mining areas. The remaining application area will be located within existing disturbed areas.
Magisterial district	The proposed Project is located within Bojanala District Municipality, the Rustenburg Magisterial District and the Rustenburg Local Municipality.
Distance and direction from nearest town	Tharisa Mine is located approximately 4 km to the south of Marikana Town, in the North West Province.
Distance and direction from nearest communities (Map 2)	• Bokamoso community settlement located east of the Tharisa mine. • Mmaditlhokwa is located immediately north of the West Pit. • Lapologang is located 480 m south of the West Pit. • Private landowners (Buffelspoort) are located approximately 450 m south of the N4.
21-digit Surveyor General (SG) Code for each farm portion	The relevant Surveyor General Codes are tabulated below. Relevant SG codes: East Above Ground (OG) Waste Rock Dump • T0JQ00000000034200152 • T0JQ00000000034200138 • T0JQ00000000034200096 • T0JQ00000000034200183 • T0JQ00000000034200218 • T0JQ00000000034200219 • T0JQ00000000034200220 • T0JQ00000000034200184 • T0JQ00000000034200186 • T0JQ00000000034200251 West Above Ground (OG) Waste Rock Dump • T0JQ00000000034200012 • T0JQ00000000034200150 • T0JQ00000000034200109 • T0JQ00000000034200011 • T0JQ00000000034200358 • T0JQ00000000034200357 • T0JQ00000000034200190 • T0JQ00000000034200029 • T0JQ00000000034200030 • T0JQ00000000034200335 • T0JQ00000000034200336 • T0JQ00000000034200105 • T0JQ00000000034200118 • T0JQ00000000034200013 • T0JQ00000000034200117 • T0JQ00000000034200048 • T0JQ00000000034200047 • T0JQ00000000034200041

Description	Details
	• T0JQ00000000034200334 • T0JQ00000000034200019 • T0JQ00000000034200266 • T0JQ00000000034200318 • T0JQ00000000034200213 • T0JQ00000000034200212 • T0JQ00000000034200262 • T0JQ00000000034200259 • T0JQ00000000034200026 • T0JQ00000000034200028 • T0JQ00000000034200027 • T0JQ00000000034200025 • T0JQ00000000034200074 • T0JQ00000000034200016 • T0JQ00000000034200214 • T0JQ00000000034200015 • T0JQ00000000034200206
Water catchment and management area	• Crocodile River Basin: lower Sterkstroom of the Upper Crocodile Sub-Water Management Area (Sub-WMA). • A21K quaternary catchment.

2.3 LOCALITY PLAN

This Section provides regional location and site layout plans.

The regional and local settings of the Tharisa Mine are illustrated in Map 1 and Map 2, respectively. The location and layout of the project components are illustrated in Map 4.

3. DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY

This Section identifies the listed and specified activities applicable to the proposed Project and describes the activities that would be undertaken as part of the proposed Project. It has been compiled using information provided by the Tharisa Project Team and preliminary project-specific specialist input.

3.1 LISTED AND SPECIFIED ACTIVITY AND DESCRIPTION OF ACTIVITY

The main project activities, identified as listed activities in terms of NEMA and the EIA Regulations, 2014, as well as the associated or specified activities, identified as listed waste management activities in terms of NEM:WA, are provided in Table 4 below. The integrated EA and waste management licence application submitted for the proposed Project applied for the listed activities outlined below.

Table 4: Proposed Project activities and associated listed activities

Main project activity	Aerial extent of the activity (ha)	Listed activity (mark with an x)	Applicable listing notice, listed activity number and activity description	Applicable waste management authorisation
Extension of a previously approved WRD (West OG WRD)	Approximately 109 ha (108 ha within a disturbed area)	X	**NEMA EIA GN R. 983 of 2014: Listing Notice 1[5] Activity 27** The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for - (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	**GNR 921 of 2013: Category B, Activity 7**: The disposal of any quantity of hazardous waste to land. **Relevance:** The waste rock may be considered hazardous material. **GNR 921 of 2013: Category B, Activity 10**: The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity). **Relevance:** Waste rock dumps will be constructed for the storage of waste rock. **GNR 921 of 2013: Category B, Activity 11**: The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the MPRDA. **Relevance:** The proposed West Above Ground (OG) WRD, East Above Ground
Extension of a previously approved WRD (West OG WRD)	Approximately 109 ha	X	**NEMA EIA GN R. 983 of 2014: Listing Notice 1 Activity 21D:** Any activity including the operation of that activity which requires an amendment or variation to a right or permit in terms of section 102 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity contained in this Listing Notice or in Listing Notice 3 of 2014, required for such amendment. **Relevance:** The proposed Project requires an amendment of the approved EMPr to cater for all the proposed Project components.	
Establishing waste rock over backfilled portions of the East (East OG WRD)	Approximately 72 ha			
Extension of a previously approved WRD (West OG WRD)	Approximately 109 ha	x	**NEMA EIA GN R. 983 of 2014: Listing Notice 1 Activity 34:** The expansion of existing facilities or	

[5] "Listing Notice 1" means Environmental Impact Assessment Regulations Listing Notice 1 of 2014, published under Government Notice No. R. 983 in Government Gazette No. 38282 of 4 December 2014, as amended by Government Notice No. 327 in Government Gazette No. 40772 of 7 April 2017, Government Notice No. 706 in Government Gazette No. 41766 of 13 July 2018 and Government Notice No. 517 in Government Gazette No. 44701 of 11 June 2021.

Main project activity	Aerial extent of the activity (ha)	Listed activity (mark with an x)	Applicable listing notice, listed activity number and activity description	Applicable waste management authorisation
Establishing waste rock over backfilled portions of the East (East OG WRD)	Approximately 72 ha		infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent, or pollution, excluding – where the facility, infrastructure, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies the expansion of existing facilities or infrastructure for the treatment of effluent, wastewater, polluted water or sewage where the capacity will be increased by less than 15 000 cubic metres per day; or the expansion is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will be increased by 50 cubic meters or less per day. **Relevance:** The extension of West Above Ground (OG) WRD and the establishment of the East Above Ground (OG) WRD require an amendment to the existing IWUL.	(OG) WRD are considered residue stockpiles.

Main project activity	Aerial extent of the activity (ha)	Listed activity (mark with an x)	Applicable listing notice, listed activity number and activity description	Applicable waste management authorisation
Extension of a previously approved WRD (West OG WRD)	Approximately 109 ha	x	**NEMA EIA GN R. 985 of 2014: Listing Notice 3[6], Activity 12:** The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. <u>North West:</u> • World Heritage Sites; core of biosphere reserve; or sites or areas identified in terms of an international convention. • A protected area including municipal or provincial nature reserves as contemplated by NEMPAA or other legislation. • All Heritage Sites proclaimed in terms of National Heritage Resources Act, 1999 (Act No. 25 of 1999). • Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority. • Sensitive areas as identified in an environmental management framework as	
Establishing waste rock over backfilled portions of the East (East OG WRD)	Approximately 72 ha			

[6] "Listing Notice 3" means Environmental Impact Assessment Regulations Listing Notice 3 of 2014 published under Government Notice No. R. 985 in Government Gazette No. 38282 of 4 December 2014 as amended by Government Notice No. 324 in Government Gazette No. 40772 of 7 April 2017, Government Notice No. 706 in Government Gazette No. 41766 of 13 July 2018 and Government Notice No. 517 in Government Gazette No. 44701 of 11 June 2021.

Main project activity	Aerial extent of the activity (ha)	Listed activity (mark with an x)	Applicable listing notice, listed activity number and activity description	Applicable waste management authorisation
			contemplated in chapter 5 of the Act and as adopted by the competent authority. • Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland. **Relevance:** The proposed Project is located within a critical biodiversity area.	

3.2 DESCRIPTION OF ACTIVITIES

This Section provides information on the current and proposed activities at the mine.

3.2.1 Mining method

Information in the following section was sourced from the approved 2008 EIA and EMPr (Metago, 2008) and 2014 EIA and EMPr (SLR, 2014).

Tharisa currently operates the Tharisa mine, producing chrome and platinum group metals (PGM) concentrates and has been operational since 2008. Mining is undertaken in two sections, namely the East Mine and West Mine, using conventional open pit truck and shovel methods. The two mining sections are separated by the perennial Sterkstroom River and the D1325 (Marikana Road).

The mining method at Tharisa comprises a standard open pit truck and shovel method. Access to the mining face is by means of haul roads and boxcuts with ramps. Steady state open pit dimensions will differ between the east and west sections because of the varying dip of the target ore body. In the western section, the dimensions are expected to be 360 m wide, 1 km in length along the outcrop with a final high wall averaging at approximately 180 m. On the eastern section, the dimensions are expected to be 580 m wide, 1 km in length along the outcrop with a final high wall averaging at approximately 180 m. The general mining direction is north.

The mineral processing operation comprises a concentrator complex which includes the Vulcan optimisation plant. The concentrator complex caters for two streams, namely PGM's and chrome, to accommodate the different characteristics of the ore seams that are mined and the Vulcan is for fine chrome recovery. The target production figures for the plants are approximately 40 000 tonnes of PGM concentrate per year; and approximately 1.5 million tonnes of chrome concentrate per year. Key activities associated with the mining and method are included in Table 5 below.

Table 5: Mining and Processing Related Activities at Tharisa (SLR, 2014; Metago, 2008)

Activity		Description	
Mining	Method	Tharisa is an opencast mine, which comprises two sections namely the East Mine and West Mine. The mining method at Tharisa comprises a standard open pit truck and shovel method.	
	Access to Ore	Access to the mining face is by means of haul roads and boxcuts with ramps. Steady state open pit dimensions will differ between the east and west sections because of the varying dip of the target ore body. In the western section, the dimensions are expected to be 360 m wide, 1 km in length along the outcrop with a final high wall averaging at approximately 180 m. On the eastern section, the dimensions are expected to be 580 m wide, 1 km in length along the outcrop with a final high wall averaging at approximately 180 m. The general mining direction is north.	
	Removal of topsoil	All topsoil is dozed into stockpiles along the low wall (outcrop) sides of the open pits. Topsoil is stockpiled separately for use in rehabilitation	
	Drilling and blasting	Once the topsoil is removed the area is drilled as per the drill design. Charges are designed to prevent excessive ground vibration, airblast and fly rock. The remaining waste rock and the ore is drilled and blasted together.	
	Removal of waste rock	The removal of waste rock above the ore body is undertaken as a bulk operation by load and haul with large equipment. The material is placed on waste rock dumps.	
	Removal of ore	Run of mine ore (ROM) is stockpiled according to ROM type, prior to being sent to the concentrator plant for processing.	
Mineral Processing	Concentrator plant	Crushing and screening	Chrome ROM material will be tipped into a receiving bin for crushing by a primary jaw crusher. The crushed material is then conveyed to the secondary jaw crusher circuit. Oversized material from the secondary circuit is returned to the primary crusher feed conveyor for reprocessing. Correctly size material from the secondary crushing process will be separated into different fractions using a double deck screen. The lumpy and chips from the screening process will report to the DMS section, while the undersize will report to a mill feed stockpile for milling prior to spiral plant treatment. The PGM plant crushing facility will consist of a primary gyratory crusher and a secondary cone crusher. Material is discharged directly into the primary gyratory crusher to be crushed. Following primary crushing the material will be stored in a stockpile. Ore will be extracted from the stockpile by feeders onto a conveyor for transport to a sizing screen. The crushed material is screened with the oversize material reporting to the secondary crusher for further crushing (closed circuit). Undersize from the screen will report to a silo for storage prior to milling.
		Dense Media Separation (DMS) - chrome plant only	The chrome lumpy material will be treated in a DMS plant, while the chip fraction will be treated in a cyclone plant. A drum gives good separation at the lumpy size fraction as the cyclone does for the smaller chip fraction. The recovered lump and chip material will be conveyed to separate stockpiles, while the discard (float) material is transported to a discard bin for removal to the waste rock stockpile.

Activity		Description	
		Milling	The Chrome undersize material from the secondary screening process will be fed at a controlled rate to a ball mill for grinding. Product from the ball mill will be screened with oversize returning to the grinding circuit and undersize reporting to the spirals plant PGM ore from the silo will be fed onto the mill feed conveyor by three variable speed feeders. The primary ball mill will receive both feed material, as well as mill water for flushing the ore into the mill. Material from the mill discharges onto a screen where the oversize will be collected in a bin and the undersize pumped through a cyclone. The cyclone overflow will be filtered with the oversize material being recycled and the undersize material reporting to a screen together with the cyclone sinks. Undersize material from the screen will report to the agitated rougher flotation feed tank, while the oversize material reports to the secondary mill feed.
		Floating – PGM plant only	The flotation plant will consist of a rougher, cleaner, re-cleaner and scavenger section. Chemicals are added at the various stages to the feed material, allowing the PGE's to attach to the foam. In some cases, a depressant may be required to prevent other minerals from attaching to the carrier-bubbles. Underflow material will be rejected to the PGE spirals plant whilst the concentrate is pumped to the product thickener for dewatering. The PGE concentrate is pumped to a storage tank for loading by truck.
		Spiral	The PGM underflow material from the floatation section is pumped to cyclones with the underflow gravitating into the spirals and the overflow reporting to the tailing's thickener. Two streams will leave the spirals plant; a product stream and tailings. The product stream will be dewatered and stockpiled (8000t). Water will be recovered from these stockpiles and will be returned to the PGM plant for water and product recovery. Tailings will be dewatered in the PGE tailings thickener for water recovery, with the underflow reporting to the tailings dam. Approximately 40 000 tonnes of PGM concentrate will be produced per year. The chrome material from the grinding section will be pumped to cyclones with the underflow gravitating into the spirals and the overflow reporting to the tailing's thickener. Two streams will leave the spirals plant; a product stream (Met and Chem grade chromite) and tailings. The product stream will be pumped to four cyclones to produce two fine material stockpiles (8000t met grade and 2000t chem. grade). Drainage from these stockpiles will be returned to the MG1 plant for water and product recovery. Tailings will be dewatered in the tailing's thickener for water recovery, while the underflow is pumped to the tailings dam. Approximately 1.5 million tonnes of chrome concentrate will be produced per year.
Dispatch	Method	Railway transportation of product is the preferred option for the mine. The nearest railway is to the north of the mine at the Marikana Siding, the siding has been upgraded in consultation with Transnet to cater for Tharisa's requirements. Product is transported via 30-tonne trucks with an estimated rate of 320trucks/day for chrome concentrate and 8trucks/day for PGM. Chrome will be dispatched to Richards Bay via the Marikana Railway siding and/or the N4. PGM will be dispatched to smelters in the region.	

Activity		Description
Waste disposal	Tailings dam	Slurry from the secondary rougher flotation process will be discarded as tailings. It will be thickened and pumped to a tailings facility for deposition by means of conventional spigotting. Tailings production will be approximately 4 million tonnes per year. Process water from the tailings dam will be recycled to the plant for use in the process. After the underground mine is operational the new arisings are planned to be backfilled underground.
Rehabilitation	Method	Rehabilitation is concurrent with mining. Waste rock/overburden will be used to backfill voids where required. Overburden material will be used to cater for any settlement. Once the backfill material has settled, topsoil will be placed on top of the overburden and vegetation will be re-established.

3.2.2 Existing and pending waste rock dumps at Tharisa

With reference to the approved 2008 EIA and EMPr (Metago, 2008) and 2014 EIA and EMPr (SLR, 2014), waste rock from the open pit mining operations has been used in the construction of the TSF containment walls, mine haul roads and as general backfill for various platforms. These uses would continue where required. Waste rock will also be used in the backfilling of the open pits on an advancing front basis once the pits have been developed sufficiently. Excess waste rock is stored in waste rock dumps. The approved EIA and EMP report (Metago, 2008) made provision for four waste rock dumps:

- Far East WRD (made up of East WRD 1 and East WRD 2);
- West WRD 1;
- East WRD; and
- Far West WRD 1.

In addition, Green Gold Group (Pty) Ltd (GGG) (GGG, June 2019), submitted an environmental authorisation application for the extension of the West WRD 1. Various decisions are still pending. Refer to Map 4 for the location of the West WRD 1.

3.2.3 Description of proposed Project

The nature of the pits at Tharisa is such that there is continually more waste rock generated than capacity available in the worked-out areas of the pits and the balance must be dumped on surface WRDs. Additional waste rock handling and storage capacity is therefore required to accommodate the waste rock from the open pit operations. As part of its on-going mine planning, Tharisa has identified the need for additional WRD storage on site. In this regard, Tharisa is making application to the DMRE for an integrated EA and update of the mine's EMPr and is proposing the following:

- The expansion of the existing and approved Far West WRD 1 by a footprint of 109 ha. The expanded area will be referred to as the West Above Ground (OG) WRD. Portions of the West OG WRD will be located on backfilled areas of the West Pit; and
- The establishment of a waste rock dump (referred to as the East OG WRD) on backfilled portions of the East Pit. The proposed East OG WRD will cover an area of approximately 72 ha.

The proposed Project forms part of the existing approved operations and as such the development of the proposed WRD's will not generate any additional employment opportunities.

3.2.4 Proposed waste rock dumps

The details of the WRD design are provided in the section below.

3.2.4.1 Design of the proposed waste rock dumps

The management of residue stockpiles and deposits must be undertaken in accordance with Regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits (GN R. 632 of 2015). In this regard, the design features of the proposed WRD's are presented in Table 6. The location of the proposed WRD's is illustrated in Map 4.

Table 6: Design Features of the waste rock dumps

Feature	Detail
Physical dimensions	Height: Approximately 70 m (applies to all proposed WRD's) Bench height: Approximately 15 m Footprint: • West OG WRD: Approximately 109 ha; and • East OG WRD: Approximately 72 ha. Maximum storage capacity: • West OG WRD: Approximately 35.31 million m^3; and • East OG WRD: Approximately 26.26 million m^3.
Chemical properties	With reference to the geology, the waste rock material comprises pyroxenite, anorthosite and norite. The geochemical work undertaken for waste rock samples at Tharisa indicate that the waste rock is non-acid generating and based on leachate tests chemicals of concern that are likely to leach from the WRD's when compared to water quality standards include: Elevated concentrations of Al, Chromium (Cr), Iron (Fe), Manganese (Mn), Lead (Pb).
Waste rock transport and deposition	Excess open pit waste rock loaded onto mine dump trucks and transported to WRDs. Waste rock access ramps constructed with a maximum gradient of 1V:7H (8°) for mine dump trucks. Waste rock is then dumped and spread / flattened with a bulldozer.
Control of seepage and dirty water run-off	The control of seepage from the toe of the WRD's as well as run-off from the side slopes will be achieved by the construction of a series of toe paddocks and secondary toe paddock cross walls around the perimeter of the WRD's, from where it will seep into the unsaturated soil or evaporate.
Diversion of clean water	Stormwater diversion trenches will be established to divert clean surface run-off from the surrounding area away from the WRD in order to prevent the contamination of clean water.
Topsoil stripping	Topsoil in WRD footprint areas will be stripped and stockpiled in accordance with the topsoil conservation guide. A stripping depth of 500 mm has been recommended by the soils study. Stripping and stockpiling of topsoil will be done in advance of dumping.
Lining	With reference to Section 32.4.6.1, a Class D liner is required.
Side slopes	Average slope: 1V:3H
Access and access control	A 4 m wide waste rock road will be constructed around the perimeter of each dump for routine inspections and maintenance. A perimeter fence around each WRD is planned.
Monitoring	Monitoring of seepage water retained in the perimeter toe paddocks and of boreholes around the perimeter of each WRD.
Dust control	Operational Phase: Watering of roads for dust suppression. Post Operational Phase: No measures necessary due to the coarse particle size distribution.
Closure	The WRD should be shaped to ensure the area is free draining (i.e no ponding of water on the top surface post closure). The WRD side slopes to be confirmed through on-going field trails. The WRD should be capped with a minimum of 300 mm soil/growth medium material. The capping thickness should be confirmed through on-going field trails. No active groundwater protection measures are envisaged during closure given the relatively low pollution potential of the residual waste rock material. In the event that water quality monitoring around any WRD indicates that the WRDs are causing pollution, additional management measures will be investigated in consultation with a qualified specialist.

Feature	Detail	
Rehabilitation	Revegetation	The WRD is to be revegetated using a mix of indigenous grasses (i.e. dry seeding) and trees/shrubs (i.e. hand planting of seedlings). The vegetation species will be confirmed through ongoing field trials.
	Erosion control	The erosion management measures and/or mitigation measures to be confirmed through ongoing field trials.
	Maintenance and aftercare	Maintenance and aftercare period to be confirmed through ongoing field trials.
	Rehabilitation success criteria	Rehabilitation success will be determined by monitoring trends in soil nutrient levels, soil microbial levels, vegetation cover and vegetation biodiversity levels and comparing data and temporal trends in the data to numerical targets.

4. POLICY AND LEGISLATIVE CONTEXT

This section outlines the key legislative context applicable to the proposed Project and outlines the guidelines, policies and plans that have been considered during the S&EIA process

4.1 LEGISLATIVE CONSIDERATION IN THE PREPARATION OF THE ENVIRONMENTAL IMPACT ASSESSMENT

In accordance with the EIA Regulations, 2014, all legislation and guidelines that have been considered in the S&EIA process must be documented. Table 7 below provides a summary of the applicable legal framework that has been considered and will be considered in the assessment process.

Table 7: Legal Framework

Applicable legislation	Reference where applied	Applicability to the project
Mineral and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA) and associated Regulations	Introduction and Section 4.1.1.1	Any changes to the mine's approved EMPr's require consent from the DMRE. A Section 102 application was prepared by Tharisa and was submitted to the DMRE on the 12th of May 2022 via the South African Mineral Resources Administration System (SAMRAD).
National Environmental Management Act (No. 107 of 1998) (NEMA) and associated Regulations	Introduction, Sections 4.1.2	An integrated EA and waste management licence application was prepared by SLR and was submitted to the DMRE on the 12th of May 2022 via SAMRAD. A copy of the application form is available on request.
National Environmental Management Waste Act (No. 59 of 2008) (NEM:WA) and associated regulations.	Introduction, Sections 4.1.4	
National Water Act (No. 36 of 1998) (NWA) and associated Regulations	Section 4.1.6	The proposed Project will require an amendment to the IWUL Section 21 water uses. This process will be managed as part of a separate application process.
National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM: AQA) and associated Regulations.	Section 4.1.7	The proposed Project will result in the release of air emissions. Air emissions was thus considered as part of project planning and a Monitoring Programme will be compiled for the proposed Project.
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM: BA) and associated Regulations.	Section 4.1.8	The proposed Project will result in the clearance of indigenous vegetation and may include the removal of protected plant species. Biodiversity was thus considered as part of project planning and a Biodiversity Study will be compiled for the proposed Project. In addition to this, consideration will also be given to the management of alien invasive species.
Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)		
National Forest Act (No. 84 of 1998) (NFA)		
National Heritage Resources Act (No. 25 of 1999) (NHRA).	Section 4.1.9	The proposed Project will entail the change of character of a site exceeding 5 000 m^2. Heritage/cultural and palaeontological resources were thus considered as part of project planning and heritage/cultural and palaeontological studies will be compiled for the proposed Project.

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

The MPRDA governs the acquisition, use and disposal of mineral and petroleum resources in South Africa. The MRPDA promotes equitable access to the nation's mineral and petroleum resources. The objectives of the Act, amongst others, are to promote economic growth and mineral and petroleum resources development in the Republic, particularly development of downstream industries through provision of feedstock and development of mining and petroleum inputs industries and also to promote employment and advance the social and economic welfare of all South Africans.

Chapter 4 of the Act provides a framework to regulate the application for mining, prospecting, and closure rights. Section 24(4) of NEMA provides the minimum requirements for procedures for the investigation, assessment, management, and communication of the potential impacts. With the establishment of the “One Environmental System” in 2014, the DMRE must apply the range of environmental principles included in Chapter 2 of NEMA when taking decisions that significantly affect the environment. To give effect to the general objectives of Integrated Environmental Management (IEM), the potential impacts on the environment of listed or specified activities must be considered, investigated, assessed, and reported on to the competent authority.

In addition, Section 102 of the MPRDA governs the amendment of rights, permits, mine work programmes and EAs and management programmes. In terms of the Act, these may not be amended or varied without the written consent of the Minister.

The proposed Project will require an amendment to the approved 2014 EMPr. It follows that a Section 102 Amendment will be applied for in terms of the MPRDA.

4.1.1.1 Mineral Petroleum Resources Development Act, Regulations, 2004 (GN R. 527 of 2004)

The MPRDA Regulations (GN R. 527 of 2004), promulgated in terms of Section 107 of the MPRDA, provide for a range of matters relating to the administration of the Act. Part 1 details regulations for the lodgement of applications, Part 2 deals with Social and Labour plans while Part 3 sets out environmental regulations for mineral development. The recent amendment in March 2020 removed the great majority of the environmental provisions from the Regulations. These Regulations had not been practicably implementable since the December 2014 introduction of the “One Environmental System” and the amendment of the overriding legislation (MPRDA and NEMA).

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

The NEMA establishes principles and provides a regulatory framework for decision-making on matters affecting the environment. All organs of state must apply the range of environmental principles included in Section 2 of NEMA when taking decisions that significantly affect the environment. Included amongst the key principles is that all development must be socially, economically, and environmentally sustainable and that environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural, and social interests equitably. The participation of I&APs is stipulated, as is that decisions must consider the interests, needs and values of all I&APs.

Chapter 5 of NEMA provides a framework for the integration of environmental issues into the planning, design, decision-making and implementation of plans and development proposals. Section 24 provides a framework for granting of EAs. To give effect to the general objectives of Integrated Environmental Management (IEM), the potential impacts on the environment of listed or specified activities must be considered, investigated, assessed, and reported on to the competent authority. Section 24(4) provides the minimum requirements for procedures for the investigation, assessment, management, and communication of the potential impacts. In terms of the management of impacts on the environment, Section 24N details the requirements for an EMPr.

4.1.2.1 Environmental Impact Assessment Regulations, 2014 (GN R 982 of 2014)

"EIA Regulations" means the Environmental Impact Assessment Regulations, 2014, published under Government Notice No. R. 982 in Government Gazette No. 38282 of 4 December 2014, as amended by:

- GN R. 619 of 2016 in Government Gazette No. 40041 of 03 June 2016;
- GN R. 326 in Government Gazette No. 40772 of 7 April 2017;
- GN R. 706 in Government Gazette No. 41766 of 13 July 2018;
- GN R. 599 in Government Gazette No. 43358 of 29 May 2020;
- GN R. 517 in Government Gazette No. 44701 of 11 June 2021; and
- GN R. 1816 in Government Gazette No. 45999 of 03 March 2022.

"Listing Notice 1" means Environmental Impact Assessment Regulations Listing Notice 1 of 2014, published under Government Notice No. R. 983 in Government Gazette No. 38282 of 4 December 2014, as amended by Government Notice No. 327 in Government Gazette No. 40772 of 7 April 2017, Government Notice No. 706 in Government Gazette No. 41766 of 13 July 2018 and Government Notice No. 517 in Government Gazette No. 44701 of 11 June 2021.

"Listing Notice 2" means Environmental Impact Assessment Regulations Listing Notice 2 of 2014 published under Government Notice No. R. 984 in Government Gazette No. 38282 of 4 December 2014 as amended by Government Notice No. 325 in Government Gazette No. 40772 of 7 April 2017 and Government Notice No. 517 in Government Gazette No. 44701 of 11 June 2021.

"Listing Notice 3" means Environmental Impact Assessment Regulations Listing Notice 3 of 2014 published under Government Notice No. R. 985 in Government Gazette No. 38282 of 4 December 2014 as amended by Government Notice No. 324 in Government Gazette No. 40772 of 7 April 2017, Government Notice No. 706 in Government Gazette No. 41766 of 13 July 2018 and Government Notice No. 517 in Government Gazette No. 44701 of 11 June 2021.

The EIA Regulations, 2014 set out the procedures and documentation that need to be complied with when applying for EA. A Basic Assessment process must be applied to an application if the authorisation applied for is in respect of an activity or activities listed in Listing Notices 1 and/or 3 and a S&EIA process must be applied to an application if the authorisation applied for is in respect of an activity or activities listed in Listing Notice 2.

The proposed Project will trigger activities specified in Listing Notice 2 (refer to Table 4 1) and therefore a S&EIA process is required in order for the DMRE to consider the application in terms of NEMA. As the DMRE

is the competent authority for the NEMA and NEM:WA activities, Tharisa will apply for an integrated EA, as provided for in section 24L of the NEMA

4.1.3 Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations, 2015 (GN R 1147 of 2015)

The purpose of the Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations (No. 1147 of 2015), is to regulate the determination and making of financial provision as contemplated in the Act for the costs associated with the undertaking of management, rehabilitation and remediation of environmental impacts from prospecting, exploration, mining or production operations through the lifespan of such operations and latent or residual environmental impacts that may become known in the future.

The compilation of a financial provision report in support of the proposed Project forms part of the plan of study as outlined in Section 9.4.

4.1.4 National Environmental Management: Waste Act (No. 59 of 2008

The NEM: WA regulates all aspects of waste management and has an emphasis on waste avoidance and minimisation. NEM: WA creates a system for listing and licensing waste management activities which may have a detrimental effect on the environment. A waste management activity identified in terms of the NEM: WA may not commence, be undertaken or conducted except in accordance with published standards or a Waste Management Licence.

Listed waste management activities are included in GN 921 of November 2013. Category A and Category B listed waste management activities above certain thresholds are subject to a process of impact assessment and licensing. Category C listed waste management activities do not require a waste management license but are subject to the provisions of National Norms and Standards (GN 926, November 2013). The assessment and reporting process in support of a Waste Management Licence application must be undertaken in accordance with the EIA Regulations, 2014. These Regulations define the requirements for the submission; processing, consideration, and decision of applications authorisation of listed activities. Activities listed in Category A require a Basic Assessment process, while activities listed in Category B require a S&EIA process in order for authorities to consider an application in terms of NEM: WA.

The proposed Project activities trigger waste management listed activities under Category B (refer to Table 4 1, requiring a waste management licence. As the DMRE is the competent authority for the NEMA and NEM: WA activities, Tharisa will apply for an integrated EA, as provided for in section 24L of the NEMA.

4.1.5 Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits from a prospecting, mining, exploration, or production operation, 2015 (GN R 632 of 2015)

The purpose of these Regulations is to regulate the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration, or production operation. The identification and assessment of environmental impacts arising from the establishment of residue stockpiles and residue deposits must be done as part of the environmental impact assessment conducted in terms of the NEMA. A risk analysis based on the characteristics and the classification must be used to determine the appropriate mitigation and management measures.

The design of the proposed Project will need to meet the requirements of GN R 632 of 2015.

4.1.6 National Water Act, 1998 (No. 36 of 1998)

The NWA provides a legal framework for the effective and sustainable management of water resources in South Africa. It serves to protect, use, develop, conserve, manage and control water resources, promoting the integrated management of water resources with the participation of all stakeholders. This Act also provides national norms and standards, and the requirement for authorisation (either a Water Use Licence or General Authorisation) of water uses listed in Section 21 of the Act.

The proposed Project includes water uses identified in terms of Section 21 of the NWA. The proposed Project will therefore require an amendment of the existing IWUL to cater for the additional WRD's. It must be noted that this S&EIA process does not address the requirements of a water use licensing process. This will be handled as part of a separate process with the competent authority, the DWS.

4.1.6.1 Regulations on the Use of Water for Mining and Related Activities, 1999 (GN R. 704 of 1999)

GNR. 704 of June 1999, was established to provide regulations on the use of water for mining and related activities aimed at the protection of water resources. The main principal conditions of GN R. 704 of June 1999 applicable to this proposed Project are:

- Condition 6 which describes the capacity requirements of clean and dirty water systems. Clean and dirty water systems must be kept separate and must be designed, constructed, maintained, and operated to ensure conveyance of flows of a 1:50 year recurrence event. Clean and dirty water systems should not spill into each other more frequently than once in 50 years. Any dirty water dams should have a minimum freeboard of 0.8 m above full supply level.
- Condition 7 which describes the measures which must be taken to protect water resources. All dirty water or substances which may cause pollution should be prevented from entering a water resource (by spillage, seepage, erosion etc.) and ensure that water used in any process is recycled as far as practicable.

The design of the proposed WRD's will need to meet the requirements of GN R. 704 of June 1999. The detailed WRD design reports are provided in Section. 3.2.4

4.1.7 National Environmental Management: Air Quality Act, 2004 (No. 34 of 2004)

The NEM: AQA regulates all aspects of air quality, including prevention of pollution and environmental degradation; providing for national norms and standards (through a National Framework for Air Quality Management) regulating air quality monitoring, management, and control; and licencing of activities that result in atmospheric emissions and have or may have a significant detrimental effect on the environment.

4.1.7.1 Listed Activities and Minimum Emission Standards, 2015 (GN R. 893 of 2013)

In terms of Section 22 of NEM: AQA no person may conduct an activity releasing emissions (GN R. 893, 22 November 2013) without an Atmospheric Emissions Licence (AEL). However, the proposed Project does not trigger any activities sets out in the notice and thus there is no requirement for an AEL.

4.1.7.2 National Dust Control Regulations, 2013 (GN R. 827 of 2013)

The National Dust Control Regulations, 2013 (GN R. 827 of 2012) (NDCR) were gazetted on 1 November 2013. The purpose of the regulations is to prescribe general measures for the control of dust in all areas including residential and light commercial areas. The regulations provide a guideline for monitoring and measuring dust fall. Dust fall is assessed for nuisance impact and not an inhalation health impact.
The proposed Project entails materials handling and will lead to the release of dust. Potential dust emissions from the proposed Project will be assessed against NDCR and a Monitoring Programme will be compiled for the proposed Project.

4.1.7.3 National Environmental Management: AQA Waterberg Bojanala Area Air Quality Management Plan, 2015 (GN R. 1207)

The Minister declared the Waterberg–Bojanala Priority Area (WBPA) on 15 June 2012 as the third National Priority Area, crossing the North West and Limpopo provincial borders. It includes the Waterberg District Municipality (WDM) in Limpopo Province and parts of the Bojanala Platinum District Municipality in the North West Province, with nine Local Municipalities.
An Air Quality Management Plan (AQMP) was developed for the WBPA. The Overall Objective of the WBPA AQMP is to be realised through the attainment of five related goals and is considered as part of the proposed Project. These are:

- Cooperative governance in the WBPA promotes the implementation of the AQMP.
- Air quality management in the WBPA is supported by effective systems and tools.
- Ambient concentrations of air pollutants comply with the NAAQS in the WBPA as a result of emission reductions.
- Air quality decision making in the WBPA is informed by sound research.
- Knowledge and the understanding of air quality amongst stakeholders in the WBPA is enhanced.

The AQMP, will be taken into consideration as part of the proposed Project given that Tharisa is located in the WBPA.

4.1.8 National Environmental Management: Biodiversity Act, 2004 (No. 10 of 2004)

The NEM: BA provides for the management and conservation of South Africa's biodiversity and the protection of species and ecosystems that warrant national protection. NEM: BA regulates the carrying out of restricted activities, without a permit, that may harm listed threatened or protected species or activities that encourage the spread of alien or invasive species and makes provision for the publication of bioregional plans and the listing of ecosystems and species that are threatened or in need of protection. Bioregional plans should be considered by competent authorities in their decision-making regarding an application for EA.

Based on the South African Conservation Areas Database, the proposed Project is located within the transition zone of the Magaliesberg Biosphere Reserve. In addition, the proposed Project is located within a Critical Biodiversity Area and Ecological Support Area as per the 2015 North West Biodiversity Sector Planning.

4.1.8.1 Alien and Invasive Species Regulations, 2014 (GN R. 598 of 2014)

Alien and Invasive Species Regulations (GN R. 598 of 2014) as well as the Alien and Invasive Species List (GN R. 864 of 2016) have been published to regulate the monitoring, control, and eradication of listed invasive

species. All landowners on whose land alien and invasive species occur must make the necessary arrangements to be compliant with these Regulations. These will guide the EMPr for the project.

4.1.9 Conservation of Agricultural Resources Act, 1983 (No. 43 of 1983)

The objects of this Act are to provide for the conservation of the natural agricultural resources of the Republic by the maintenance of the production potential of land, by combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the vegetation and the combating of weeds and invader plants. As part of the proposed Project, in particular during the compilation of the EMPr for the project, consideration will be given to the management of alien invasive species.

4.1.10 National Forests Act, 1998 (No. 84 of 1998)

The NFS provides for the sustainable management and development of forests for the benefit of all, including providing special measures for the protection of certain forests and trees. In terms of Section 15(1) of the Act, no person may cut, disturb, damage or destroy any protected tree, except under a licence. The proposed Project will entail the removal of more than 156 ha of undisturbed vegetation. National Heritage Resources Act, 1999 (No. 25 of 1999) (NHRA).

The NHRA provides for the identification, assessment, and management of the heritage resources of South Africa. The Act lists development activities that would require authorisation by the responsible heritage resources authority. The Act requires that a person who intends to undertake a listed activity notify the relevant provincial heritage authority at the earliest stages of initiating such a development. The relevant provincial heritage authority would then in turn, notify the person whether a Heritage Impact Assessment (HIA) should be submitted. However, according to Section 38(8) of the NHRA, a separate report would not be necessary if an evaluation of the impact of such development on heritage resources is required in terms of the Environment Conservation Act (No. 73 of 1989) (now replaced by NEMA) or any other applicable legislation. The decision-making authority should, however, ensure that the heritage evaluation fulfils the requirements of the NHRA and consider in its decision-making any comments and recommendations made by the relevant heritage resources authority.

The total application area is approximately 417 ha. Of the total application area approximately 1 ha will be located on undisturbed mining areas. In this regard, the provisions of the NHRA have been considered and a HIA and Palaeontological Assessment has been undertaken for the proposed Project. The Reports have been submitted to the South African Heritage Resources Agency (SAHRA) for their comment via the South African Heritage Resources Information System (SAHRIS).

4.2 GUIDELINES, POLICIES, PLANS, STANDARDS AND FRAMEWORKS

The guidelines, policies and plans listed in Table 8 below have been considered during the S&EIA process.

Table 8: Guideline and Policy Framework

Guideline	Governing body	Relevance
National Development Plan 2030 (NDP)	National Planning Commission	The NDP is the overarching development planning policy for the country, to which all other development planning, in particular spatial planning must be aligned. The NDP outline South Africa's Vision and provides the Framework for eliminating poverty and reducing inequality by 2030.
New Growth Path (2011) (NGP)	Department of Economic Development	The NGP reflects the commitment of Government to prioritise employment creation in all economic policies and sets out the key drivers and sectors for employment which will be the focus of Government.
North-West Development Corporation Strategic Plan 2015-2020	North-West Provincial Government	The vision of the strategic plan is to ensure that the North West province becomes the cornerstone of sustainable economic development and job creation. This would be achieved through the province's contribution to economic growth through sustained focus on agriculture, culture and tourism through villages, townships and small dorpies.
North-West Provincial Spatial Development Framework (2016) (PSDF)	Office of the Premier of the North-West	The North-West PSDFs sets out the key spatial challenges faced by the province and the proposed spatial policies, which have been formulated to address these challenges. As such, it supports the spatial development vision to achieve the North-West Development Plan 2030.
Bojanala Platinum District Municipality Integrated Development Plan (2017-2022) (IDP)	Bojanala Platinum District Municipality	The Bojanala Platinum District Municipality IDP is the principle strategic instrument guiding all planning, management, investment and development within the province in order to provide best solutions towards sustainable development.
Rustenburg Local Municipality IDP (2018-2019)	Rustenburg Local Municipality	The Rustenburg Local Municipality IDP is the principle strategic instrument guiding all planning, management, investment and development within the province in order to provide best solutions towards sustainable development.
Public participation guideline in terms of NEMA (2017)	DEFF	The purpose of this guideline is to ensure that an adequate public participation process is undertaken during the S&EIA process.
Guideline on need and desirability (2017)	DEFF	This guideline informs the consideration of the need and desirability aspects of the proposed Project.
National Freshwater Ecosystem Priority Areas (NFEPA) (2011)	DHSWS	Biodiversity was considered as part of project planning and in the assessment of potential impacts. Reference was made to various national and provincial databases to determine potential presence and conservation
Mining and Biodiversity Guideline (2013)	South African National Botanical Institute (SANBI)	
Important Bird and Biodiversity Areas	Birdlife International	
National Biodiversity Assessment	DFFE	

4.3 REQUIRED ENVIRONMENTAL LICENCES

The proposed Project activities trigger waste management listed activities under Category B (refer to Table 4, requiring a waste management licence. As the DMRE is the competent authority for the NEMA and NEM:WA activities, Tharisa will apply for an integrated EA, as provided for in section 24L of the NEMA.

5. NEED AND DESIRABILITY

This section aims to provide an overview of the need and desirability with the strategic context of national development policy and planning, broader societal needs and regional and local planning, as well as the NEMA principles and sustainable development.

5.1 BACKGROUND

The DEA guideline on need and desirability (GN. R891, 20 October 2014) notes that while addressing the growth of the national economy through the implementation of various national policies and strategies, it is essential that these policies take cognisance of strategic concerns such as climate change, food security, as well as the sustainability in supply of natural resources and the status of our ecosystem services. In 2017, the DEA published an updated guideline on project need and desirability, although this is yet to be formally gazetted. The 2017 guideline on need and desirability provides that addressing the need and desirability of a development is a way of ensuring sustainability – in other words, that a development is ecologically sound and socially and economically justifiable.

Thus, the over-arching framework for considering the need and desirability of development in general is taken at the policy level through the identification and promotion of activities / industries / developments required by civil society as a whole. The DEA guideline further notes that at a project level (as part of an EIA process), the need and desirability of the project should take into consideration the content of regional and local plans, frameworks, and strategies. Consistent with the aim and purpose of the EIA, the concept of "need and desirability" relates to, amongst others, the nature, scale, and location of the development being proposed, as well as the wise use of land and natural resources.

5.2 NATIONAL POLICY AND PLANNING FRAMEWORK

5.2.1 National Development Plan 2030

The National Development Plan (NDP) 2030 provides the context for all growth in South Africa. The NDP provides a broad strategic framework, setting out an overarching approach to confronting poverty and inequality through the promotion of development, based on the six focused and interlinked priorities. One of the key priorities is "faster and more inclusive economic growth". To transform the economy and create sustainable expansion for job creation, an average economic growth exceeding 5% per annum is required. The NDP sets out that transforming the economy also requires changing patterns of ownership and control.
It is also acknowledged that environmental challenges are in conflict with some of these development initiatives. As such, it is emphasised that there is also a need to:

- Protect the natural environment.
- Enhance the resilience of people and the economy to climate change.
- Reduce carbon emissions in line with international commitments.
- Make significant strides toward becoming a zero-waste economy.
- Reduce greenhouse gas emissions and improve energy efficiency.

5.2.2 New growth path 2010

In all economic policies and sets out the key drivers and sectors for employment which will be the focus of Government. The sectors identified for prioritisation include infrastructure, agriculture, mining, manufacturing, tourism, and the green economy.

5.3 REGIONAL AND LOCAL POLICY AND PLANNING FRAMEWORK

This section aims to provide an overview of the regional and local policy and planning context relating to the proposed development.

5.3.1 North West

The North West Provincial Spatial Development Framework (PSDF) sets out the key spatial challenges faced by the Province and the proposed spatial policies, which have been formulated to address these challenges. As such, it supports the spatial development vision to achieve the North-West Development Plan 2030. To realise the spatial development vision, the PSDF outlines five broad development principles: (i) spatial justice (ii) fair and good governance (iii) sustainability (iv) efficiency and (v) integration.

Five strategic objectives have been identified to provide foundation for spatial development strategies in North-West. These objectives are outlined below:

- Strategic Objective 1: Focus development on regional spatial development initiatives, development corridors, development zones and nodes.
- Strategic Objective 2: Protect biodiversity, water, and agricultural resources.
- Strategic Objective 3: Promote Infrastructure Investment.
- Strategic Objective 4: Support economic development and job creation guiding the spatial development pattern of North West.

To achieve high growth scenarios and strategic objectives above, seven development mechanisms were identified. These include land use planning and management, settlement planning, economic development, infrastructure investment, human resources development, facilitative governance, and industrialisation. These mechanisms will ensure that the province enjoys high growth by shifting from social needs-based policy to infrastructure and economic growth-based policies.

5.3.2 Bonjanala Integrated Development Plan and Spatial Development Framework

Each municipality is required to prepare an Integrated Development Plan and that a Spatial Development Framework (SDF) be a component of the IDP. The Bojanala Platinum District Municipality Integrated Development Plan is the principle strategic instrument guiding all planning, management, investment and development within the province in order to provide best solutions towards sustainable development. The vision of the Bojanala District Municipality IDP (2017 to 2021) is to provide a model of cooperative governance for effective and efficient service delivery in partnership with local municipalities and all stakeholders. The IDP aims to realize the NDP, the North-West PSDP by identifying the following priority issues and challenges within the district:

- Water and sanitation.
- Roads and storm water.
- Electricity.
- Land and housing.
- Economic development.
- Institutional development.
- Municipality healthy.
- Social services.

Economic opportunities abound in mining can be exploited further when skills of the people are in line with economic and technological needs.

5.3.3 Rustenburg Local Municipality

The Rustenburg Local Municipality Integrated Development Plan is the principle strategic instrument guiding all planning, management, investment, and development within the province to provide best solutions towards sustainable development. The Rustenburg Local Municipality's IDP (2017 – 2022) identifies strategic focus areas it has identified as the cornerstones of a successful and thriving council within the developed Master Plan 2040, and which form the foundation of its Five-year Integrated Development Plan. The approved master plan has 5 goals which reads as follows:

- City of vibrant and diversified economy.
- City of identity.
- City of smart liveable homes.
- City of excellence in Education and sport.
- City of sustainable resources management.

The IDP identifies agriculture, mining, manufacturing, utilities, trade, transport, finance, community and personal services, general government services and tourism as sectors that contributes to local economic development. Of relevance to the project is opportunities identified in terms of recycling and rehabilitations of mines which could contribute to the local economic development.

5.4 CONSISTENCY WITH POLICY AND PLANNING CONTEXT

The previous sections have considered the policy and planning context at national, regional, and local level, which are relevant to the proposed Project. As highlighted above, there is a drive from national and provincial Governments to stimulate development and grow the economy of South Africa with a strong focus on job creation in all sectors. Mining has been identified as drivers of economic growth and job creation and are furthermore considered particularly important in the provincial economy. The proposed Project is consistent with and in support of the broad national policy framework for the development of mining in South Africa. At the regional level, it is deemed consistent with the North West PSDF and the SDF of Bojanala.

5.5 CONSISTENCY WITH NATIONAL ENVIRONMENTAL MANAGEMENT ACT PRINCIPLES

The national environmental management principles contained in NEMA serve as a guide for the interpretation, administration, and implementation of NEMA and the EIA Regulations. In order to demonstrate consistency with the NEMA principles, a discussion of how these principles are considered is provided in Table 9 below.

Table 9: Consideration of the NEMA Principles in Relation to the proposed Project

National Environmental Management Principles	Comment
(2) Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural, and social interests equitably.	Mining has long been one of the key drivers of economic growth and employment in South Africa. The proposed Project activities would continue to support the day-to-day operations of the Tharisa mine while ensuring that environmental management principles are implemented during operation. The EIA process identifies the needs and interests of potentially affected parties and attempts to address issues and concerns raised through the course of the study.
(3) Development must be socially, environmentally, and economically sustainable.	Government has set development goals aimed at reducing poverty, unemployment, and inequality. The New Growth Path identifies the mining value chain as one of the seven key

National Environmental Management Principles	Comment
	economic sectors for job creation. Mining is promoted in the national, regional, and local policy and planning frameworks; thus, the proposed Project activities support the continuation of the mine's operation and aims to find acceptable environmental management strategies for that promotes sustainable development.
(4)(a) Sustainable development requires the consideration of all relevant factors including the following: (i) That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied; (ii) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied; (iii) that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied; (iv) that waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner; (v) that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource; (vi) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;	The S&EIA process considers resultant biophysical, cultural and socio-economic impacts as a result of the proposed Project. Measures to avoid, minimise and/or remedy potential pollution and/or degradation of the environment that may occur as a result of the proposed Project shall be detailed in the EMPr during the EIA phase.
(4)(a)(vii) that a risk-averse and cautious approach is applied, which considers the limits of current knowledge about the consequences of decisions and actions; and	Assumptions, uncertainties, and limitations associated with the compilation of the reports is included in this report. Compliance with the various legislative requirements is presented in this report.
(4)(a)(viii) that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.	The EIA process considers and assesses the resultant social, economic, and biophysical impacts of the project. The EMPr will provides the recommended management measures to mitigate the significance of identified impacts.
(4)(b) Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the	The S&EIA process that is being followed recognises that all elements of the environment are linked and interrelated. DMRE, as the decision-making authority, will be responsible for taking all aspects of the environment, including whether or not the potential impacts of the project would unfairly discriminate

National Environmental Management Principles	Comment
environment by pursuing the selection of the best practicable environmental option.	against any person, into consideration when making a decision regarding the proposed Project.
(4)(c) Environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons.	
(4)(d) Equitable access to environmental resources, benefits, and services to meet basic human needs and ensure human well-being must be pursued and special measures may be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination.	The proposed Project activities are located within the current mining operations and will not limit access to environmental resources that meet basic human needs.
(4)(e) Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.	The applicant is committed to comply with environmental health and safety obligations for their current operations and during closure.
(4)(f) The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured.	The public participation process has been undertaken in accordance with the requirements of the EIA Regulations, 2014.
(4)(g) Decisions must take into account the interests, needs and values of all I&APs, and this includes recognizing all forms of knowledge, including traditional and ordinary knowledge.	The S&EIA process will take into the account the interests, needs and values of all I&APs, through the submission of comments on the proposed Project. Thus, the decision-makers will have all the necessary information before them on which to base an informed decision.
(4)(h) Community wellbeing and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means.	The EIA report and the EMPr prepared for the proposed Project will be made available to communities for review and comment.
(4)(i) The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment.	The S&EIA process considers identified potential social, economic, biophysical impacts of the project in an integrated manner. The significance of these impacts will be assessed as part of the process.
(4)(j) The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected.	The owners and managers of the mine would be required to comply with the requirements of the Occupational Health and Safety Act. An Environmental Awareness Plan will be developed in the EIA phase, which will require staff be informed about any aspects of their work that may pose a danger to the environment.

National Environmental Management Principles	Comment
(4)(k) Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law.	The public consultation process is being undertaken in accordance with the requirements of the EIA Regulations, 2014 and will allow for the distribution of the S&EIA reports for public review and comment. This information will be provided in an open and transparent manner.
(4)(l) There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment.	The public participation process provides an opportunity for the Organs of State to provide comment on the proposed Project and address any potential conflicts between policies or other developmental proposals administered by them that may be in conflict with the proposed Project before decision-making.
(4)(m) Actual or potential conflicts of interest between organs of state should be resolved through conflict resolution procedures.	It is not anticipated that the proposed Project would result in any conflicts between organs of state.
(4)(n) Global and international responsibilities relating to the environment must be discharged in the national interest.	DMRE, as the decision-making authority, will be responsible for taking cognisance of any international obligations that could have an influence on the project. The proposed Project does not require compliance with any international standards.
(4)(o) The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.	The S&EIA process considers and assesses the identified potential social, economic, biophysical impacts of the project.
(4)(p) The costs of remedying pollution, environmental degradation, and consequent adverse health effects and of preventing, controlling, or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.	The owners and managers of the Tharisa mine will be responsible for the implementation of the measures that will be included in the EMPr.
(4)(q) The vital role of women and youth in environment management and development must be recognised and their full participation therein must be promoted.	The public participation process for the proposed Project has been and will continue to be inclusive of women and the youth.
(4)(r) Sensitive, vulnerable, highly dynamic, or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.	The S&EIA process undertaken for the proposed Project has identified relevant sensitive and/or vulnerable areas and assessed potential impacts if applicable. Appropriate mitigation measures have been proposed where required.

5.6 ENSURING ECOLOGICAL SUSTAINABLE DEVELOPMENT AND USE OF NATURAL RESOURCES

Due to the nature of mining projects, impacts on sensitive biodiversity areas, linkages between biodiversity areas and related species, and the role that they play in the ecosystem, are probable. The sections of the proposed West OG WRD (refer to Section 16.3) could result in the general disturbance of biodiversity, particularly if unmitigated. This is of relevance when considering that the proposed Project areas are in the endangered Marikana Thornveld, which has already been extensively disturbed by existing operations and

surrounding mining, community, and farming activities. The protected Morula Tree is known to occur at the Tharisa Mine, and as follows could be disturbed if located within the undisturbed footprint of the section of the West OG WRD. This will be confirmed as part of specialist investigations.

Further to this, when considering national and provincial site sensitivity databases, the proposed Project area falls within areas of biodiversity important in term of the Mining Biodiversity Guidelines, North-West Biodiversity Section Plan, 2015, IBA's and the transitional zone of the Magaliesberg Biosphere. As part of the EIA phase of the proposed Project and with input from specialists, the impacts associated with the destruction and general disturbance was investigated and is discussed in Section 16.3.

5.7 PROMOTING JUSTIFIABLE ECONOMIC AND SOCIAL DEVELOPMENT

Community/society priorities are officially expressed through public documents including the provincial growth and development strategy and spatial development framework documents. Although provincial growth and development plans mostly focus on municipal priorities over a five-year cycle, they do provide some insight and guidance in terms of future planning for the municipalities. Spatial Development Frameworks (SDFs) which usually have a longer life cycle aim to guide and facilitate the implementation of Integrated Development Plans (IDPs) for the municipality. The vision of the North-West Provincial Growth and Development Plan and SDF is to eliminate income poverty, reduce inequality and unemployment rate by creating an enabling environment for sustainable employment, economic growth, and infrastructure development. The local municipal IDP identifies mining, agriculture, construction and infrastructure and tourism as sectors to be prioritised for driving economic growth and reducing unemployment.

Given that the proposed Project forms part of existing approved operations and that the proposed Project will not generate significant employment opportunities, negative project-related socio-economic impacts including inward migration are not expected to occur. In addition, the proposed Project is required to provide additional capacity for storage of waste to allow for the optimisation of mining. As a result, the potential for increased economic benefits (as a result of job creation) due to project activities is expected to be insignificant. However, the proposed Project will allow continuation of the current employment opportunities during operation, decommission and closure.

6. PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

All listed activities will cease at the end of operation. The mine has a remaining life of mine of 12-years (i.e. until 2034).

7. MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT ON THE SITE INCLUDING THE PROCESS FOLLOWED TO DEFINE THE PREFERRED DEVELOPMENT ALTERNATIVES

This Section describes the alternatives (if applicable) considered for the project and summarises the process being followed to reach the preferred alternatives.

7.1 DETAILS OF ALTERNATIVES CONSIDERED

Where changes to the layout have already taken place no site layout alternatives can be considered. The advantage of the layout changes is that it enables Tharisa to optimise their mining processes and activities on site.

7.1.1 Layout alternative

The proposed Project will be located within the existing Mining Right boundary which is constrained for open space. The Tharisa Mine is also bordered by other mining companies (Western Platinum Mine, Marikana Platinum Mine and Samancor) on the West, North and Eastern boundaries of the Tharisa Mining Right area (refer to Map 4). The N4 and farming community of Buffelspoort is located to the South of the Tharisa Mine. In addition to this, some of the WRD's will be placed on previously disturbed areas, thereby minimising the project footprint. It follows that no alternative for the location of the proposed additional WRD's have been considered for the proposed Project.

7.1.2 Technology/activity alternatives

The following technology/ activity alternatives were considered as part of the proposed Project. These includes the following:

- **Trucking waste rock to a different location:** Open pit mining consists primarily of the removal of topsoil and overburden, drilling and blasting of ore, and the transportation of waste rock by haul trucks**.** Transportation of waste rock is cyclic in nature and requires the dispatch of a large number of trucks per month. Reducing the cycle time for transportation of waste rock results in increased productivity and reduces the operational costs. The proximity of the proposed Project to the open pits allows for increased productivity, minimisation of transportation costs as well as minimisation of noise and traffic impacts associated with transportation of waste rock.
- **Alternative mining technique (underground mining)**: Underground mining is used to extract ore from below the surface of the earth safely, economically and with as little waste as possible. Underground mining is practical when the ore body is too deep to mine profitably by open pit. The target ore body for underground mining has not been reached for Tharisa, as such underground mining, as an alternative mining technique is not considered feasible.
- **Waste rock backfill of open pits:** Tharisa has approval for backfilling of the open pits with waste rock, this is presently undertaken concurrently with mining.

It follows that no activity/technology alternative have been considered for the proposed Project.

7.1.3 The "no-go" alternative

The "no-go" alternative would mean that the proposed WRD's would not be established. This would restrict the mine's ability to realise the economic benefits associated with extracting the mineral resources from the East and West Mines. The mine is continually generating more waste rock from mining activities than previous

anticipated. The balance of waste rock which cannot be backfilled in the pit will require dumping on surface. It follows that no other no other feasible alternatives exist for waste storage. The “no-go” option would not allow for the optimisation of the current mining operations and could potentially result in the closure of the mine.

8. DETAILS OF THE PUBLIC PARTICIPATION FOLLOWED

This Section describes the public participation process undertaken in line with Section 6 of the EIA Regulations, 2014.

The aim of the public consultation process is to co-ordinate a process through which I&APs are informed of the proposed Project and environmental assessment process and are provided with an opportunity to provide input into the project plan, the assessment and proposed mitigation measures. I&APs broadly refers to all landowners, adjacent landowners, land users, non-government organisations, municipalities, surrounding mines and industries, communities, commenting authorities and parastatals. An overview of the public participation process undertaken to date is outlined in Table 10 Due to COVID-19 restrictions alternatives methods to inform I&APs about the proposed Project were identified and are catered for in the Table 10 below.

Since the initiation of the public participation process, there have been several changes to the proposed Project description. In this regard, public participation material distributed to date, has referred to the establishment of West WRD 2, the increase in the height of existing TSF's through a self-raise and establishment of a new tailings dam (referred to as TSF 3). In this regard, public participation material distributed initially (in November 2021), referred to the following project components:

- Establish a new WRD (West WRD 2).
- Extend a previously approved WRD (currently West OG WRD).
- Establish WRDs above backfilled portions of the East and West pits (currently East and West OG WRDs).
- A new tailings storage facility (TSF 3).

The proposed Project description was revised and as such the public participation material was redistributed in April 2022 and referred to the following components:

- Extend a previously approved WRD (currently West OG WRD).
- Establish WRDs above backfilled portions of the East and West pits (currently East and West OG WRDs).
- Increase in the height of the existing TSF through self-raise.

The design work and planning for these project components need to be further progressed before Tharisa is able to initiate an environmental authorisation process for these components. Going forward, this environmental authorisation process only focusses on the establishment of the West OG WRD and the East OG WRD.

Table 10: Overview of the public participation process

Task		Description
Public participation completed to date	**Pre-application phase**	
	DMRE pre-application meeting	A pre-application meeting was held with the DMRE on 6 July 2021. The purpose of the pre-application meeting was to: • Provide information about the proposed Project and alternatives being considered (if relevant).

Task		Description
		• Provide information about the receiving biophysical, cultural, and socio-economic environment. • Provide information about the environmental authorisation process to be undertaken for the proposed Project. • Provide information and obtain input pertaining to the potential biophysical, cultural, and socio-economic impacts identified including associated specialist input required for the proposed Project. • Provide information and obtain input pertaining to the planned public participation process for the proposed Project. • Record any comments and suggestions made by the DMRE. A copy of the meeting minutes inclusive of the attendance register is included in Appendix C.
	Notification – I&APs	
	Land claims commissioner consultation	The Land Claims Commissioner has been contacted to confirm if any land claims have been lodged on the properties that the project activities are located on. On 24 May 2021 the Land Claims Commissioner confirmed that a land claim was associated with the project property, however the claim was dismissed on the basis that minimum requirements in terms of the Land Rights Act No. 22 of 1994 were not met. A copy of the correspondence with the land claims commissioner is included in Appendix C.
	A desktop social scan	A desktop social scan was undertaken to verity details of the existing I&AP database for Tharisa. The social scan included the following: • The verification of the relevant surrounding landowners, adjacent landowners, land users, non-government organisations, municipalities, surrounding mines and industries, community forums, commenting authorities and parastatals. • Verification of contact details for I&APs on the existing database. • Verification of appropriate communication structures. The above verification process was undertaken using a combination of methods which included telephonic discussions, deed searches and sourcing landowner information from Tharisa. The I&AP database will be updated on an ongoing basis for the duration of the environmental authorisation process.
	Background Information Document (BID)	A BID was compiled by SLR and distributed to all I&APs registered on the project database. The BID provided: • Information about the proposed Project and alternatives being considered (if relevant). • Information about the receiving biophysical, cultural, and socio-economic environment. • Information about the environmental authorisation process to be undertaken for the proposed Project. • Information pertaining to the potential biophysical, cultural, and socio-economic impacts identified including associated specialist input required for the proposed Project.

Task		Description
		• Information pertaining to the planned public participation process for the proposed Project. • Information on how I&aps can have input into the environmental assessment process. A registration and response form were attached to the BID, which provided I&APs with an opportunity to register as an I&AP and submit comments on the proposed Project. The BID was initially made available in English, Afrikaans, and Setswana on 25 November 2021. Due to changes in the project description, a revised BID in English, Afrikaans and Setswana was distributed on 11 April 2022. Copies of the BID including the proof of distribution is included in Appendix C.
	Site notices	SLR placed laminated A2-sized site notices in English, Afrikaans, and Setswana at key conspicuous positions in and around the Tharisa Mine as well as nearby towns on 25 November 2021. Due to changes in the project description, revised site notices in English, Afrikaans and Setswana were distributed on 11 April 2022. It is important to note that efforts were made to place site notices at the Bufelspoort Dam, Kilarnies and a Garage near the Tharisa Mine. SLR was only allowed to place site notices at the Garage. Copies of the site notices, and photographic proof of placement are included in Appendix C.
	Newspaper advertisements	Block advertisements were placed in two local newspapers. In this regard, advertisements were published in the Rustenburg Herald on 25 November 2021 and in the Brits Pos 26 November 2021. Due to changes in the project description, revised advertisement was published in the Rustenburg Herald and Brits Pos on 15 April 2022. Refer to Appendix C for copies of the advertisements.
	Flyers	Flyers were initially distributed in the communities on 25 November 2021. Due to changes in the project description, revised flyers were distributed on 11 April 2022. The flyers provided information pertaining to the proposed Project and the environmental authorisation process. In addition to this, the flyers informed I&APs how they can have input into the environmental assessment process and how to access information. Copies of the flyers are included in Appendix C.
	Loud hailing	Loud hailing services were utilised within the communities of Lapologang, Mmaditlhokwa and Bokamoso to inform members about the proposed Project and to invite them to attend community meetings in December 2021. Similar platforms will be used going forward.
Public participation completed to date	**Focussed meetings**	
	Focussed I&APs meetings and general public meetings during the Scoping Phase	To date the following meetings have been held: • Focussed meetings with ward councillor from Mmadithlokwa, Bokamoso and Lapologang on 30 July 2021, 15 August 2021 and 14 October 2021. • Community meetings with Mmadithlokwa and Lapologang on 08 December 2021. • Community meeting with Bokamoso on 14 December 2021. It should be noted that SLR was prevented from presenting the proposed Project to the community who indicated their unwillingness to participate in the

Task		Description
		process due to pending SLP related issues between the mine and the community. • Focussed virtual meeting with commenting authorities. This meeting was scheduled for 25 April 2022; however no commenting authorities attended the meeting. • General public meeting held on 25 April 2022. Changes to the project description were discussed during this meeting. The purpose of the focussed meetings and general public meetings were to: • Provide information about the proposed Project and alternatives being considered (where relevant). • Provide information about the receiving biophysical, cultural, and socio-economic environment • Provide information about the environmental authorisation process to be undertaken for the proposed Project. • Provide information and obtain input pertaining to the potential biophysical, cultural, and socio-economic impacts identified including associated specialist input required for the proposed Project. • Provide information and obtain input pertaining to the planned public participation process for the proposed Project. • Record any comments and suggestions made by the I&APs. Due to the change to the project description, additional meetings were held with the Lapologang, Mmaditlhokwa and Bokamoso ward councillors. The meeting also served to update the ward councillors regarding the status of the environmental authorisation process and the next steps in the process. Further to this, the ward councillor provided input regarding the location for the placement of the Scoping Report for public review. The following focussed meetings were held: • Focussed meeting held on 29 April 2022 to inform the Lapologang and Mmaditlhokwa ward councillors of the change to the project description. • Focussed meeting held on 04 May 2022 to inform the Bokamoso ward councillors of the change to the project description. A copy of all focussed and general public meeting minutes is included in Appendix C.
	Focussed meetings during the EIA and EMPr Phase	To date the following meetings have been held: • Focussed meetings with ward councillor from Mmadithlokwa and Lapologang on 21 November 2022. The purpose of the meeting was to: • provide an updated overview of the proposed project; • provide feedback following the impact assessment; and • discuss the way forward. Copies of the focussed meeting held with Mmadithlokwa and Lapologang is included in Appendix C.

Task		Description
	Application phase	
	NEMA/NEM:WA Environmental Authorisation application	Submission of the NEMA/NEM:WA Environmental Authorisation application form to the DMRE via the SAMRAD system. A copy of the acknowledgement of receipt is included in Appendix C.
	Review of the Scoping Report and EIA and EMPr	
	I&AP review of Scoping Report	The Scoping Report was made available for public review and comment for a period of 30 calendar days (18 May 2022 to 17 June 2022) to all I&APs registered on the project database. Non-technical summaries of the Scoping Report were made available to all I&APs registered on the project database via email. The Scoping Report was also be made available on SLR's data-free website. Hard copies of the report were made available at the following venues: • Bokamoso Community Hall • Lapologang Piet Retief School • Mmadikhlokwa Community Hall • Rustenburg Community Centre • Rustenburg Local Municipality • Piet Retief Primary school
	Submission of Scoping Report to the DMRE	The Scoping Report was updated to include comments received during the public review and commenting period. The Scoping Report acceptance letter is included in Appendix C.
	Review of the EIA and EMPr	The EIA and EMPr was made available for a 30-day review and comment period from 26 October 2022 to 25 November 2022. Copies of the report and NTS (available in English, Afrikaans, IsiXhosa- and Setswana) were made available on the SLR website and at the following public venues: • Bokamoso Community Hall • Lapologang Piet Retief School • Mmadikhlokwa Community Hall • Rustenburg Community Centre • Rustenburg Local Municipality • Piet Retief Primary school Copies of the report were made available electronically on a CD, on request. The NTS of the report (available in English, Afrikaans, IsiXhosa- and Setswana) was e-mailed to registered I&APs and authorities. In addition, I&APs were notified when the report was available for review via SMS. Copies of the NTS including the proof of distribution is included in Appendix C.
	Site Notices distributed during the EIA and EMPr phase	Laminated A2-sized site notices in English, Afrikaans, IsiXhosa and Setswana were placed at key conspicuous positions around the Tharisa Mine as well as nearby towns on 25 October 2022. Copies of the site notices, and photographic proof of placement are included in Appendix C.

Task		Description
Planned Consultation	Submission of EIA and EMPr for decision-making	Following closure of the commenting period, all comments received were incorporated and responded to in an Issues and Concerns Report. Where required the EIA and EMPr was updated to address comments received. The report including I&AP comments will be submitted to the DMRE for decision-making.
	I&AP notification of decision	After the DMR have reached a decision registered I&APs will be notified of the outcome of the application, the reasons for the decision and details of the appeal process.

8.1 SUMMARY OF ISSUES RAISED BY I&APS

A summary of the issues and concerns raised by I&APs, commenting authorities and the competent authority to date as part of the public participation process are captured in the table below. Please note, comment received during the EIA Phase of the project are indicated in **blue** text.

Table 11: Summary of Issues Raised by Interested and Affected Parties

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
Commenting authority				
South African Heritage Resource Agency				
Natasha Higgitt (SAHRA).	01/12/2021	Please note that all development applications are processed via our online portal, the South African Heritage Resources Information System (SAHRIS) found at the following link: http://sahra.org.za/sahris/. We do not accept emailed, posted, hardcopy, faxed, website links or DropBox links as official submissions. Please create an application on SAHRIS and upload all documents pertaining to the Environmental Authorisation Application Process. As per section 24(4)b(iii) of NEMA and section 38(8) of the National Heritage Resources Act, Act 25 of 1999 (NHRA), an assessment of heritage resources must form part of the process and the assessment must comply with section 38(3) of the NHRA. Once all documents including all appendices are uploaded to the case application, please ensure that the status of the case is changed from DRAFT	This was done.	N/A

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		to SUBMITTED. Please ensure that all documents produced as part of the EA process are submitted as part of the application.		
Elijah Dumisani Katsetse (SAHRA Heritage Officer)	12 December 2022	SLR Consulting has been appointed by Tharisa Minerals (Pty) Ltd to conduct an Environmental Authorisation (EA) Application for the proposed expansion of the existing and authorised Far West WRD 1 by a foot print of 109 ha on the Farms 342 JQ and Elandsfontein 467 JQ near Marikana in the Rustenburg Local Municipality, Bojanala Platinum District Municipality, North West Province. A draft Scoping Report (DSR) has been submitted in terms of the National Environmental Management Act, no 107 of 1998 (NEMA) and the NEMA Environmental Impact Assessment (EIA) Regulations for activities that trigger the . The scope of work will entail an addition of waste rock storage by a footprint of 109 ha and the establishment of a waste rock dump on backfilled portions of the East Pit covering an area of 72 ha. CTS Heritage have been appointed to provide heritage specialist input as part of the EIA process as required by section 24(4)b(iii) of NEMA and	As part of the proposed Project, independent specialists were appointed to undertake a Heritage Assessment and a Palaeontological Desktop Assessment. Copies of these assessments are included in Appendix L and Appendix M respectively. The recommendations outlined in the Final Comments have been noted, and have been included in the EMPr, which is included in Table 43. Further to this, SLR will ensure that a final copy of the EIA and EMPr is uploaded onto SAHRIS. In addition to this, once a decision has been received from the DMRE, a copy of the decision will be uploaded onto SAHRIS.	Table 43

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		section 38(3) and 38(8) of the National Heritage Resources Act, Act 25 of 1999 (NHRA). Lavin, J. May 2022. Heritage Screener: Proposed establishment of additional waste rock storage at Tharisa Mine near Marikana, North West Province. The author undertook a desktop assessment and notes that the proposed development area is located within an authorised development and mining operations. It is clear that all of the areas proposed for development have been either previously surveyed for heritage resources or impacted by the existing mine and as such, it is very unlikely that the proposed development will impact negatively on any significant archaeological heritage resources. No further assessment of impacts to archaeological heritage is recommended. Based on the available information, the proposed development is not likely to impact on significant heritage resources and as such, it is recommended that no further heritage impact assessments are required in terms of section 38 of the NHRA.	As part of the proposed Project, independent specialists were appointed to undertake a Heritage Assessment and a Palaeontological Desktop Assessment. Copies of these assessments are included in Appendix L and Appendix M respectively. The recommendations outlined in the Final Comments have been noted, and have been included in the EMPr, which is included in Table 43. Further to this, SLR will ensure that a final copy of the EIA and EMPr is uploaded onto SAHRIS. In addition to this, once a decision has been received from the DMRE, a copy of the decision will be uploaded onto SAHRIS.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		Bamford, M. May 2022. Letter of Exemption: Request for Exemption of any Palaeontological Impact Assessment for the Proposed Tharisa Waste Rock Dumps, near the Town of Marikana in the Bojanala District Municipality, and Rustenburg Local Municipality within the North West Province. The proposed additional waste rock dumps are located in the Rustenburg layered suite, Busheveld Igneous Complex. These are intrusive volcanic (Igneous) rocks so do not preserve any fossils at all. This is confirmed by the SAHRIS PalaeoSensitivity map grey shading. Therefore, we request an exemption of any Palaeontological Impact Assessment. In an Interim Comment issued on 20/07/2022 (**https://sahris.sahra.org.za/node/601541**), SAHRA acknowledged receipt of the DSR and the attached specialist report and stated that further comments will be issued upon submission of the DEIR. Since the issuing of the Interim Comment the DEIR has been submitted for commenting.	As part of the proposed Project, independent specialists were appointed to undertake a Heritage Assessment and a Palaeontological Desktop Assessment. Copies of these assessments are included in Appendix L and Appendix M respectively. The recommendations outlined in the Final Comments have been noted, and have been included in the EMPr, which is included in Table 43. Further to this, SLR will ensure that a final copy of the EIA and EMPr is uploaded onto SAHRIS. In addition to this, once a decision has been received from the DMRE, a copy of the decision will be uploaded onto SAHRIS.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		Final Comment The following comments are made as a requirement in terms of section 3(4) of the NEMA Regulations and section 38(8) of the NHRA in the format provided in section 38(4) of the NHRA and must be included in the Final EIA and EMPr: • 38(4)a – The SAHRA Archaeology, Palaeontology and Meteorites (APM) Unit has no objections to the proposed development; • 38(4)b – The recommendations of the specialists are supported and must be adhered to. No further additional specific conditions are provided for the development; • 38(4)c(i) – If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Elijah Katsetse/Phillip Hine 021 462 4502) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of	As part of the proposed Project, independent specialists were appointed to undertake a Heritage Assessment and a Palaeontological Desktop Assessment. Copies of these assessments are included in Appendix L and Appendix M respectively. The recommendations outlined in the Final Comments have been noted, and have been included in the EMPr, which is included in Table 43. Further to this, SLR will ensure that a final copy of the EIA and EMPr is uploaded onto SAHRIS. In addition to this, once a decision has been received from the DMRE, a copy of the decision will be uploaded onto SAHRIS.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		section 51(1)e of the NHRA and item 5 of the Schedule; • 38(4)c(ii) – If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Ngqalabutho Madida 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offense in terms ofsection 51(1)e of the NHRA and item 5 of the Schedule; • 38(4)d – See section 51(1) of the NHRA; • 38(4)e – The following conditions apply with regards to the appointment of specialists, If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA;	As part of the proposed Project, independent specialists were appointed to undertake a Heritage Assessment and a Palaeontological Desktop Assessment. Copies of these assessments are included in Appendix L and Appendix M respectively. The recommendations outlined in the Final Comments have been noted, and have been included in the EMPr, which is included in Table 43. Further to this, SLR will ensure that a final copy of the EIA and EMPr is uploaded onto SAHRIS. In addition to this, once a decision has been received from the DMRE, a copy of the decision will be uploaded onto SAHRIS.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		• The Final EIA and EMPr must be submitted to SAHRA for record purposes. • The decision regarding the EA Application must be communicated to SAHRA and uploaded to the SAHRIS Case application.	As part of the proposed Project, independent specialists were appointed to undertake a Heritage Assessment and a Palaeontological Desktop Assessment. Copies of these assessments are included in Appendix L and Appendix M respectively. The recommendations outlined in the Final Comments have been noted, and have been included in the EMPr, which is included in Table 43. Further to this, SLR will ensure that a final copy of the EIA and EMPr is uploaded onto SAHRIS. In addition to this, once a decision has been received from the DMRE, a copy of the decision will be uploaded onto SAHRIS.	
Elijah Dumisani Katsetse (SAHRA Heritage Officer)	15 February 2022	Interim Comment: The SAHRA APM Unit requests the following is undertaken in terms of section 38(3) of the National HeritageResources Act (25 of 1999) as part of the EA application process. The proposed expansion and/or addition of a TSF and WRD has the potential to impact negatively on heritage and/or cultural resources, therefore a heritage impact assessment must be conducted. A field-based assessment of the impact to archaeological resources must be conducted by a qualified archaeologist. The report must comply with section 38(3) of the NHRA and the SAHRA 2006 Minimum Standards: Archaeological and	An independent specialist was appointed to prepare a Heritage Impact Study for the proposed Project, which was made available to SAHRA for review and comment. A copy of the Heritage Impact Assessment is included in Appendix L.	Appendix L

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		Palaeontological Component of Impact Assessments, and the 2012 Minimum Standards: Archaeological Component of Heritage Impact Assessments. The Minimum Standards provides allowance for a Letter of Recommendation for Exemption that can be submitted by a qualified archaeologist should they deem it appropriate. The assessment should include any other heritage resources that may be impacted such as built structures over years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewscapes must also be assessed. Further comments will be issued upon receipt of the above and the Scoping and EIA reports inclusive of appendices.	An independent specialist was appointed to prepare a Heritage Impact Study for the proposed Project, which was made available to SAHRA for review and comment. A copy of the Heritage Impact Assessment is included in Appendix L.	
Department of Mineral Resources and Energy – Competent Authority				
Thilivani Merengi	Scoping report acceptance letter received via email	1. The Department has evaluated the submitted SR and plan of study for the environmental impact assessment and is satisfied that the document comply with the minimum requirements of appendix 2(2) of the Nation Environmental Management Act, 1998 (as amended) (NEMA)	The condition under 1. (a) and (b) has been included under Section 22, which outlines the conditions that need to be included in the EA for the proposed Project. In this regard, for the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at	Section 22

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		Environmental Impact Assessment Regulations, 2014. The SR is hereby accepted by the Department in terms of Regulation 22 (a) of the NEMA EIA Regulations, 2014 with the following conditions: (a) The expansion of the Far waste rock dump which is closer to the community will only be considered once the neighbouring community of Mmaditlhoka village has been relocated away from the site. (b) For the duration that the community is still located where it is currently, the expansion of the far waste rock dump should be put on hold from the mine's operation due to the environmental and social impacts already affecting the said community.	this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available.	
Thilivani Merengi	Scoping report acceptance letter received via email	2. You may proceed with the environmental impact assessment process in accordance with the tasks contemplated in the plan of study for EIA as required in terms of the NEMA EIA Regulations, 2014 and must cover the scope of assessment as content of the environmental impact assessment reports as stipulated on Appendix 3(3) of	Noted, this EIA has been prepared in line with the EIA Regulations, 2014.	N/A

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		NEMA:EIA Regulations, 2014, taking into consideration of the conditions on item no 1.		
Thilivani Merengi	Scoping report acceptance letter received via email	3. Please ensure that comments from all relevant stakeholders are submitted to the Department with the EIAR. This includes but is not limited to the Provincial Heritage Resource Authority, Provincial Environmental Department, Department of Agriculture, Forestry and Fisheries (DAFF), Department of Water and Sanitation (DWS) and the local municipality. Proof of correspondence with various stakeholder must be included in the EIAR. Should you be unable to obtain comment, proof of the attempts that were made to obtain comments should be submitted to the Department.	All comments received from stakeholders have been included in Appendix C	Appendix C
Thilivani Merengi	Scoping report acceptance letter received via email	4. In addition, the following amendments and additional information are required for the EIR: a) You are required to include the following: alternatives on the alternatives in the environmental Impact Report that you will submit. Please note that alternatives must include the description of alternatives to be considered and assessed within the prefer site including the option of not processing with the activity. Also	From a site layout alternatives perspective, the proposed Project will be located within the existing Mining Right boundary which is constrained for open space. The Tharisa Mine is also bordered by other mining companies (Western Platinum Mine, Marikana Platinum Mine and Samancor) on the West, North and Eastern boundaries of the Tharisa Mining Right area (refer to Map 4). The N4 and farming community of Buffelspoort is located to the South of the Tharisa Mine. In addition to this, some of the WRD's will be placed on previously disturbed areas, thereby minimising the project footprint. It follows	Section 7.1.2 and 7.1.3. Appendix C.

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		note that alternatives are different means of meeting the general purpose and need of the proposed activity, alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal; alternatives or no go alternatives. b) Include a clear newspaper advertisement. c) Should a water use licence be required, proof of application for a licence needs to be submitted. d) Information on services required on the site, e.g. sewage, refuse removal, water and electricity. Who will supply these services and has an agreement and confirmation of capacity been obtained? e) A construction and operational phase EMPr to include mitigation and monitoring measures f) Should blasting be required, appropriate mitigation measures should be provided.	that no alternative for the location of the proposed additional WRD's have been considered for the proposed Project. Alternatives pertaining to technology and the no-go alternative are included in Section 7.1.2 and 7.1.3. With reference to Section 8, block advertisements were placed in two local newspapers. In this regard, advertisements were published in the Rustenburg Herald on 25 November 2021 and in the Brits Pos 26 November 2021. Due to changes in the project description, revised advertisement was published in the Rustenburg Herald and Brits Pos on 15 April 2022. Tear sheets are provided in Appendix C. A water use licence will be required for the proposed Project as, the establishment of the WRD's triggers water uses in terms of Section 21 of the NWA. It is important to note, that the submission of a WULA, will be managed as part of a separate process. Tharisa is an existing and operational mine. The proposed east OG WRD will be situated over backfilled portions of the pit. The proposed Project will thus not have any additional services require and will make use of existing services already in place at the mine. The EMPr (part B) of this document provides mitigation ad management measures for the construction and operational phase.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
			No blasting will be required for the proposed Project.	
Thilivani Merengi	Scoping report acceptance letter received via email	5. Please ensure that the EIA Report includes the A3 size locality maps of the area and illustrates the exact location of the proposed development. The maps must be of acceptable quality and as a minimum, have the following attributes: • Maps relatable to one another; • Co-ordinates; • Legible legends; • Scale of 1:50000; • Indication of alternatives; and • Vegetation types of the study areas.	The locality map has been updated according to this requirement. All the figures for the proposed Project are included in Appendix B.	Appendix B.
Thilivani Merengi	Scoping report acceptance letter received via email	6. Further, it must be reiterated that, should and application for Environmental Authorisation be subjected to any permits or authorations in terms of the provisions of any specific Environmental Management Acts (SEMAs), proof of such application will be required.	Noted. No other authorisations in terms of SEMA's is required.	N/A
Thilivani Merengi	Scoping report acceptance letter	7. Please note that as part of your reports, you are required to provide and undertaking under oath as required per the EIA Regulation.	The relevant undertaking is provided in Section 39.	Section 39.

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
	received via email			
Thilivani Merengi	Scoping report acceptance letter received via email	8. You are requested to submit two (2) hard copies of the EIAR and EMPr and at least one electronic copy (CD/DVD) of the complete EIAR and EMPr to this Regional office	This will be done.	N/A
Thilivani Merengi	Scoping report acceptance letter received via email	9. Your attention is brought to section 24F of the NEMA which stipulates "that no activity may commence prior to an environmental authorisation being granted by the competent authority".	This is understood.	N/A
Community Leadership and Community				
Councillor Phillip Mntombi (Mmadithlokwa)	30 July 2021	Can Tharisa consider giving the dumps to the communities to use as aggregate for cement making for example?	The DMRE indicated this can be considered but with the following conditions: 1. The dump must be used for rehabilitation purposes (backfilling of open pits). 2. A clearly defined plan with an EMP from the requester addressing the following: • Negative environmental and social concerns that may emanate from the requester's project. • The location of the project. • Safety concerns from the planned project.	N/A

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
			• Legal/authority advice will also be necessary.	
Councillor Phillip Mntombi (Mmaditlhokwa)	30 July 2021	It is painful that the leadership went to the DMRE to present a proposal for the community to use the waste rock dumps as aggregate, the DMRE referred the leadership back to Tharisa and the proposal was not considered.	The DMRE indicated this can be considered but with the following conditions: 1. The dump must be used for rehabilitation purposes (backfilling of open pits). 2. A clearly defined plan with an EMP from the requester addressing the following: • Negative environmental and social concerns that may emanate from the requester's project. • The location of the project. • Safety concerns from the planned project. • Legal/authority advice will also be necessary	
Councillor Ellen Dikgang (Bokamoso)	30 July 2021	What we are doing today does not assist the communities at all. There have been multiple proposals from businesses around Bokamoso that were submitted to Tharisa, requesting access to the waste rock dumps for brick making, etc. No feedback has been received to date.		
	30 July 2021	Councillor Philip was at DMRE to propose the use of the waste rock dumps as aggregate, there are businesses in the communities that are qualified and could use the waste rock dumps to benefit their businesses.		
Ezekiel Ndlovu (Mmaditlhokwa)	8 December 2021	Tharisa must give us a written document that outlines the community benefits, including the area identified for resettlement as well as the house plan.	The proposed Project forms part of the existing approved operations and as such the development of the proposed WRD's will not generate any additional employment opportunities.	N/A
Thabiso (Lapologang)	8 December 2021	How will we benefit as a community if this proposed Project goes ahead? Please provide the project benefits in writing.		

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
Mr Mampuru (Mmaditlhokwa)	8 December 2021	How will the community benefit from the proposed Project?	As queries relating to community benefits fall outside of SLR's scope of work, it was agreed that the Tharisa SLP team will meet with community leaders to discuss these issues.	
BC Chairperson (Bokamoso)	14 December 2021	We do not benefit anything from Tharisa.		
Councillor Phillip Mntombi (Mmaditlhokwa)	30 July 2021	We have waste rock dumps that will encroach on the community in a land that does not belong to Tharisa, the leadership would like to obtain additional information regarding the socio-economic benefits before giving approval to the project to avoid being labelled as sell outs.	The Mmaditlhokwa community will be relocated before the west OG WRD is processed and thus does not form part of this application.	
Lie Mokamedi (Bokamoso)	30 July 2021	The purpose of the meeting is Tharisa telling the leadership that they have a project that they would like to initiate, the leadership cannot help the mine with its operations. Especially when there are no job opportunities associated with the project. This presentation should include the socio-economic benefits associated with the project.	The proposed Project forms part of the existing approved operations and as such the development of the proposed WRD's will not generate any additional employment opportunities. Addressing existing grievances and SLP related issues from Bokamoso is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this report for completeness purposes.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
	30 July 2021	The leadership cannot support the project when the community is not benefiting. Tharisa should take the project to the community and outline the socio-economic benefits, as the community is the one that suffers. Tharisa is consulting with the community because they are looking for a way to get the project through to the DMRE as they know they cannot do this project without the community.	Issues regarding the availability of pastoral land for livestock are outside the scope of the project. These issues have been forwarded to Tharisa for consideration.	
Tieho Ncheche (Lapologang)	15 August 2021	What are the benefits of the project for the communities? What are the opportunities for Small, Medium and Micro Enterprises for this project? We are having problems with access to pastoral land for our livestock. The electric fence surrounding the Tharisa mine is electrocuting our livestock every day. In terms of animal rights, will Tharisa provide pastoral land for our livestock?	As queries relating to community benefits fall outside of SLR's scope of work, it was agreed that the Tharisa SLP team will meet with community leaders to discuss these issues.	
Godfrey Sedimerd (Mmaditlhokwa Community Leadership)	29 April 2022	How can the community members benefit from this proposed Project?		N/A

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
Unemployment Forum (UF) representative 1 (Bokamoso)	14 December 2021	People from Bokamoso do not get employed by Tharisa. The posts from Tharisa require a very high qualification and most of the community members do not have those qualifications. For example, Tharisa will want a Grade 12 qualification and not many people in this community have a grade 12.	Addressing existing grievances and SLP related issues from Bokamoso is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this report for completeness purposes.	N/A
UF representative 1 (Bokamoso)	14 December 2021	The General Worker (GW) posts at Tharisa require a Grade 12 qualification. This community does not have many people with a Grade 12 qualification. Tharisa has brought their interns here to the meeting, whereas none of us have ever been called as interns to work for Tharisa.		
UF representative 1 (Bokamoso)	14 December 2021	Tharisa is also not upskilling us as a community so that we can qualify for some of these posts.		
UF representative 2 (Bokamoso)	14 December 2021	In this community we could even assist in the driving of the trucks that make a daily noise.		
UF representative 2 (Bokamoso)	14 December 2021	We need more learnerships from Tharisa and Tharisa has never given this to us.		

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
UF representative 2 (Bokamoso)	14 December 2021	We do not have high qualifications in this community, for example we do not have many people with a Grade 12 qualifications. There is no need for GWs to have a Grade 12 qualification. For example, SAMANCOR only requires GWs to have at least a Grade 10 qualification.	Addressing existing grievances and SLP related issues from Bokamoso is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this Report for completeness purposes.	N/A
UF representative 1 (Bokamoso)	14 December 2021	Ward 27 is mostly populated by a poor demographic but there has been no skills development for the community from Tharisa.		
UF representative 1 (Bokamoso)	14 December 2021	There are GWs at Tharisa and we do not know where they come from because they do not come from our community.		
Community Member 1 (Bokamoso)	14 December 2021	Tharisa should also provide us with opportunities to work internationally.		
Community Member 6 (Bokamoso)	14 December 2021	We would like 100 opportunities for the community from Tharisa. These include: 20 positions for general workers; 50 bursaries; and 30 opportunities for the BC. Tharisa has only provide two general worker posts to the community of Bokamoso.		

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
Community Member 3 (Bokamoso)	14 December 2021	Since the Tharisa operations have surrounded us, they should provide transport in the form of school buses for our children at the local school.	Addressing existing grievances and SLP related issues from Bokamoso is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this Report for completeness purposes.	N/A
Mokgadi (Bokamoso)	14 December 2021	General workers should not fail interviews. From my understanding, GW is simple work and people can easily be hired for it as it only requires your body and your mind. Fitness tests are the only things we should be failing.		
BC Chairperson (Bokamoso)	14 December 2021	Tharisa must give the BC a vender number.		
BC Chairperson (Bokamoso)	14 December 2021	Tharisa must not negotiate business opportunities with certain individuals. There are different forums in the community that they can liaise with to give the community the opportunities. This includes the BC, the UF and the Ward Councillor. An email can be sent to the secretary of the BC to pass on opportunities for the businesses in the community.		
BC Chairperson (Bokamoso)	14 December 2021	The school budget needs to increase. We need a bigger school within the community.		

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
BC Chairperson (Bokamoso)	14 December 2021	The community must be provided with 450 food parcels from Tharisa by Friday the 17th of December 2021 if they want the negotiations to continue. If the BC can supply food parcels for 400 – 450 households then Tharisa can assist with ease.	Addressing existing grievances and SLP related issues from Bokamoso is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this Report for completeness purposes.	
BC Chairperson (Bokamoso)	14 December 2021	We can get yellow machinery from Barloworld and get it if Tharisa would give us business opportunities of that kind.		
BC Chairperson (Bokamoso)	14 December 2021	Tharisa must give us at least five (5) computers with printers because our youth need them for their CVs and even our school children can use the computers.		
BC Chairperson (Bokamoso)	14 December 2021	Tharisa needs to engage with ward councillor and his leadership to give the community bursaries.		
BC Chairperson (Bokamoso)	14 December 2021	I have sat in meetings with Tharisa, and I have written several letters to Tharisa asking them to assist the community with at least food parcels and have never received any responses since 2016.		
BC Chairperson (Bokamoso)	14 December 2021	Tharisa has done nothing for the community since 2008.		

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
BC Chairperson (Bokamoso)	14 December 2021	Tharisa must put in writing how the community is going to benefit from the proposed Project. Since Tharisa began its operations in 2008, there has not been a single development that they have done for the community of Bokamoso. I have worked for Tharisa as well and have since resigned. There has not even been a water tank in the community from Tharisa even though we are the most affected community. If Tharisa wants to test us and continue with the WRD we will do what we have done with SAMANCOR and shut down Tharisa.	Addressing existing grievances and SLP related issues from Bokamoso is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this Report for completeness purposes.	N/A
BC Chairperson (Bokamoso)	14 December 2021	The BC knows there are many opportunities that could come from the mine, and we are ready. We know of the opportunities particularly in the logistics sector.		
Moloko Matshubeni (Bokamoso)	14 December 2021	Tharisa advertises posts for the broader community before they advertise them solely for us, first. For example, by making the posts open via email, which makes it open to everyone in South Africa before we can apply and more likely than not, there are more qualified candidates than us. Tharisa should first look for candidates		

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		within the community before looking for candidates outside our community, so that we have an advantage.	Addressing existing grievances and SLP related issues from Bokamoso is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this Scoping Report for completeness purposes.	
Gibson Masena (Mmaditlhokwa)	8 December 2021	The WRD will be close to our school. We must benefit from the development. While Tharisa is blasting, Lonmin and Sibanye provide Tharisa with staff. As a community we are not benefitting.	For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available.	N/A
Christina Mudau (Mmaditlhokwa)	8 December 2021	On the map that is on slide 5 of the presentation that was given by SLR, there is the yellow shape that is above the proposed West WRD 2, that is the local school. Tharisa is placing the dump close to our children's school. Our children will inhale dust and pollution and get affected by the vibrations. We refuse. It is not fair as our children are inhaling air pollution. Tharisa does not care for us, will the school be relocated and where is Tharisa planning to relocate it to?		
Councillor Phillip Mntombi (Mmaditlhokwa)	30 July 2021	Are the proposed waste rock dumps located within the community or do they encroach onto the community?		
Elias (Did not sign the register)	15 August 2021	Are you aware of the impacts of the proposed Waste Rock Dumps (WRDs) to the community? The community is currently suffering from the	For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion	Appendix E

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		impacts as a result of the existing WRDs and other mining operations. What measures will be in put in place to manage the dust, noise and air quality impacts experienced by the community.	of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available. Blasting will not be undertaken as part of this project.	Appendix E
Thabo Maluleka (Lapologang)	8 December 2021	We do not sleep at night because of the noise from the blasting and the vehicles. The dust is also unbearable.		
Tshepo Jonas (Mmaditlhokwa)	15 August 2021	Dust is so visible from the communities? How much dust are communities inhaling daily? The establishment of the additional WRDs will only worsen the situation.		
Zanethemba Badula (Bokamoso)	14 December 2021	Since 2015, Tharisa started with the blasting. The trucks have been making a lot of noise and the dust has been excessive and we have reported all these issues to the councillor, and we do not receive any responses. Tharisa has not even provided us with assistance with these issues since. The proposed WRD will not go ahead in our community if you do not take our issues and concerns seriously.	The Bokamoso community will not be affected by the proposed project. This was confirmed through numerous specialist assessments. Simulated PM10 daily ground level concentrations (GLCs), with current mitigation measures in place, are in non-compliance with the NAAQS over a portion of the Maditlhokwa Community and to the north-east of the mining rights boundary, but at no other AQSRs. Annual average GLCs are within compliance with the NAAQS at all AQSRs, except at Maditlhokwa Community.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
Lesiba Mookamedi (Bokamoso)	15 August 2021	Please advise if the area been assessed to determine whether it was safe? What is the distance from the new WRDs to the community? Please advise what is the extent of the buffer in terms of health and safety? What is the buffer that is allowed in terms of the DMRE regulations? SLR should undertake an assessment to identify the environmental issues such as noise from blasting, air quality issues etc. This would inform the discussion with the community leadership. The leadership cannot convince the community to accept the project when people are suffering from the impacts as a result of the existing WRDs and other mining operations. This project will not be supported without answers. The students from communities will be affected by the noise from the proposed Project. Please provide the leadership with mitigation measures to address the noise and air quality issues from Tharisa.	Noise levels due to project operations are predicted to exceed the day-time IFC noise guideline of 55 dBA for residential areas up to a distance of ~110 m from the proposed West OG WRD and ~250 m from the East OG WRD. Noise levels due to project operations are predicted to exceed the night-time IFC noise guideline of 45 dBA for residential areas up to a distance of ~700 m from the proposed West OG WRD and ~1100 m from the East OG WRD. No blasting will be undertaken as part of the proposed Project. For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available.	Appendix E
Nonti and other community	8 December 2021	Blasting and the explosives is causing cracks on our windows, even the plates and it scares the children. The fumes from the dust is also affecting	Simulated PM10 daily ground level concentrations (GLCs), with current mitigation measures in place, are in non-compliance with the NAAQS over a portion of the Maditlhokwa Community and to the	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
members (Lapologang)		our health. The network signal is also bad because of the blasting.	north-east of the mining rights boundary, but at no other AQSRs. Annual average GLCs are within compliance with the NAAQS at all AQSRs, except at Maditlhokwa Community. However, the simulation shown for dust from the proposed East OG WRD will not affect the Bokamosa community. No blasting will be undertaken as part of the proposed Project. Grievances outside the project scope should be directed to Tharisa. For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available. Activities on the proposed East OG WRD may only take place during the day with other mitigation measures implemented to reduce the impact on the community.	
Given (Lapologang)	8 December 2021	How far does the blasting travel in metres so we know how many metres we should be relocated to?		
Christina Mudau (Mmaditlhokwa)	8 December 2021	Tharisa wants more WRDs, and it seems as though we are a nuisance to them for residing in the area where they want to operate. Tharisa only wants to benefit themselves. We already experience impacts like vibrations from blasting and dust pollution from the blasting. Why were specialists not brought in a few years ago to do the assessments? The blasting affects our properties. Our water is also contaminated. Our houses are no longer balanced, they tilt and as a result our homes are flooding when it rains.		
Cecilia Hanyane (Mmaditlhokwa)	8 December 2021	When Tharisa wants something from the community, they can come into the community to engage with us. We have underlying water issues, the water we drink is contaminated. There is also a blasting issues that has affected our elderly and our children. The elderly people are becoming sick as a result of the dust in the area. Furthermore, it		

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		is heart breaking to see our children run around like they are crazy and faint during blasting.	No blasting will be undertaken as part of the proposed Project. Grievances outside the project scope should be directed to Tharisa. For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available. The monitoring plan for the proposed Project have been included in Section 35.	
Mr Mampuru (Mmaditlhokwa)	8 December 2021	On the issue of the environment, we need a proper monitoring plan. We are grateful that you are here doing the assessment and compiling and environmental report.		
Mr Mampuru (Mmaditlhokwa)	8 December 2021	We understand that you may not have all the answers at this stage because you still need to do the assessments but as a community as well, we need to form committees and teams that will deal with all the issues we have. We need to undo the mistake of the past leadership. We need proper direction as a community before we engage with the SLP team.		
Tebogang Makoanjane (Lapologang Community Leadership)	29 April 2022	The waste rock dump (WRD) in the west looks close to Lapologang. How will the impacts of dust and blasting affect our community?	For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such,	Appendix E
Tseere Mokwala (Mmaditlhokwa	29 April 2022	Community members close to the mine have had issues with the impacts from mining activities.		

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
Community Leadership)			the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available. No blasting will be undertaken as part of the proposed Project. Grievances outside the project scope should be directed to Tharisa.	
John Salang (Mmaditlhokwa Community Leadership)	29 April 2022	The proposed infrastructure is close to the Lapologang community. There are already existing mining activities that affect the community e.g., noise pollution from the blasting and dust – how do you as a consultant expect that the new infrastructure will affect us?		
Tseere Mokwala (Mmaditlhokwa Community Leadership)	29 April 2022	How long with these reports take as I do not want to agree or form an opinion, yet. I will engage further on issues after the Scoping Report.	The Scoping Report was made available for public review and comment for a period of 30 calendar days (18 May 2022 to 17 June 2022). The EIA and EMP was made available from 26 October 2022 to 25 November 2022.	N/A
John Salang (Mmaditlhokwa Community Leadership)	29 April 2022	On the west operations of the mine, I see that there is proposed backfilling in the pits. How was the rehabilitation done for the pit in the east?	The rehabilitation of the open pits still needs to be done. Currently in-pit dumping takes place.	N/A
Mr Mampuru (Mmaditlhokwa)	8 December 2021	We as Black people do not take each other seriously because if this were a white person addressing us right now, instead of a Black person, we would have listened to them.	Tis will be taken into consideration for any future community meetings.	N/A
Elias (Did not sign the register)	15 August 2021	Let me refer you to chapter 4 of the Mining Charter in terms of establishment of the WRDs. I would like to request SLR to undertake a health survey for all affected communities as part of the	As part of the proposed Project, an independent Air Quality Specialist was appointed. It is important to note that as part of their work, a preliminary health screening process was undertaken assessing	Appendix E and Appendix F

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		environmental assessment process. As the community is already suffering from the impacts because of the existing WRDs and other mining operations.	human health risk due to exposures through inhalation only. In this regard, the preliminary health screening caters for the following: 1. Hazard Identification: The specialist examined whether the proposed Project has the potential to cause harm to humans and/or ecological systems, and if so, under what circumstances. This is covered by the AQIA for the inhalation pathway by identifying the pollutants that are/will be emitted and ranking these based on toxicity (identifying the pollutants that are likely to impact on human health). 2. Dose-response assessment: The specialist gathered information to determine the numerical relationship between exposure and effects. This is covered by the AQIA for the inhalation pathway by quantifying the amount of pollution emitted and determining the pollution concentrations that will impact on human health by screening these against ambient air quality standards and guidelines that are there to protect human health. 3. Exposure assessment: The specialist will examine what is known about the frequency, timing, and levels of contact with the proposed Project. This is covered by the AQIA for the inhalation pathway by quantifying the amount of pollution emitted and determining the pollution concentrations that will impact on human health by screening these against ambient air quality standards and guidelines that are there to protect human health. 4. Risk Characterisation Risk: Includes the estimated or measured exposure level for each stressor and plant or animal population, community, or ecosystem of concern. This is covered on a screening	
Tshepo Jonas (Mmaditlhokwa)	15 August 2021	The Department of health together with the mine needs to conduct a health survey to ensure that communities are not harmed by the proposed Project. SLR is advised to consult with the mine prior to holding meetings with the community. The community would like to be relocated to ensure that they do not suffer from the environmental impacts because of the Tharisa mining operations. Please undertake a risk assessment before you schedule community meetings. SLR has stated that the meeting held forms part of the engagement process, however, this could be perceived as approval by community members. It would therefore make sense for the specialist studies to be undertaken first to ensure that communities can be provided with answers.		

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			level as part of the AQIA, where the modelled impacts are screened against air quality standards and guidelines, thus if these "flag": then a more in-depth assessment is required. Simulated PM10 daily ground level concentrations (GLCs), with current mitigation measures in place, are in non-compliance with the NAAQS over a portion of the Maditlhokwa Community and to the north-east of the mining rights boundary, but at no other AQSRs. Annual average GLCs are within compliance with the NAAQS at all AQSRs, except at Maditlhokwa Community. The west OG WRD will not be processed during this application due the impacts on the community.	
Elias (did not sign the register)	15 August 2021	The WRDs will result in clearance of additional land. The DMRE, SLR and Tharisa should undertake a joint inspection to assess the health and safety impacts of the project. Please provide documents that show that SLR together with Tharisa, consulted with the DMRE. Please note that the property values within the communities are decreasing due to the environmental issues from Tharisa's mining operations. It is a waste of time for the community	As part of the proposed Project a pre-application meetings was held with the DMRE. A copy of the meeting minutes is included in Appendix C. The proposed east OG WRD will be situated in a disturbed area (above the backfilled pit and will not require additional undisturbed land. For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts	Appendix C

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		leaders to sit with SLR to raise major concerns which SLR is failing to respond to.	pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available.	
Former Ward 27 Councillor (Bokamoso)	14 December 2021	The rocks from the WRD also fall onto our roads.	Grievances outside the project scope has been forwarded to Tharisa for consideration.	N/A
Councillor Ellen Dikgang (Bokamoso)	30 July 2021	The leadership cannot always come to approve the project when the community is not benefiting. The attendance register should not be submitted to the DMRE until the socio-economic benefits of the project are outlined.	Attendance at meetings with community leadership does not provide any form of approval for the proposed Project and the attendance register is only used to provide proof that SLR has consulted with I&APs.	N/A
Thabo Ncheche (Lapologang)	15 August 2021	The attendance register will be used by SLR as proof of consultation to the DMRE.		
Thabo Ncheche (Lapologang)	15 August 2021	The leadership is not attending this meeting to give Tharisa approval to establish the WRDs. Please tell the DMRE that the leadership is saying a big “NO” to the project.	Your objection to the proposed Project is noted. For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such,	N/A

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			the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available.	
Kedibone Khumalo (Mmadithlokwa)	8 December 2021	How do you agree to the WRD project when you are busy with a pending relocation process with the community? The proposed Project will result in even more negative impacts such as the impact of dust that we are already experiencing?	Tharisa requires additional space for the storage of waste rock to allow for the continuation of existing mining activities. However, for the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available.	Appendix E
Councillor Ellen Dikgang (Bokamoso)	30 July 2021	We have made attempts to engage with Tharisa regarding environmental issues such as the blasting methods used (which is very dangerous), noise and dust and we did not get any assistance. We, therefore, cannot sit here and approve the project. The communities will be asking questions	SLR first started engaging with the communities and leadership prior to the Impact Assessment and thus had limited information on how the project will affect the communities. Feedback meetings with the community leadership were held to provide feedback to I&APs regarding issues and concerns raised, the	Appendix E and the minutes of the meeting are attached as Appendix C

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		which we are not able to answer. We, therefore, please with SLR and Tharisa to meet us halfway.	findings of the specialist studies as well as the impacts and mitigation measures identified for the proposed Project. SLR also discussed the DMRE's decision to place the application of the West OG WRD on hold. Minutes to the meetings are attached in Appendix C.	
Thabo Ncheche (Lapologang)	15 August 2021	The leadership is upset, we do not understand if SLR is failing to deliver or if it is not prepared enough to answer our questions. If SLR cannot provide answers to us as the leadership, how will it provide answers to the communities? SLR is failing us, we have had two meetings and SLR is still failing to provide answers to our questions. Please do your research.		
Thabo Ncheche (Lapologang)	15 August 2021	I signed my name on the register not to give approval for the project but to say that I was here listening to the lies of the consultants. Something similar was done when mining in the west pit commenced. Tharisa said they would not blast, however, they started to blast eventually. SLR will take the attendance register and attached it to their report, stating that the project can continue. We signed to say we are starting negotiations for Tharisa to establish additional WRDs. For the next meeting, all representatives from Tharisa, DMRE and farmers must attend.	Attendance at meetings does not provide any form of approval for the proposed Project and the attendance register is only used to provide proof that SLR has consulted with I&APs.	N/A

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Elisa (did no sign the register)	15 August 2021	Mr Mokotedi as a representative of Tharisa has heard all the concerns raised. The leadership is not happy about the presentation. Please ensure that meeting minutes are submitted to Tharisa to provide them with feedback from this meeting.	Minutes of the community meetings were compiled and are included in Appendix C. Further to this, all comments and concerns raised by communities have been included in the Scoping Report and EIA for consideration by the DMRE.	Appendix C
Lie Mokamedi (Bokamoso)	30 July 2021	How many tons of waste rock dumps will be produced because of the proposed Project and how long is the project?	East OG WRD: Approximately 26.26 million m^3 (approximately 14.6 months of storage).	N/A
George (Lapologang)	8 December 2021	From the research I have done, a mine has never been stopped from placing a WRD. There has only been one mine that has been stopped and that was in 1998 in Welkom, Free State. Therefore, we need an honest response from Tharisa on whether they will go ahead with the WRD or not. That way we know how to approach Tharisa.	SLR is not able to comment on the decisions made by the DMRE in terms of other projects in South Africa. In terms of the proposed Project, Tharisa is planning to establish additional WRD (East OG WRD) and will therefore submit the EIA and EMPr to the DMRE for decision making purposes. Only the DMRE can decide whether the proposed Project can commence or not. The west OG WRD is no longer being considered as part of the proposed Project.	N/A
Tieho Ncheche (Lapologang)	15 August 2021	The simplest way to communicate with the task team and the leadership can be via WhatsApp and email.	In order to meet the needs of all individuals within communities, SLR makes use of various forms of communication platforms. This includes a combination of SMS notifications, email notifications, focussed meetings with the leadership/ ward councillors, general community meetings. In addition to this, loud hailing is also used to inform community members of the planned meetings.	Section 8
Lesiba Mookamedi (Bokamoso)	15 August 2021	There are community members who do not have smart phones to access the project related information, as such the leadership would prefer		

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		for community meetings to be held. This will allow the elderly to participate in the process.	In order to meet the needs of all individuals within communities, SLR makes use of various forms of communication platforms. This includes a combination of SMS notifications, email notifications, focussed meetings with the leadership/ ward councillors, general community meetings. In addition to this, loud hailing is also used to inform community members of the planned meetings.	
Elias (Did not sign the register)	15 August 2021	The proposed line of communication (i.e., the use of email, WhatsApp and SMS) is only effective when communicating with the leadership. These methods of communication will not be effective for the bulk of community members.		
Tshepo Jonas (Mmaditlhokwa)	15 August 2021	The ideas presented by SLR regarding community engagement are acceptable, however, they target the youth. Elderly people who do not have access to the website still need to be engaged. As such, community meetings will be required to ensure that the elderly are able to participate in this process.		
Elias (Did not sign the register)	15 August 2021	Did SLR consult with the DMRE? Or are they only starting to consult with the community leadership? Can we as the leadership receive the presentation that was done for the DMRE?	A project announcement meeting was held with the community leadership on the 30 July 2021. A pre-application meeting was also held with the DMRE on 6 August 2021. Of copy of the DMRE pre-application meeting minutes (which includes a copy of the presentation) is included in Appendix C. It is important to note that the project description for the proposed Project has been revised since the onset of the project and as such certain project components presented at the pre-application meeting no longer form part of this environmental authorisation process.	Appendix C

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Ezekiel Ndlovu (Mmaditlhokwa)	8 December 2021	On slide 8 of the presentation, you mentioned that the process where you are in right now will run from May to December. I do not understand this as it is December right now, why did you only come to us now in December?	At the time of the presentation, the project was in the pre-application phase. SLR was not able to schedule meetings earlier due to COVID restrictions. It should also be noted that the pre-application phase also included preparation of public participation materials such as a BID, site notices and meetings with authorities and the community leadership. These activities form part of the pre-application phase and were undertaken prior to the community meetings.	Appendix C
Ditshotlo Moleme (Task Team, Mmaditlhokwa)	15 August 2021	Please go back and do your homework first before you come to the communities to present the project. SLR should also make sure that all relevant stakeholders are included in the consultation process.	Initial meetings were arranged with community leadership/ ward councillors (also known as the task teams) at the onset of the proposed Project. These initial meetings were specifically focussed on confirming who all the relevant community stakeholders include and to obtain confirmation regarding the best mechanisms of communicating with the communities and disseminating information within the communities. Given that the environmental authorisation process was in the initial stage it was not possible to provide answers to all questions raised at that time. As part of the EIA and EMPr, answers to questions (within SLR's scope) raised are provided. Further to this, feedback meetings with community leaders were set up to provide feedback to I&APs regarding issues and concerns raised, the findings of the specialist studies as well as the impacts and mitigation measures identified for the proposed Project.	Appendix C
Dipuo Ubisse (Bokamoso)	15 August 2021	SLR should come prepared to meetings, especially given that there was an initial consultation that was undertaken. We expect SLR to have all the answers for this project.		

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			SLR first started engaging with the communities and leadership prior to the Impact Assessment and thus had limited information on how the project will affect the communities. Feedback meetings with the community leadership were held to provide feedback to I&APs regarding issues and concerns raised, the findings of the specialist studies as well as the impacts and mitigation measures identified for the proposed Project. SLR also discussed the DMRE's decision to place the application of the West OG WRD on hold. Minutes to the meetings are attached in Appendix C	
Philip Mntombi (Mmaditlhokwa)	15 August 2021	We are still fighting with Tharisa because of existing environmental issues, yet they would like to establish additional waste rock dumps? I can't allow you to conduct public participation in my community as I know the pain of my community. I am fighting with the community as if I agreed for Tharisa to blast. This process will continue without our agreement, as per the environmental authorisation process outlined on page 9 of the presentation. It is painful	Your objections have been noted. Issues relating to community benefits all outside of SLR's scope of work and will be dealt with by Tharisa.	N/A

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		to allow Johannesburg companies to come and benefit while the community is suffering.		
George (Lapologang)	8 December 2021	Tharisa must not hide anything from us so that we can have a clear idea of a way forward. Another thing is that we need to know is if Tharisa has agreed to go ahead/is going ahead with the proposed Project or not, so that we do not waste our time in these meetings and put forward our views on the proposed Project when Tharisa will not respond to our views. We need to know if Tharisa will take into consideration the communities' issues on the ashes/dust. This way we know how to reach a fair consensus with Tharisa. Do not lie to us or hide things from us. We need to know that at the end of the day, Tharisa is going to do what they want to do. That way we can have one voice as a community.	SLR is the independent EAP appointed by Tharisa to undertake the environmental assessment process for the proposed Project. All comments raised during the meeting are noted and have been collated and submitted to the DMRE for decision making together with the EIA and EMPr. The ultimate decision to approve the proposed Project is made by the DMRE and is based on the findings of the environmental impact assessment process. For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available.	N/A
Thabo Paelwana (Mmaditlhokwa)	8 December 2021	We need to know what the project is about. You are speaking a lot of English and old people don't	Noted. A separate session was held earlier with the elderly people to present the project to them without using the technical language.	N/A

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		understand English. We need an explanation again on what is going to take place.		
Aubrey Thobejane (Mmaditlhokwa)	8 December 2021	You speak about the application that will be submitted for the project; however, operations have already commenced. Tharisa is blasting.	Tharisa mine has existing authorisations for their current operations, including the mining of the two open pits which would result in blasting at specified time intervals. The proposed Project has not commenced and can only commence with all necessary approvals have been obtained. The proposed Project components do not require blasting.	N/A
Aubrey Thobejane (Mmaditlhokwa)	8 December 2021	The constitution states that people need to be the centre in anything that is done. You say you are using NEMA but what about specific environmental management acts? Section 2 of NEMA states that environmental management must always place people and their needs at the forefront of its concerns including physically, psychologically, socially, and culturally. Did Tharisa apply the 7 (seven) principles in NEMA? It shows that Tharisa does not care for the people.	Noted. The environmental assessment process takes into account specific environmental management acts that are relevant to the project. Section 5.5 of this report, outlines how the principles of NEMA were taken into consideration.	Section 5.5
Kedibone Khumalo (Mmaditlhokwa)	8 December 2021	Please change the meeting times with the communities from the morning to be at 14:00 or 16:00.	Noted, should any community meetings be required it would be scheduled between 14:00-16:00.	N/A
Christina Mudau (Mmmaditlhokwa)	8 December 2021	Has our area changed from a residential area similar to when our ancestors resided here? Is it now a mining area on maps?	Mmaditlhokwa remains a residential area, but it is located within the mining right area.	N/A

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		I know the history of Mmaditlhokwa. It is a mining area, and it is not residential area, but it is still the government's responsibility to engage people within the mining area when making decisions such as the proposed Project.		
Nonti (Lapologang)	8 December 2021	Where will be relocated since the rocks/waste are going to be dumped here? We are already suffering from diseases such as asthma and TB from the current WRDs that are surrounding us.	For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available.	N/A
Dipuo (Lapologang)	8 December 2021	What will happen to the people when they are resettled? Where will they be taken to?		
Michael (Lapologang)	8 December 2021	What about the relocation issues? Relocation has been pending for a long time and Tharisa wants to go on with another WRD. My suggestion is that Tharisa relocates us and then they continue to do what they want to do		
All Community Members (Lapologang)	8 December 2021	This environmental process must run concurrently with the relocation process. Is the relocation still happening? Are we still going or not? We are surrounded by dumps, and we cannot be living like this, we need a solution.	For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang,	N/A

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Thabo Paelwana (Lapologang)	8 December 2021	Where are you relocating the people now that you have decided to deposit waste rock here or will we remain here in Mmaditlhokwa?	Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available. Resettlement falls outside the scope of this environmental process. This question has however been recorded as part of this process for completeness purposes and will be provided to the Tharisa's SLP team for consideration. For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available.	
Mapule Tiro (Mmaditlhokwa)	8 December 2021	My mother was relocated by Tharisa mine before to Mmaditlhokwa. I do not know of the law that allows for people to be relocated multiple times to allow for the expansion of the mine. Black people are offered RDP houses which end up cracking while farmers south of the mine are given money as part of the relocation process.		
Cecilia Hanyane (Mmaditlhokwa)	8 December 2021	All Tharisa cares about is making money, you don't care about us, why don't you relocate us so that you can make money? Why are white farmers south of the mine given money to relocate? How long does it take for Tharisa to find a suitable land for relocation? Please call the executives to come to the communities and address us. They must not send you.		
Kedibone Khumalo (Mmadithlokwa)	8 December 2021	Can the issue of relocation please be addressed before Tharisa implements any projects? We want to relocate, please provide us with a house plan.		N/A
Mr Mampuru (Mmaditlhokwa)	8 December 2021	The process of relocation started in 2012, to date this process has not been finalised, the past leadership failed to take responsibility to push the		

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		mine to relocate us. There was lack of leadership structures previously but thus will be resolved with the current leadership.	Resettlement falls outside the scope of this environmental process. This question has however been recorded as part of this process for completeness purposes and will be provided to the Tharisa's SLP team for consideration.	
Thabo Paelwana (Mmaditlhokwa)	8 December 2021	Tharisa also needs to come directly to the people. We know of Thabang Maluke (Tharisa representative) and perhaps he now fears the community and has sent Gordon instead. We need direction from Tharisa. Please provide us with a date of resettlement. We want the directors to come engage with the community themselves. White people that used to live in Mmaditlhokwa were given money to relocate. We are assuming that Tharisa would have to build another school before the project commences. We are also assuming that the community would also benefit before the project commences. We are willing to relocate provided there are benefits for us as a community.		N/A
Gibson Masena (Mmaditlhokwa)	8 December 2021	We want the detailed steps that are to be taken by Tharisa when relocating us?		
Adam Pele (Mmaditlhokwa)	8 December 2021	We want Tharisa to come here to the community so that we can show them the environmental		

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		damages directly. What about the relocation issue?	Resettlement falls outside the scope of this environmental process. This question has however been recorded as part of this process for completeness purposes and will be provided to the Tharisa's SLP team for consideration. For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available.	
Christina Mudau (Mmaditlhokwa)	8 December 2021	The executives of Tharisa (such as the MDs and CEOs) must come to Mmaditlhokwa and see what is happening in this community for themselves. Tharisa does not respect us, they do not value us meanwhile they are making billions. Please relocate us.		
Mr Mampuru (Mmaditlhokwa)	8 December 2021	The process of relocation started in 2012, to date this process has not been finalised, the past leadership failed to take responsibility to push the mine to relocate us. There was lack of leadership structures previously but thus will be resolved with the current leadership.		
Masisi Plaatjie (Lapologang Community Leadership)	29 April 2022	In the last community meeting with SLR, the community mentioned that they wanted to be relocated and resettled before the proposed Project commenced. What is the update from Tharisa with regards to this issue?		
Shepard Mampuru (Mmaditlhokwa Community Leadership)	29 April 2022	Will people be relocated near the west of the WRD as they seem to be affected?		

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Shepard Mampuru (Mmaditlhokwa Community Leadership)	29 April 2022	From my understanding a waste rock dump (WRD) should have a tailings facility in close proximity to it and this proposed WRD in the west does not have one close to it. As consultants, you should advise Tharisa.	Waste Rock material is unwanted material that is extracted from an open pit in order to allow for access to the underlying ore body. The waste rock is then stored on surface. Tailings material is generated as part of the processing plant and needs to be disposed of onto a tailings dam. It follows that these two types of waste form part of different waste streams and are not dependent on the other.	N/A
Godfrey Sedimerd (Mmaditlhokwa Community Leadership)	29 April 2022	Which road will be used to access the new development?	The existing internal mine haul roads will be used. No new haul roads will be established.	N/A
Mr Jali (Bokamoso Community Leadership)	04 May 2022	Are there still opportunities to add my comments on the project?	Opportunity to add comment was provided throughout the S&EIA Process.	N/A
John Salang Mmaditlhokwa and Lapologang Community Leadership	Meeting held 21 November 2022 (the minutes of the meeting is provided in Appendix C)	Mr. John Salang (JS) requested that SLR provide this feedback in writing in order to share the feedback with the community during a meeting on Wednesday (23 November 2022).	SLR has provided the meeting feedback in writing though the minutes of the meeting, The information provided is as follows and the minutes are also attached in Appendix C Chané Coetzee (CC) gave a presentation providing an updated overview of the Proposed Project and provided information pertaining to the following project components: • Expansion of the existing and approved Far West WRD 1 by a footprint of 109 ha. The expanded area will be referred to as the West Above Ground (OG) WRD. Portions of the West OG WRD will be located on backfilled areas of the West Pit; and	Appendix C

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			• The establishment of a waste rock dump (referred to as the East OG WRD) on backfilled portions of the East Pit. The proposed East OG WRD will cover an area of approximately 72 ha. CC outlined the current environmental authorisation phase, and the public participation process that has been undertaken to date for the Proposed Project. CC provided feedback on the impacts identified for the proposed project. CC confirmed that numerous specialist studies were undertaken to inform the draft Environmental Impact Report (EIR). CC confirmed that due to the nature of the activity and current mining activities in the project area, most of the impacts will remain high or medium without mitigation and medium to low with mitigation. CC further provided feedback in terms of the scoping acceptance letter from the Department of Mineral Resources and Energy (DMRE). CC outlined that the scoping acceptance letter included a condition that the EIA phase may continue for the east above ground WRD, but that the west above ground WRD will not be processed as part of this application as the Mmaditlhokwa community must first be relocated. CC provided a map of the night-time simulated noise levels that shows the high impact it will have on the Mmaditlhokwa Community. CC further stated that the specialist recommended that activities on the	

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			proposed East OG WRD must be restricted to day-time hours only; or, that the Mmaditlhokwa Community is relocated (as night-time activities due to East OG WRD exceed IFC residential guidelines at this NSR). CC did not discuss the recommendations for the West OG WRD since it will not be processed as part of this application. CC concluded that: 1. An EA amendment process will be undertaken to include the West OG WRD once the Mmaditlhokwa community is relocated. 2. The proposed project will not affect Lapologang community. 3. Activities on the eastern OG WRD will be limited to day time hours only, thus not affecting the Mmaditlhokwa community. 4. An EIA for the relocation of the Mmaditlhokwa community has been undertaken and is pending approval by the DMRE. 5. Due to the above, it is not considered necessary for the EAP to facilitate a public meeting to provide this feedback to the communities, but that the traditional leaders and councilors will be in better position to provide the communities with this feedback. 6. The 30 day public review period will end on 25 November 2022. No comments that relate specifically to the Proposed Project were received to date. The comments received relate to concerns in terms of the current mining activities.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
John Salang Mmaditlhokwa and Lapologang Community Leadership	Meeting held 21 November 2022	Clarification around the relocation of the Mmaditlokwa and Lapologang needs to be clarified with Tharisa, outside of this meeting.	CC provided feedback in terms of the scoping acceptance letter from the Department of Mineral Resources and Energy (DMRE). CC outlined that the scoping acceptance letter included a condition that the EIA phase may continue for the east above ground WRD, but that the west above ground WRD will not be processed as part of this application as the Mmaditlhokwa community must first be relocated.	N/A
John Salang Mmaditlhokwa and Lapologang Community Leadership	Meeting held 21 November 2022	It is suggested that a meeting be held with the communities on 23 November 2022, he will provide the feedback to the community and revert back with any questions, comments and concerns following the meeting. It was agreed that SLR would not need to present during this meeting.	No further questions or concerns were provided.	N/A
Ward 27 Council	Meeting held 19 January 2023 (the minutes of the meeting is provided in Appendix C)	The Bokamosa council suggested that the meeting be cancelled as the environmental feedback does not benefit the community and does not resolve the queries regarding community benefits. It was suggested that an in person meeting be held.	A meeting was held with the Bokamosa council to discuss the decision of the DMRE to not process the application of the West OG WRD and to discuss the findings of the EIA. The minutes of the meeting is attached as Appendix C	Appendix C
Federation for Sustainable Environment				

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
Mariette Liefferink	25 April 2022	Please provide information pertaining to the current groundwater and surface water quality.	Tharisa undertakes monitoring of groundwater and surface water resources in accordance with their monitoring programme. The long-term water quality monitoring data from 2013 to 2021 of 232 process water samples were analysed statistically. From the analysis none of the samples exceeded the chromium SANS 241 Drinking Water Limit. Chromium is therefore not a parameter of concern at the site. The monitoring results confirmed that only Nitrate is a potential contaminant parameter. Refer to Appendix F for the groundwater and surface water monitoring data.	Appendix F
Mariette Liefferink	25 April 2022	Has the stability of the proposed WRD's been considered?	Epoch has been appointed to prepare the detailed design for the proposed WRD's. As part of their work, a stability analysis was undertaken. Further to this, the proposed WRD's design will need to meet the requirements of GN 632 of 2015 that regulates the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration, or production operation.	The design report is attached as Appendix P
Mariette Liefferink	25 April 2022	Will the proposed WRD's be lined?	In accordance with Regulation 3 of GN R. 632 of the NEM:WA, waste rock stockpiles need to be characterised and classified using a risk-based approach to determine the appropriate management measures. In the absence of a prescribed method on how to undertake a risk-based analysis, the characterisation and assessment	Table 43

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
			of waste rock material at Tharisa was determined in accordance with the following associated National Norms and Standards: The National Norms and Standards for the assessment of waste for landfill disposal (GNR 635 of 2013); and The National Norms and Standards for disposal of waste to landfill (GNR 636 of 2013). The waste classification and assessment in terms was undertaken by SLR in 2019 (SLR, 2019. The results from the assessment indicate that the waste rock is classified as a Type 3 waste in terms of the total concentration and a Type 4 waste in terms of the leachable concentrations. In terms of the risk-based waste assessment, it has been motivated that Class-D liner system is required for storage of the waste rock material, based on the following reasons: • The leachable concentrations of all the constituents are below the threshold limit which indicates a lack of mobilised leachate and a low risk of seepage; • The placed waste rock material will be dry and not contain water; and • The waste rock material is not acid generating.	
Mariette Liefferink	25 April 2022	Will the proposed WRD's result in leachate and has there been consideration to acid mine drainage?	A geochemical analysis was undertaken in 2019 by SLR. The results confirmed that there is no potential for acid mine drainage from the proposed waste rock dumps.	Section 17

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
			In addition to this, the geochemical analysis also included a leachate assessment. The following CoCs were identified in the Tharisa mine WRD samples: • Aluminium (Al) exceeded the SANS 241: Operational guidelines in all the samples; • Iron (Fe) exceeded the SANS 241: Aesthetic guidelines in samples MG-4A-OBW-1A.1B.1C, MG-4A-OBW-3A.3B.3C, MG-4A-OBW-4A.4B.4C, MG-3-IBW-6A.6B.6C, MG-2-IBW-7A.7B.7C, MG-2-IBW-8A.8B.8C, while the rest of the samples exceeded the SANS 241: Chronic Health and IFC (2007) guidelines; • Lead (Pb) exceeded SANS 241: Chronic health and WHO (2017) guidelines in samples MG-4A-OBW-1A.1B.1C and MG-2-IBW-7A.7B.7C; • The SANS 241: Operational and IFC mining effluent (2007) pH ranges (> 9) were exceeded in all samples except MG-4A-OBW-3A.3B.3C, MG-4A-OBW-5A.5B.5C and MG-1-IBW-10A.10B.10C which still fell within the top end of the tolerance range of > 8 pH; and • The Total Suspended Solids (TSS) parameter exceeded IFC (2007) guidelines for all WR samples.	
Mariette Liefferink	25 April 2022	What is the volume of the proposed WRD's?	East OG WRD: Approximately 26.26 million m^3 (approximately 14.6 months of storage).	Section 3.2.4
Mariette Liefferink	25 April 2022	What consideration will be given to the fact that Tharisa is located in the Bojanala Priority Area? Will the project result in the need to update an Atmospheric Emissions Licence (AEL) for Tharisa?	This comment has been noted. As part of the proposed Project an independent air quality specialist was appointed for the proposed Project. The simulations have shown that given the current mining	Appendix F

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
			activities at the site, the addition of the East OG WRD will not be significant with mitigation measures implemented. The Tharisa operations does not require the need for an AEL. Further to this, the proposed Project does not require an AEL.	
Mariette Liefferink	25 April 2022	In the meeting, it was indicated that an Agricultural Study will be undertaken. Will the proposed Project result in the loss of any agricultural land?	No, the proposed Project will not result in the loss of any agricultural land. The reason for addressing this aspect as part of the proposed Project is that the DFFE screening tool requires that this aspect is considered.	Appendix E
Mariette Liefferink	25 April 2022	Are the proposed Project components located in any CBA's, NFEPAS and are any red data species likely to be influenced by the proposed Project?	The proposed Project does not affect any biodiversity areas or watercourses and is located on already disturbed areas through current mining activities.	Section 9.4
Other I&APs, parastatals				
Natalie Koneight (Rand Water).	01/12/2021	Can you please provide Rand Water with the shape files (kmz files), Locality map and Application in order to determine if Rand Water will be affected?	This information was provided via email. The proposed project is not likely to affect any Rand Water infrastructure.	N/A
Engela Janse van Rensburg.	01/12/2021	On which portions of 342JQ will the waste rock and tailings dam be constructed?	Please note that the tailings dam no longer forms part of this environmental authorisation process. The farm portions on which the proposed Project is located is tabulated below. I have also attached a map for your perusal.	N/A

<table>
<tr><th>Interested and affected party</th><th>Date comment received</th><th>Issues raised</th><th>Response provided</th><th>Section and paragraph reference in this report where the issues and or responses were incorporated</th></tr>
<tr><td></td><td></td><td></td><td><table><tr><th>Relevant project component</th><th>Relevant farm name</th><th>Relevant farm number</th></tr><tr><td>East OG WRD</td><td>342 JQ</td><td>152, 138, 96, 183, 218, 219, 220, 184, 186 and 251</td></tr></table></td><td></td></tr>
<tr><td>Frik du Preez (Glencore).</td><td>02/12/2021</td><td>Unfortunately this notice does not impress or provide any reconciliation for us as already interested and effected parties, since it is apparent that the previous impact studies done for Tharisa was insufficient, incomplete and without consideration for the actual impact on the surrounding communities.

We have engaged independent Environmental and Medical specialists in light of recent deaths and illnesses occurring within the surrounding community, which you might be completely unaware off, yet we aim to analyse the true and relevant influence of the mining activities on the human beings in the doorstep community, since the agricultural, farming and property damage impacts have been blatantly ignored and complaints completely disregarded to this point.</td><td>As part of the proposed Project, numerous specialist studies have been completed to understand the impact associated with the proposed Project. In this regard, the specialists took cognisance of the current state of the environment and determine how the proposed Project will influence the existing state.

The groundwater findings is summarised as follows:
Monitoring Data – The long-term water quality monitoring data from 2013 to 2021 of 232 process water samples were analysed statistically. From the analysis none of the samples exceeded the chromium SANS 241 Drinking Water Limit. Chromium is therefore not a parameter of concern at the site. The monitoring results confirmed that only Nitrate is a potential contaminant parameter.
Residue Facilities - From the unmitigated maximum impact nitrate mass migration results, the nitrate plumes do not travel < 500 m from the current and proposed new facilities for both East Pit and West Pit, with the main receptors being the Sterkstroom, Marikana settlement directly downstream of the mine, I & APs directly next to Far W WRD 1 (The Wolvaart and van der Hoven residences) and west of W WRD 1 (Retief Primary</td><td>Section 18 and Appendix E</td></tr>
</table>

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		Mining and its processing activities inevitably comes with the contamination of surrounding environments with the associated metals through atmospheric deposition, waste-water discharge, and surface runoff. Platinum and Chrome metals and elements more specifically in this case, has long been recognized as toxic, mutagenic and carcinogenic to microorganism, plants, animals and humans. These toxic substances released into the environment could pose a risk and health problems to populations in their vicinity therefore we sought to investigate whether there might be excess cancer and other illness-related mortality in our populations residing in the direct vicinity of Tharisa mine. Following the availability and release of our environmental and toxicology reports and action or inaction from the DMRE, the law will determine the future course with the various active diagnoses we have in the immediate community.	School borehole). The ZOI would also minimise nitrate mass migration off site and therefore migration impacts are low for the proposed new facilities. Nitrate is only an operational concern as it would decay to below SANS 241 Drinking Water Standard Limits after 5 - 10 years post operations. • Nitrate plume migration from current and proposed new residue facilities does not migrate more than < 500 m, with the open pits acting as a groundwater sink limiting migration (medium impact rating). The recommended Multiple-Capturing-Barrier-System mitigation and sustainable groundwater management plan should be included in the mine planning. The management plan should be activated based on monitoring, early warning, and verification of simulated potential impacts. Nitrate is only an operational concern as it would decay to below SANS 241 Drinking Water Standard Limits after 5 - 10 years post operations. The mitigation proposed would ensure management of the impact to a low-risk rating. For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken	

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			at a later stage for the West OG WRD, once more information pertaining to relocation is available.	
Richard Spoor (Richard Spoor Inc. Attorneys). Was not on the database - added.	02/12/2021	Please register us as an interested an affected party. We represent a number of property owners within the Tharisa Mining Rights Area. They are: 1. Portion 110 – Mr PHC Wolvaardt and Mrs HM Wolvaardt 2. Portion 139 – Mr GJC Pretorius and Mrs SC Pretorius 3. Portion 196 – Ms N van der Hoven 4. Portion 305 – Mr GJC du Preez and Mrs MD du Preez Attached find a copy of a notice issued in terms of Section 54 of the MPRDA and served on the regional manager of the DMRE on 17 November 2021, that sets out the current circumstances faced by our clients. The content of the notice issued to the DMRE in terms of Section 54 of the MPRDA is as follows: We act for the persons listed in the Schedule, who are the owners or lawful occupiers of the properties appearing next to their names.	Members of Richard Spoor Inc. have been included on the project database. Your objection to the project has also been noted. As part of this environmental authorisation process, numerous specialist investigations have been undertaken to inform the understanding of how the proposed Project will influence the current biophysical, cultural and socio-economic environment. In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa community, the department will not process the West OG WRD, including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD have been included for completeness purposes but will be addressed at a later stage as part of a separate process. The comments relating to concerns regarding the current mining activities are noted. However, this does not farm part of the current	Section 18 and Appendix E

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		All the properties fall within the mining rights area of Tharisa Minerals (South Africa) Limited, who own and operate the Tharisa Platinum Mine, near Marikana. Our clients have suffered and continue to suffer significant hardship, loss, and damage as a result of Tharisa's mining operations. Mining operations, including the dumping of waste rock and blasting are taking place within a few hundred meters of our clients' properties, in some instances, waste rock is being dumped on their property boundaries. The mining activities have caused structural cracking of dwelling houses and cracked and broken windows. They are literally falling apart. Persons living on the properties are exposed to noise and severe dust daily, to the extent that their health is being seriously affected thereby. The smell of blasting fumes hangs thick in the air. It has become almost impossible to live on the properties and conditions are quite intolerable. We have no doubt that the mining activities in such close proximity to our clients' properties and the associated nuisance and danger they cause are unlawful.	scope of work and related grievances should be communicated with Tharisa. In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa community, the department will not process the West OG WRD, including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD have been included for completeness purposes but will be addressed at a later stage as part of a separate process. No blasting will be undertaken as part of the proposed project.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		As a result of the mine's activities our clients' boreholes have dried up and the value of our clients' properties has collapsed, the properties are unsaleable in the open market. It has also become impossible for our clients to carry on farming activities, which many of them did before Tharisa started mining in the area. We have been engaged with Tharisa for over a year regarding this situation. While Tharisa has indicated that it is willing to purchase our clients' properties, we have been unable to agree on a price. Our view is that the properties should be purchased by Tharisa at replacement value and that the owners also be compensated for the financial loss and harm that they have suffered as a result of Tharisa's mining activities. In this regards we point out that Tharisa subscribes to the Equator Principles and is therefore bound to comply with the International Financial Corporation's Performance Standards on Social and Environmental Sustainability, which stipulate that where people or communities are displaced by mining activities that they should be	The comments relating to concerns regarding the current mining activities are noted. However, this does not form part of the current scope of work and related grievances should be communicated with Tharisa. The comments relating to concerns regarding the current mining activities and property acquisition are noted. However, this does not farm part of the current scope of work and related grievances should be communicated with Tharisa.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		compensated for the loss of their properties on a replacement value basis. On its part Tharisa refuses to comply with its own commitments and has indicated that it will only pay market value for the properties. This does not come close to replacement value. Tharisa is also not willing to pay compensation for loss and harm. We have proposed referring the matter to arbitration but Tharisa and their attorney have been unresponsive. Tharisa is unmoved by the intolerable circumstances on the ground. As it appears to us, the mine wishes to make our clients lives completely intolerable so as to compel them to agree to the mine's unfair terms. This is completely unacceptable, and as a result we require your urgent intervention. In the circumstances we call upon you (DMRE) to: 1. To send an official, on an urgent basis, to inspect the properties and assess and to report on the hazard posed to the lawful occupiers and to their property by Tharisa's continuing mining operations.	The comments relating to concerns regarding the current mining activities and property acquisition are noted. However, this does not farm part of the current scope of work and related grievances should be communicated with Tharisa. In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa community, the department will not process the West OG WRD, including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD have been included for completeness purposes but will be addressed at a later stage as part of a separate process. The comments relating to concerns regarding the current mining activities and property acquisition are noted. However, this does not farm part of the current scope of work and related grievances should be communicated with Tharisa.	

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		2. Subject to what you find, to prohibit Tharisa from continuing with mining operations, including dumping of waste rock within 500m of our client's properties, until such time as the dispute has been resolved by arbitration or by a competent court. 3. To require Tharisa to make representations regarding the issues raised in this letter. 4. Having considered Tharisa's representations, to direct that the issue of compensation be referred to arbitration for determination in accordance with the Arbitration Act or by a competent court. We will oppose the grant of any further environmental authorisations to Tharisa until such time as the company addresses our clients' concerns.	In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa community, the department will not process the West OG WRD, including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD have been included for completeness purposes but will be addressed at a later stage as part of a separate process. Your opposition to the project is noted.	
Mbengeni Tshidzumba (Eskom).	20/04/2022	We refer to your email dated 11/04/2022. This application affects our Eskom North West Operating Unit, MIDDELKRAAL / THARISA 1 88kV, THARISA / SPRUITFONTEIN 1 88kV, THARISA / SERAMER 1 11kV, THARISA / RAMOSER 1 11kV and THARISA / MAMALEKA 1 11kV Conductors. Eskom Distribution will raise no objection to the proposed application, provided Eskom's rights	With reference to the information available (shapefiles and google imagery) to date, it is not anticipated that the proposed Project will impact on any Eskom infrastructure. With reference to the information available (shapefiles and google imagery) to date, it is not anticipated that the proposed Project will impact on any Eskom infrastructure.	N/A

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		and services are acknowledged and always respected. 1. There is 9 metres building and tree restriction on either side of the centre line of the 11 kV power lines, which must be adhered to in all future developments. No construction work may be executed closer than 9 meters from any of Eskom's structures and or supporting mechanisms. The building restriction for 132 kV on each side of the center of the power line is 15.5m and the separation distance between parallel lines is 21m. 2. All work within Eskom Distribution reserve area and servitudes must be done in accordance with the requirements of the Occupational Health and Safety Act No.85 of 1993 as amended. Special attention must be given to the clearances between Eskom's conductors, structures, cables and electrical apparatus and the proposed work as stipulated by Regulation R15 of the Electrical Installations Regulations of the aforementioned Act or any other legal requirements. The	With reference to the information available (shapefiles and google imagery) to date, it is not anticipated that the proposed Project will impact on any Eskom infrastructure.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		requirements of the OHS Act must be adhered to in conditions where the existing. 3. Eskom Distribution's services and equipment must be always acknowledged and may not be tampered or interfered with. 4. All work within Eskom Distribution reserve area and servitudes must be done in accordance with the requirements of the Occupational Health and Safety Act No.85 of 1993 as amended. Special attention must be given to the clearances between Eskom's conductors, structures, cables and electrical apparatus and the proposed work as stipulated by Regulation R15 of the Electrical Installations Regulations of the aforementioned Act or any other legal requirement. 5. The Applicants and Eskom's cables must be placed in sleeves encased in concrete across the width of the servitude, at the applicant's expense where frequent excavations occur in the cable area.	With reference to the information available (shapefiles and google imagery) to date, it is not anticipated that the proposed Project will impact on any Eskom infrastructure.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		6. Eskom Distribution shall not be liable for the death of or injury to any person or for the loss of or damage to any property whether as a result of the encroachment or of the use of thearea where Eskom Distribution has its services, by the applicant, his/her agent, contractors, Employees, successors in title and assigns. 7. The applicant indemnifies Eskom against loss, claims or damages including claims pertaining to interference with Eskom Distribution services or apparatus or otherwise. The applicant's attention is drawn to section 27(3) of the Electricity Act 1987, as amended in 1994, which stipulates that the applicant can be fined and/or imprisoned as a result of damage to Eskom's apparatus. 8. No mechanical equipment, including mechanical excavators, high lifting machinery and drilling equipment, may be used within Eskom's reserve area, or within close proximity of Eskom's services and equipment, without prior permission in writing and supervision of Eskom's	With reference to the information available (shapefiles and google imagery) to date, it is not anticipated that the proposed Project will impact on any Eskom infrastructure.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		authorised area manager for the NWOU Technical Service Centre Area; T Sewisa - SewisaTM@eskom.co.za> (Tel. 0724269569). 9. Permission must be obtained at least 10 (ten) working days prior to the commencement of any work within the reserve area. 10. Eskom Distribution shall at all times have unobstructed access to and egress from its services. 11. It will be required of the applicant to familiarise him/her self with all safety hazards related to electrical plant. 12. Eskom's consent will not relieve the applicant from obtaining the necessary statutory, land owner or municipal approvals. (Eskom is not the land owner). 13. Any third-party servitudes encroaching on Eskom servitudes shall have to be registered against the property at the applicant's own cost. 14. The ineffective management and handling of waste is of crucial importance. No dumping shall be allowed within Eskom Distribution Servitudes. All unwanted waste (gaseous, liquid or solids) should be disposed of at a registered waste	With reference to the information available (shapefiles and google imagery) to date, it is not anticipated that the proposed Project will impact on any Eskom infrastructure.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		disposal site as stipulated under Section 20 of the Environmental Conservation Act (Act 73 of 1989). 15. No blasting is permitted. If blasting is needed, an additional application is to be lodged with Eskom Distribution. 16. Any development, which necessitates the relocation of our services, will be to the account of the developer. For the relocation of any services, please contact Eskom Customer Services at Eskom Contact Centre: 086 00 37566. 17. Eskom will recover costs from the applicant where any damages of Eskom assets and or any penalties suffered by Eskom occur. Should the applicant or his contractor damage any of Eskom services during commencement of any work whatsoever, then Eskom's 24-hour Contact Centre Tel: 086 000 1414 must be notified immediately to report the incident. We thank you and hope you will find the above in order. Should you have technical queries on the Eskom standards and specifications please feel free to phone our Technology and Quality Department, contact person: Mr Stephen Nkwane Tel: 012 421 4853	With reference to the information available (shapefiles and google imagery) to date, it is not anticipated that the proposed Project will impact on any Eskom infrastructure.	

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S Chabalala (Bokamoso mooinooi business Chamber).	21/04/2022	Herein Bokamoso Mooinooi business Chamber (BMBC) represented by its executive members. BMBC is the registered company that has been registered to serve ward 27 at large that consists of Mooinooi and Mamba (Bokamoso). We are here by interested in tendering for this project for the benefit of the community. We will be sending through our quote for consideration as we know that the rehabilitation projects belongs to the local communities.	SLR has been appointed as an independent environmental practitioner to undertake an environmental authorisation process for the proposed Project. In this regard, SLR is not involved with tendering processes at Tharisa and as such this would need to be handled directly with Tharisa. Your comment has however been noted and has been forwarded to Tharisa. What is important to note is that the Proposed WRD project has not been approved. It follows that the proposed Project can only commence when all necessary approvals have been obtained. This environmental authorisation process only deals with the establishment of the WRD at the Tharisa Mine. The Closure and Rehabilitation Project is being handled as part of a separate process by a different environmental consulting company.	N/A
S Chabalala (Bokamoso mooinooi business Chamber)	28/04/2022	Note that we have been trying to get hold of you telephonically with regards to the rehabilitation project from Tharisa. We did go through the 3 attachments but there is no quantities and distances on the documents shared with us of which it doesn't give us clear understanding on the pricing. We as BMBC would like to be given clarity on the above raised concerns on this tender so that we can price it correctly as concerned. We also request an extension for two days so that we can have enough time to work on pricing.		N/A

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
Collen Dimo	11 April 2022	I don't understand this SMS what's that mean. The revised Background Information Document (BID) for the Additional Waste Rock Storage at the Tharisa Mine is available for review. A copy of the BID is available electronically on the SLR website (https://slrconsulting.com/public-documents). For queries contact Reinett Mogotshi from SLR (0114670945, rmogotshi@slrconsulting.com).	Tharisa is an opencast mining operation that produces chrome and platinum group metals (PGM) concentrate. The opencast mine is located on the farms 342 JQ and Elandsdrift 467 JQ near the town of Marikana in the Bojanala District Municipality and Rustenburg Local Municipality, North West Province. Tharisa holds existing environmental authorisations and licenses. As part of its on-going mine planning Tharisa has identified the need for additional waste rock storage on site. In this regard, Tharisa is proposing to: Extend a previously approved WRD; and establish WRD above backfilled portions of the East pit. As a resident of the neighbouring community, you were identified as an interested and affected party for the proposed Project at Tharisa and have received a notification on the availability of the BID for review.	N/A
Dorris Makgaka	25 April 2022	How was the bid made available? And to who was it given if it's in black and white?	The BID was made available electronically for review. A copy of the BID can be accessed from the SLR website (https://www.slrconsulting.com/en/public-documents/tharisa) or on SLR's data-free website (at https://slrpublicdocs.datafree.co/public-documents/tharisa).	Appendix C

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
			All registered stakeholders received either an SMS/ Email to notify them of the availability of the BID for review and a link to where this document can be accessed.	
Mzwakhe Soka	Via email 17 May 2022	What about relocating people first before implementing the proposal, because what you doing you are simply saying that children and adults should get sick while the Project will be making money. Where is the spirit of UBUNTU	Following the comments received from the DMRE on the scoping report, a condition was included that the EIA process may move forward for the east OG WRD, but that due to the existing impacts on the Mmaditlhokwa community, the west OG WRD will not be processed during this application and that an amendment may be undertaken once the community is relocated.	N/A
Natalie Koneight	Via email on the 12th of May 2022	Rand Water is hereby registering as IAP for the above-mentioned project. Kindly forward confirmation of registration as IAP to Natalie Koneight at nkoneigh@randwater.co.za and wayleave@randwater.co.za Also, please send a formal wayleave application to wayleave@randwater.co.za for more information. Attached is Rand Water's Wayleaves, for your information. Can you please provide Rand Water with the following: The shapefiles for the infrastructure proposed as well as road connections/access roads.	Please note the project will only include the WRD (proposed Project Components) on the map. No sewerage system or additional application is required as it is not affected by the proposed Project. The information requested was sent to you on 27 May 2022.	N/A

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		Coordinates of the development. A layout plan for the development including development footprint. Specialist studies being undertaken. Confirmation as to whether wayleaves will be required from Rand Water. The detail about the facility that will receive the sewerage. An agreement that the identified sewerage facility is aware of the development and that they have the capacity to accept the sewerage from the site without overloading the facility. Will there be any discharges other than the sewerage system that will increase storm water entering the environment? If so, has the development considered retention and stilling ponds to slow down high peak flows. If the sewerage facility cannot accept the additional load into their facility then this will have a negative impact on the environment and the pollution load into the river systems. Minimum requirements for shapefiles (spatial data)	Please note the project will only include the WRD (proposed Project Components) on the map. No sewerage system or additional application is required as it is not affected by the proposed Project. The information requested was sent to you on 27 May 2022.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		The shapefile must be in the geographic (decimal degrees) coordinate system in the WGS84 datum, in other words, not projected e.g. to Transverse Mercator. It is essential that the shapefile contain at least the following three files having the same prefix, but different extensions: ·.shp – the file that stores the feature geometry (or the shape of the feature). ·.shp – the file that stores the index of the feature geometry. ·.dbf – the dBASE file that stress the attribute information of features. When shapefiles are created using ESRI's ArcGIS software, a file with the following extension must also be included: ·.prj – the file that stores the coordinate system information. (Check the shapefile's properties and make sure that the coordinate system is set to geographic, WGS84). Optional extensions to include may be any of the following: ·.xml – the file that stores metadata (information about the data).	The information requested was sent to you on 27 May 2022.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		·.sbn and .sbx – the files that store the spatial index of the features. ·.fbn and .fbx – the files that store the spatial index of the features for shapefiles that are read-only. ·.ain and .aih – the files that store the attribute index of the active fields in a table or a theme's attribute table. The collection of files should be treated as one file and should never be separated, or else the shapefile will be rendered unusable. NB: Please note that a file with any of the following extensions is not a shapefile: .apr, .aep, .axl, .mxd. These are examples of map documents (commonly referred to as project files) created by different ESRI GIS software. Map document files only contain references to data stored on your hard disc and do not contain the data physically. Such a file cannot be opened without the accompanying shapefiles.	The information requested was sent to you on 27 May 2022.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
Tlangelani Mathebula	Via email on the 1st of June 2022	May I please request for the outline/ design plans of the proposed TSF expansion in DXF in order for us to determine the distance from our opencast mine at Elandsdrift.	Please note that the TSF lift is no longer part of the Tharisa Scope included in this scoping and environmental impact assessment process. The establishment of a waste rock dump (referred to as the East OG WRD) on backfilled portions of the East Pit is the only project component.	Section 3
Kelebogile Mekgoe Rustenburg Local Municipality	Via email on the 17th of June 2022	With regard to the aforementioned, the Unit: Integrated Environmental Management acknowledges receipt of Scoping Report for the proposed additional waste rock storage project. Tharisa Minerals (Pty) Ltd is an opencast mining operation that produces chrome and platinum group metal (PGMs) concentrates. Mining is undertaken in two mining sections, namely the East Mine and West Mining, using the conventional open pit truck and shovel methods. The mine has been operational since 2008. The opencast mine is located on farms 342 JQ. This nature of the pits at Tharisa is such that there is continually more waste rock generated than capacity available in the worked-out areas of the pits and the balance must be dumped on surface	The soil, land use and land capability specialist confirmed that this project is regarded as being of low impact significance due to the inherent soil constraints of the area and the severe disturbance of the majority of the soils on site. However, mitigation measures and recommendations outlined in specialist study must be implemented in efforts to conserve soil resources in the post mining landscape. In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa community, the department will not process the West OG WRD, including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD	Appendix D

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		WRDs. Additional waste rock handling and storage capacity is therefore required to accommodate the waste rock from the open pit operations. As part of its on-going mine planning, Tharisa has identified the need for additional WRD storage on site. The following activities are proposed: • The expansion of the existing and approved Far West WRD 1 by footprint of 109 ha. The expanded area will be referred to as the West Above Ground (OG) WRD. Portions of the West OG WRD will be located on backfilled areas of the West Pit; and • The establishment of a waste rock dump (referred to as the East OG WRD) on backfilled portions of the East Pit. The proposed East OG WRD will cover an area of approximately 71 ha. The proposed activities will occurs within the approved mining rights area of Tharisa Minerals. The Mining right area has been extensively disturbed as a result of existing mining, community and private farming activities.	have been included for completeness purposes but will be addressed at a later stage as part of a separate process. In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa community, the department will not process the West OG WRD, including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD have been included for completeness purposes but will be addressed at a later stage as part of a separate process.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		Th proposed Project is listed in terms of National Environmental Management Act, NEMA, Act 107 of 1998), 07 April 2017, as amended. The prospecting right triggers listed activity, Listing Notice 1 (GNR 983 of 2014), Activity 12, 30, 34 and 48, Listing Notice 2 (GNR 984), Activity 6 and 15 and Listing Notice 3 (GNR 985 of 2014), Activity 12 as amended.	This project understanding is correct	
		The proposed activity is a waste management activity of which the Waste Management License (WML) is required in terms of the National Environmental Management: Waste Act, 59 of 2008 (NEM: WA) for waste activities in Category B (GNR 985 of 2014), Activity 12 as amended.	This project understanding is correct	
		The proposed activity is a waste management activity of which the Waste Management License (WML) is required in terms of the National Environmental Management: Waste Act, 59 of 2008 (NEM: WA) for waste activities in Category B (GNR 921 of 2013), Activity 7, 10, 11, as amended.	This project understanding is correct	
		According to the Bojanala Platinum District Municipality's Environmental Management	Understood.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		Framework (BPDM EMF, June 2020), the site is situated in Zone A: Development Zone I, Zone C: Development Zone III, Zone D: Agriculture Zone, Zone E: Agriculture Zone II, Zone F: Biodiversity Zone and Zone G: Sensitive Topography. Zone A: Development Zone I: 'Developemnt Zone I' is a refinement of areas identified for future urban development in local municipal SDFs. These development uses include, amongst others, residential land uses, commercial land uses and land uses related to government functions, but specifically excludes industrial land uses and mining related land uses Zone C: Development Zone III: 'Development Zone II (Industrial)' is a refinement of areas identified for future industrial development in local municipal SDFs. Zone D: Agriculture Zone I. The 'Agriculture Zone' represents existing high potential agricultural land in the area (i.e. cultivated fields) that should be preserved for crop production and other agricultural purposes. Zone E: Agricultural Zone II. The "Agriculture Zone" represents areas deemed suitable for	Understood Understood	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		further agricultural development for both grazing and cultivation purposes. The land may also be utilised for other types of development. Zone F: The "Bioiversity Zone" represents areas of high and significant biodiversity in the Bojanala District Municipality. Areas of high biodiversity was identified from the North West Province Biodiversity Sector Plan and includes, among others, critical biodiversity areas (CBAs) and Ecological Support Areas (ESAs). Zone G: "Sensitive Topography Zone" represents the sensitive topographical features, such as hills and ridges, which are deemed sensitive to development. According to Zone A: Development Zone I, Zone C: Development Zone III, Zone D: Agriculture Zone I, Zone E: Agriculture Zone II, Zone F: Biodiversity Zone and Zone G: Sensitive Topography Zone, the land use listed above is compatible partially compatible and incompatible, as per the above-mentioned Zone, however, the proposed Project will occur within the mining rights area of Tharisa Mine.	Understood	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		The Unit: IEM will support the proposed development, however, the following recommendations must be taken into consideration. The mitigation measures and the recommendations contained in the Scoping Report compiled by SLR Consulting (Pty) Ltd for this activity must be implemented. There is possibility of seepage from the waste rock dump (WRD) into surface and groundwater, which may contain elevated levels of chromium and other elements; therefore continuous water monitoring should be done on the existing and proposed waste rock dump (WRD) Waste rock dump is susceptible to wind entrainment and can lead to some environmental impacts especially if there are sensitive receptors down wind (i.e. The school, Lapologang and Mmaditlhokwa community and the neighbouring farm owners). It is therefore recommended that proper rehabilitation measures be put in place (i.e. slopes well managed and the dust be minimised).	In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa community, the department will not process the West OG WRD, including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD have been included for completeness purposes but will be addressed at a later stage as part of a separate process. The East OG WRD will not impact Lapologang or Mmaditlhokwa with proposed mitigation measures in place. From a soil, land use and land capability point of view, this project regarded as being of low impact significance due to the inherent soil constraints of the area and the severe disturbance of the majority of the soils on site. However, mitigation measures and recommendations outlined in this document need to be implemented accordingly in efforts to conserve soil resources in the post mining landscape.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		The stripped and stockpiled topsoil may be chemically altered due to storage, this can potentially alter nutrient levels in the soil and result in a loss of fertility, therefore proper management of topsoil must be ensured. For the proposed Waste rock dump expansion, mitigation measures must be implemented to minimise health hazard and risk to Lapologang and Maditlhowa Village, and nearby landowners (i.e. noise, dust and ground vibration). All plant species of conservation importance (i.e. Scletocarya birrea subsp.Africana) must be removed from demarcation area prior to construction commencing and must either be relocated outside of the construction area. Any complaint from the public during the construction and operation of this project must be attended to by the person involved as soon as possible to the satisfaction of the parties concerned. A complaint register must be kept up to date and shall be produced upon request. As far as possible, employment opportunities should be given to the local skilled, semi-skilled and unskilled labour force during the construction	From a soil, land use and land capability point of view, this project regarded as being of low impact significance due to the inherent soil constraints of the area and the severe disturbance of the majority of the soils on site. However, mitigation measures and recommendations outlined in this document need to be implemented accordingly in efforts to conserve soil resources in the post mining landscape. Your recommendation has been added to the EMPr. However, as an existing mine, few employment opportunities will be available.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		and operation phases to stimulate the local and regional economy as per Social and Labour Plan. The applicant must be responsible for compliance with the provisions for duty of care and remediation of environmental damage in accordance with Section 28 of National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.		
Gwendolyn Wellmann	Letter via email on the 17th of June 2022	Comments on Scoping Report for the "Additional Waste Rock Storage Project" application by Tharisa Minerals (SLR Project No: 720.20002.00065) I am submitting comments on the Scoping Report for the "Additional Waste Rock Storage Project" EIA process for Tharisa, your project number: 720.20002.00065, on behalf of the following persons: 1) Myself, Gwendolyn Wellmann, who is a shareholder of Tharisa Minerals 2) Junicia Morongwe Ncheche, erf: 3, Lapologang 3) Magdeline Salang, erf: 5, Lapologang 4) Lydia Lebogang Lebelo, erf: 7, Lapologang 5) Amelia Nana Skosana, erf: 12, Lapologang 6) Tieho Losianes Ncheche, erf: 14, Lapologang	In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa community, the department will not process the West OG WRD, including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD have been included for completeness purposes but will be addressed at a later stage as part of a separate process. In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa	Appendix E Table 43 Section 24.2

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		7) Chimane Boetie Lebelo, erf: 18, Lapologang 8) Alice Puleng Mokoena, erf: 23, Lapologang 9) Thobi Johannes Serunye and Meite Catherine Serunye, erf: 24, Lapologang 10) SC Pretorius, Portion 139 Kafferskraal (342 JQ); 11) GJ du Preez and MD du Preez, Portion 305 Kafferskraal (342 JQ); 12) N van der Hoven, Portion 196 Kafferskraal (342 JQ); 13) PHC Wolvaardt and HM Wolvaardt, Portion 110 Kafferskraal (342 JQ); 14) Nkoko Francina Mashabela, Portion 139 Kafferskraal (342 JQ); 15) Jan Hendrik Pretorius and Sindie Hendriena Pretorius, Portion 139 Kafferskraal (342 JQ); 16) Tlhopi Sanah Mashabela, Portion 139 Kafferskraal (342 JQ); 17) Petrus Molekwa, Portion 139 Kafferskraal (342 JQ); 18) Louis De Beer, Portion 139 Kafferskraal (342 JQ); 19) Johannes Lodewyk de Beer and Patricia de Beer; Portion 196 Kafferskraal (342 JQ)	community, the department will not process the West OG WRD, including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD have been included for completeness purposes but will be addressed at a later stage as part of a separate process.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		20) George Msokoli; 354 Maditlokwa All those mentioned above have the following comments related to the EIA process, the Scoping Report and Tharisa's application for the "Additional Waste Rock Storage Project": Tharisa Mine has not adhered to the mitigation measures listed in the DMRE approved 2014 Environmental Impact Assessment (EIA). There is already a growing dump right on the doorstep of the Lapologang community and the van den Hoven and Wolfaardt properties. This dump is labeled "Far West WRD 1" on Figure 2 in the Scoping Report.1 This dump creates dust and noise pollution, is an eye sore and recently has started to block cell phone reception in Lapologang and at the van den Hoven and Wolfaardt properties, which is a risk, especially for vulnerable persons who rely on their cell phones in case of an emergency. Pertinent information from the DMRE-approved 2014 EIA related to the growing dump: "The most sensitive viewing areas are expected to be from surrounding residences. Views from residential areas as well as tourism potential areas	In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa community, the department will not process the West OG WRD, including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD have been included for completeness purposes but will be addressed at a later stage as part of a separate process. Addressing concerns as to why Tharisa does not adhere to mitigation measures is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this EIA Report for completeness purposes	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		have been altered since the establishment of the approved mine in 2008. Further disturbance by the addition of the project components needs to be minimised through appropriate design and implementation of mitigation measures." (Pg 1-61) "Through the development of the approved mine, land within the mining footprint has changed from a mix of agriculture and residential (including community activities) to mining. Land surrounding Tharisa Mine is mostly used for mining operations, crop farming, livestock grazing and general community activities. Land within the project footprints is mainly agricultural or transformed, with some pockets of natural vegetation and some private homesteads and associated structures (central waste rock dump footprint). Residential areas surrounding the mine range from private farmsteads to villages of varying scales including a primary school. There is the potential for these land uses to be impacted by to varying degrees by changes to the mine's approved infrastructure and operations. As some of these land uses contribute to the economy of the region together with mineral-related activities, care should be taken when	In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa community, the department will not process the West OG WRD, including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD have been included for completeness purposes but will be addressed at a later stage as part of a separate process. Addressing concerns as to why Tharisa does not adhere to mitigation measures is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this EIA Report for completeness purposes	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		planning the project to limit impacts on these land uses. Third party service infrastructure does exist and care needs to be taken to avoid and/or manage these appropriately." (Pg 1-69) "Given that the project components relate mainly to optimising approved mining activities, no real alternatives exist for the project. The development of the project components have the potential for negative environmental and social impacts. Not proceeding with the project leaves the status quo. In the unmitigated scenario, assuming no measures are implemented to control the mine's operations, the significance of potential impacts would be high. Assuming effective implementation of the mitigation and monitoring as outlined in the EIA and EMP report, the significance of impacts can be reduced to acceptable levels." (Pg. 2-33) "In the approved [2008] EIA and EMP report, the severity of the visual impact associated with the approved operations was rated high in the unmitigated scenario and medium in the mitigated scenario. Visual exposure is the extent to which project infrastructure and activities will be visible. It follows that the closer the infrastructure and	In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa community, the department will not process the West OG WRD, including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD have been included for completeness purposes but will be addressed at a later stage as part of a separate process. Addressing concerns as to why Tharisa does not adhere to mitigation measures is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this EIA Report for completeness purposes.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		activities, the greater the visual exposure. The main project components that will influence the visibility of the mine are the re-alignment and re-shaping of the waste rock dumps. Views from local roads, local residences and from south of the mine will present the greatest visual exposure. Sensitivity of receptors relates to the way in which people will view the visual intrusion. In this regard, it is anticipated that receptors east and south of the mine and project components will be highly sensitive due to an increased change in the views from these areas. These receptors include both local residents and local and international visitors. When considering this impact cumulatively with the approved operations, the severity rating for the overall mine in the unmitigated scenario is high." (Pg. 7-50) "Although there is third party property including houses and structures within the project footprint, it is assumed in this assessment that these properties will be bought by Tharisa in a fair and amicable process." (Pg. 7-60) It is this very dump, for which the Tharisa Mine is blatantly ignoring the conditions under which it was granted the approval for the 2014 EIA, that the	In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa community, the department will not process the West OG WRD, including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD have been included for completeness purposes but will be addressed at a later stage as part of a separate process. Addressing concerns as to why Tharisa does not adhere to mitigation measures is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this EIA Report for completeness purposes.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		company now intends to do yet another EIA to expand the dump with a footprint of 109 ha. The existing Far West WRD1 is incredibly close to Lapologang and the van den Hoven and Wolfaardt properties. It is approximately 100m from the house on the Wolfaardt property, where three young children reside, exposed daily (and often at night too) to noise and dust and fumes. SLR and Tharisa Minerals appear to believe that it is acceptable to apply for an expansion (proposed West OG WRD) to this mine dump (Far West WRD1). In the Scoping Report the affected properties and communities' distances from the proposed West OG WRD is listed (pgs 140 and 141). That list demonstrates how near in reality the existing dump is and that the expansion will only add to the misery of the people living there: • "Lapologang located approximately 640 m south of the proposed West OG WRD; • Maditlhokwa located immediately north of the proposed West OG WRD; • Private property owner of Portion 110 – Mr PHC Wolvaardt and Mrs HM Wolvaardt	In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa community, the department will not process the West OG WRD, including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD have been included for completeness purposes but will be addressed at a later stage as part of a separate process. Addressing concerns as to why Tharisa does not adhere to mitigation measures is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this EIA Report for completeness purposes	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		located approximately 500m south of the proposed West OG WRD; • Private property owner Portion 139 – Mr GJC Pretorius and Mrs SC Pretorius located approximately 1.1km south of the proposed West OG WRD; • Private property owner Portion 196 – Ms N van der Hoven located approximately 550m south of the proposed West OG WRD; • Private property owner Portion 305 – Mr GJC du Preez2 and Mrs MD du Preez located approximately 1.8km south of the proposed West OG WRD"	In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa community, the department will not process the West OG WRD, including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD have been included for completeness purposes but will be addressed at a later stage as part of a separate process.	
Gwendolyn Wellmann	Letter via email on 17 June 2022	B. Tharisa's refusal to resettle affected persons. Despite numerous requests by persons listed in this letter, and Mr Richard Spoor, legal counsel for owners of portions 305, 196, 139 and 110, Tharisa Minerals has not to date provided any documentation, including a Resettlement Action Plan, related to the resettlement of all these people so badly affected by its operations, this despite most of the DMRE-approved 2014 EIA referring to resettlement. Tharisa Minerals has also steadfastly refused to pay property owners a	In terms of resettlement, Tharisa is planning on resettling members of the Lapologang and Mmaditlhokwa communities and also in the process of negotiating with farm owners to purchase their properties. This however forms part of a separate process that is being managed by Tharisa and does not form part of the proposed Project undertaken by SLR. In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa community, the department will not process the West OG WRD,	Appendix E Table 34 8 Section 26.2

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		realistic price for their property and has not been engaging with affected persons in a constructive manner. Indeed, it required a television exposé of Tharisa's breach of basic laws to bring the DMRE to its doors and to shut down the West Pit. Despite this, the company has not engaged productively and transparently related to resettlement issues. Relevant information from the 2014 EIA: "*The project and mine site are located in an area where mining is a dominant land use inter-mixed with agriculture, tourism, and residential land use type activities. Current land uses within the project footprints will be lost through the development of the project. When considering surrounding land uses, these land uses may be affected by one or more of the following potential environmental and social impacts: hazardous excavations and structures, disturbance of biodiversity, surface and groundwater quality and quantity, dust generation, noise pollution, blasting, visual and negative socio-economic impacts."* (Pg. 7-61) "In the unmitigated scenario, where environmental and social impacts are uncontrolled, the	including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD have been included for completeness purposes but will be addressed at a later stage as part of a separate process. Comments relating to the approved EMPr are noted but are not relevant to the proposed Project. Addressing concerns as to why Tharisa does not adhere to mitigation measures is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this EIA Report for completeness purposes	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		probability that land uses on and surrounding the project sites will be impacted by mining is definite. The following will be implemented: • Effective implementation of all mitigation measures as outlined in this EMP report to reduce the mine's overall impact on the environment and surrounding land-uses • Closure planning to incorporate measures to achieve future land use. • Purchase/lease farms within the mining area where project components will be developed. Should the impact on the surrounding land use and/or economic activity still prove unacceptable, Tharisa will compensate the relevant landowners accordingly." (Pg.7.62) The 2014 EIA acknowledges potential loss of property values: "In the approved [2008] EIA and EMP report, the severity of positive socio-economic impacts associated with the approved operations was rated a medium positive in both the unmitigated	Comments relating to the approved EMPr are noted but are not relevant to the proposed Project. Addressing concerns as to why Tharisa does not adhere to mitigation measures is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this EIA Report for completeness purposes	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		and mitigated scenarios. The severity of negative impacts on surrounding land values was rated medium in both the unmitigated and mitigated scenarios. The project comprises a number of changes to the approved mine operations which will result in the mining of additional ore reserves, an increased mine footprint, an increased life of mine from 12 to 18 years and optimisation of the mine's processes. As a result, the project components could have the following negative impacts: impact on land value of properties surrounding the project livelihoods of community members who own businesses such as commercial farming activities and/or make use of immediately surrounding land." (Pg. 7-66) "In the approved [2008] EMP it is outlined that: The mine will continue to implement the commitments in its social and labour plan in accordance with the employment, procurement, and social investment principles of the Mining Charter.	Comments relating to the approved EMPr are noted but are not relevant to the proposed Project. Addressing concerns as to why Tharisa does not adhere to mitigation measures is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this EIA Report for completeness purposes	

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		The administration/human resource manager is responsible for implementing these actions during all mine phases. Tharisa must effectively implement all the management actions set out in Section 6 to ensure that the identified unacceptable impact zones are maintained as close to the mine activities as possible. Land within these zones should be purchased by the mine as and when necessary. Land outside these zones should not be significantly affected. Taking the various mitigated impact types into account the approximate guideline is 500m." (Pg. 7-68) From the 2014 EIA: "In the case of air pollution, the model predicts that with mitigation that focuses on minimising pollution at the source there may still be exceedances of the NAAQ limits for PM10 and PM2.5 (particulate matter with a diameter less than 10 micron and less than 2.5 micron) emissions that could result in health-related impacts. If monitoring confirms the model predictions, then relocation of sensitive receptors within the exceedance zone may be required." (Pg. viii)	Comments relating to the approved EMPr are noted but are not relevant to the proposed Project. Addressing concerns as to why Tharisa does not adhere to mitigation measures is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this EIA Report for completeness purposes	

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		In our opinion, an EIA process undertaken at this time to expand Tharisa Mine's operations, is the most socially unjust process possible. The mitigation measures prescribed in the DMRE-approved 2014 EIA should be implemented with immediate effect and the resettlement process should first be implemented and once there is an approved Resettlement Action Plan in place, then EIA processes for expansion of the mine can be considered. This is specifically important because the Scoping Report itself details the following: "Any loss or injury is considered long term and can extend beyond the mine boundary to the communities to which the injured people and/or animals belong. The likelihood of occurrence, in the absence of management measures, is likely given that Maditlhokwa is directly adjacent to the proposed West OG WRD (pg 159)."	Comments relating to the approved EMPr are noted but are not relevant to the proposed Project. Addressing concerns as to why Tharisa does not adhere to mitigation measures is outside of the scope of the proposed Project. These comments have however been recorded and are presented in this EIA Report for completeness purposes	
Gwendolyn Wellmann	Letter via email on the 17th of June 2022	C. Lonmin and Aquarius no longer exist, yet they are mentioned in the Scoping Report on pg 141 and in various maps. The authors might be interested to know that Sibanye-Stillwater purchased Aquarius Platinum in April 2016 already, and Sibanye-Stillwater in June 2019.	The comment is noted. The map has been updated with information made available to SLR. Reference to Lonmin and Aquarius have been removed throughout the document.	N/A

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
Yolandé Jv Rensburg	Via email on the 17th of June 2022	RE: Comments on the EIA for the proposed expansion of the existing and approved Far West WRD 1 and the establishment of a new waste rock dump referred to as the East OG WRD on backfilled portions of the East Pit. The EIA for the proposed expansion of the existing Far West WRD 1 and the establishment of a new waste rock dump referred to as the East OG WRD on backfilled portions of the East Pit with reference DMRE SAMRAD FILE NUMBER: NW – 00307 – MR/102 bears reference. As an affected Party in this process, Sibanye-Stillwater hereby submit comments as it relates to the abovementioned project. As this project is located adjacent to the Sibanye-Stillwater Marikana Operations, we thought it important to raise our comments and concerns to this project. Please see below a list of comments and concerns raised: Sibanye-Stillwater has received a number of dust complaints from our employees over the past relating to dust fallout from the Far East WRD2, it	The east and far east WRD will not be expanded as part of this project. The east above ground WRD which is proposed for this project is located on backfilled portions of the East Pit.	Appendix E Table 31 Table 34 8

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		is understood that this WRD is going to be extended to further to the East. What is Tharisa's dust management plan going forward with regards to this to ensure that dust fallout is managed adequately across the footprint? This is also relevant to all of the WRD's and unpaved roads proposed. The East WRD is located over a watercourse (Maretlwana tributary) which has noticeably dried up over the years. Are there any plans in place to undertake an adequate river diversion to ensure flow is maintained? This does not seem to be planned as East WRD and Far East WRD2 seem to be joined.	The east and far east WRD will not be expanded as part of this project. The East OG WRD which is proposed for this project is located on backfilled portions of the East Pit.	
Yolandé Jv Rensburg	23 June 2022 via email	RE: Comments on the EIA for the proposed expansion of the existing and approved Far West WRD 1 and the establishment of a new waste rock dump referred to as the East OG WRD on backfilled portions of the East Pit. The EIA for the proposed expansion of the existing Far West WRD 1 and the establishment of a new waste rock dump referred to as the East OG WRD on backfilled portions of the East Pit with	In light of the condition of the acceptance of the Scoping Report from the DMRE that the EIA process may move forward for the East OG WRD, but due to the existing impacts on the Mmaditlhokwa community, the department will not process the West OG WRD, including comments raised by I&APs and the impacts outlined in this report regarding the West OG WRD, this project component will not be processed as part of this application. A separate process will be undertaken for the West OG WRD, when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa is available. It follows that comments pertaining to the West OG WRD	N/A

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		reference DMRE SAMRAD FILE NUMBER: NW – 00307 – MR/102 bears reference. As an affected Party in this process, Sibanye-Stillwater hereby submit ADDITIONAL comments as it relates to the abovementioned project. As this project is located adjacent to the Sibanye-Stillwater Marikana Operations, we thought it important to raise our comments and concerns to this project. Please see below a list of comments and concerns raised: 1. Monitoring Parameters: Upon reviewing the ground- and surface water reports and data in the public documents (incl. the IWWMP and Groundwater specialist report) it is apparent that the list of monitoring parameters is insufficient as specifically it does not address common parameters of concern associated with the mining activities in this region. It is notable that this is likely due to the limitations in the current water use authorisation requirements, however it is recommended that in the interest of responsible	have been included for completeness purposes but will be addressed at a later stage as part of a separate process. During the July 20022 hydrocensus 21 groundwater and 3 surface water locations were visited and sampled for hydrochemical analysis (Figure 6-3, Appendix A). The results showed that only one downstream sample (OC BH 02) showed an exceedance of the Manganese SANS 241 Drinking Water Limit (could occur naturally due to the local geological setting). The concentrations for most of the parameters of borehole OC BH 02 are also elevated above that of the P95 2013 upstream baseline values. This borehole is located directly downstream of an informal settlement, which could be the source for the elevated concentrations of TDS and ammonium (NH4-N). Apart from borehole OC BH 02, minimal upstream baseline (2013) exceedances are observed for sodium, sulphate, nitrate, and copper. These baseline exceedances are not significant and below the SANS 241 Drinking Water Limits for the respective constituents. From the surface water samples taken (Upstream TM SW01 and downstream TM SW04), the results show that only Cu concentrations exceed the P95 2013 upstream baseline, with no SANS 241 Drinking Water Limit exceedances.	

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		management Tharisa considers the evaluation of ammonium (NH4 as N), copper (found to be naturally elevated throughout the region) and nickel (commonly associated with processing activities). This can be done in the context of the South African Target Water Quality Guidelines, and it is likely the parameters are being analysed but are not reported in the IWWMP. 2. Interpretation of DO exceedances: Further it should be noted that the interpretation of 'exceedances' of the dissolved oxygen (DO) limits in the water use authorisation is incorrectly interpreted in Table 4.1 and 4.2 of the IWWMP, a non-compliance to the DO limit is actually when the DO is lower than the limit. In other words the DO limit is the minimum acceptable limit for the aquatic environment, anything below this may represent anoxic conditions resulting in negative impacts, thus it must be treated the same as the lower limit for pH. This limit though must always be treated with caution as natural spatial and temporal fluctuations will occur, and depending on the species composition lower concentrations may be tolerated and favourable. Finally, it is suggested that Tharisa requests the DWS to rather	The application for a water use licence and updated IWWMP does not form part of this process. The groundwater specialist has included a recommendation that the monitoring network needs to be reviewed and a formal monitoring protocol developed. A parameter optimisation study should be conducted to only analyse for the critical control parameters (CCP) as there are only ± 5 important chemical parameters. This would save on lab analysis costs. Additional downstream monitoring locations for both surface water and groundwater are required. Management and mitigation measures should be adapted based on the monitoring results to effectively mitigate the impacts. The application for a water use licence and updated IWWMP does not form part of this process.	

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		assign Chemical Oxygen Demand (COD) limits as opposed to DO limits, as COD provides a more direct indication of the impact their activities due to increased dissolved constituents, in turn this results in a relative reduction in DO. 3. Sensitive Areas: The IWWMP indicates that there are no wetlands or sensitive areas, this is not true as there is the Sterkstroom which dissects the mine (at the very least a river system with an associated riparian area, which represents a sensitive ecosystem), and the two tributaries indicated below are also watercourses that should be considered and classified. Wetland characteristics are apparent within the 500m regulated buffer areas and should be considered and at least motivated as to why they are not considered to be wetlands or sensitive areas. 4. Sterkstroom: Based on the quality presented in Table 4.1 of the IWWMP it is apparent that the site upstream of the Tharisa mine has a low nitrate concentration, however this increases more than 20 times downstream of their activities (SW02 and SW03) on average. Sibanye-Stillwater's surface water monitoring results for KM S 06 and KM S 06a show a similar	The groundwater specialist has included a recommendation that the monitoring network needs to be reviewed and a formal monitoring protocol developed. A parameter optimisation study should be conducted to only analyse for the critical control parameters (CCP) as there are only ± 5 important chemical parameters. Additional downstream monitoring locations for both surface water and groundwater are required. Management and mitigation measures should be adapted based on the monitoring results to effectively mitigate the impacts. The latest process water samples taken exceed the SANS 241 limit for nitrate. This is to be expected as nitrate build-up within the mining circuit is standard and well known as mining progresses. It also shows that nitrate exceeds the SANS 241 limit for both TM SW02 and TM SW03 (directly downstream) in terms of the maximum nitrate concentration, but that all the latest measured nitrate concentrations for all 4 surface water sample locations within the Sterkstroom are below the SANS 241 limit. This emphasizes the observed effect of fluctuations / spikes in concentration which is due to seasonal wet and dry cycles and the contribution of changes in production of current arisings (ore) and waste rock rate over time (ACS, 2022). This also points to the fact that mass migration is limited	

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		trend, and when the monthly data is considered it appears that the elevated qualities are a function of two factors: 1. dilution, with the Sterkstroom mostly showing higher qualities in low flow periods except when factor two affects the quality; and 2. ad hoc spikes in the qualities, which often is an indication of discharges (authorized or unauthorized), as seepage or impacted stormwater runoff would respectively be consistent and only associated with high/low flow conditions. This is shown for the point TM SW03 (directly downstream of Tharisa) in Figure 4.2 of the IWWMP. Thus it is recommended Tharisa investigates this potential pollution issue as it will and has resulted in hypertrophic conditions within the stream. There are a number of viable intervention measures available depending on the source of the issue, it is strongly encouraged that the source is addressed rather than treating the symptom. 5. Tributary 1 of the Maretlwana: There are no monitoring points specified in the IWWMP for this unnamed stream, as a minimum it is recommended that Tharisa investigates adding a point here: 25°43'20.98"S 27°30'1.25"E. The	and of local extent, as TM SW04 (located ± 1 km downstream) showed no nitrate exceedances during the July 2022 hydrocensus. The latest process water samples taken exceed the SANS 241 limit for nitrate. This is to be expected as nitrate build-up within the mining circuit is standard and well known as mining progresses. It also shows that nitrate exceeds the SANS 241 limit for both TM SW02 and TM SW03 (directly downstream) in terms of the maximum nitrate concentration, but that all the latest measured nitrate concentrations for all 4 surface water sample locations within the Sterkstroom are below the SANS 241 limit. This emphasizes the observed effect of fluctuations / spikes in concentration which is due to seasonal wet and dry cycles and the contribution of changes in production of current arisings (ore) and waste rock rate over time (ACS, 2022). This also points to the fact that mass migration is limited and of local extent, as TM SW04 (located ± 1 km downstream) showed no nitrate exceedances during the July 2022 hydrocensus.	

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		Sibanye-Stillwater surface water monitoring data shows the downstream areas show elevated nitrates, however these points are quite some distance from the Tharisa activities and thus inferences made would be based on insufficient data. If the monitoring point is implemented as recommended it would be most appreciated if we can jointly discuss the interventions for this unnamed stream in the interest of integrated catchment management. Initial investigations into the sediment and water qualities as part of a management and rehabilitation study underway for this stream section it was apparent that the highest nitrates were found upstream of the Sibanye-Stillwater Marikana activities, which points towards an upstream source of impact which may be related to the Tharisa Mine (if the maps are interpreted correctly this would be associated with the East Rock Dump 1). 6. Tributary 2 of the Maretlwana: The Tharisa Far East Waste Rock Dump is also associated with a tributary of the Maretlwana, and no monitoring points have been noted for these reaches. It is recommended that monitoring points be investigates on the Northern side of the	The latest process water samples taken exceed the SANS 241 limit for nitrate. This is to be expected as nitrate build-up within the mining circuit is standard and well known as mining progresses. It also shows that nitrate exceeds the SANS 241 limit for both TM SW02 and TM SW03 (directly downstream) in terms of the maximum nitrate concentration, but that all the latest measured nitrate concentrations for all 4 surface water sample locations within the Sterkstroom are below the SANS 241 limit. This emphasizes the observed effect of fluctuations / spikes in concentration which is due to seasonal wet and dry cycles and the contribution of changes in production of current arisings (ore) and waste rock rate over time (ACS, 2022). This also points to the fact that mass migration is limited and of local extent, as TM SW04 (located ± 1 km downstream) showed no nitrate exceedances during the July 2022 hydrocensus. The application for a water use licence and updated IWWMP does not form part of this process. The groundwater specialist has included a recommendation that the monitoring network needs to be reviewed and a formal monitoring protocol developed. A parameter optimisation study should be conducted to only analyse for the critical control parameters (CCP) as there are only ± 5 important	

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		rock dump, there are several flow paths that should be investigated for viable monitoring points. It can be noted that the Sibanye-Stillwater monitoring data for this unnamed tributary also shows elevated nitrates (though flow is infrequent on surface). Once again it would be ideal that should the recommendation on additional monitoring be implemented by Tharisa, that we engage on an integrated catchment management plan. 7. Groundwater: The plume modelling performed only considers sulfates, however considering the high nitrates noted in the surface - and groundwater data it is recommended that plume modelling in future consider nitrates.	chemical parameters. Additional downstream monitoring locations for both surface water and groundwater are required. Management and mitigation measures should be adapted based on the monitoring results to effectively mitigate the impacts. The latest process water samples taken exceed the SANS 241 limit for nitrate. This is to be expected as nitrate build-up within the mining circuit is standard and well known as mining progresses. It also shows that nitrate exceeds the SANS 241 limit for both TM SW02 and TM SW03 (directly downstream) in terms of the maximum nitrate concentration, but that all the latest measured nitrate concentrations for all 4 surface water sample locations within the Sterkstroom are below the SANS 241 limit. This emphasizes the observed effect of fluctuations / spikes in concentration which is due to seasonal wet and dry cycles and the contribution of changes in production of current arisings (ore) and waste rock rate over time (ACS, 2022). This also points to the fact that mass migration is limited and of local extent, as TM SW04 (located ± 1 km downstream) showed no nitrate exceedances during the July 2022 hydrocensus. The latest process water samples taken exceed the SANS 241 limit for nitrate. This is to be expected as nitrate build-up within the mining circuit is standard and well known as mining progresses.	

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			It also shows that nitrate exceeds the SANS 241 limit for both TM SW02 and TM SW03 (directly downstream) in terms of the maximum nitrate concentration, but that all the latest measured nitrate concentrations for all 4 surface water sample locations within the Sterkstroom are below the SANS 241 limit. This emphasizes the observed effect of fluctuations / spikes in concentration which is due to seasonal wet and dry cycles and the contribution of changes in production of current arisings (ore) and waste rock rate over time (ACS, 2022). This also points to the fact that mass migration is limited and of local extent, as TM SW04 (located ± 1 km downstream) showed no nitrate exceedances during the July 2022 hydrocensus. The application for a water use licence and updated IWWMP does not form part of this process. The groundwater specialist has included a recommendation that the monitoring network needs to be reviewed and a formal monitoring protocol developed. A parameter optimisation study should be conducted to only analyse for the critical control parameters (CCP) as there are only ± 5 important chemical parameters. This would save on lab analysis costs. Additional downstream monitoring locations for both surface water and groundwater are required.	
Gwendolyn Wellmann	25 November	It is with great concern that I notice that our comments submitted in June for this EIA process	Your email received on 25 November 2022 refers.	N/A

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
	2022 via email	has not been included in the latest draft report submitted for comment. Your personal undertaking in Section 41, pg. 252 of the report is thus a false declaration and when it is signed by a Commissioner of Oath becomes a criminal offence. Failure to include all comments also provides us a strong basis to contest any permissions granted to Tharisa Minerals by the DMRE on the basis of this EIA report, and to report your conduct as the EAP and project manager of this process to the EAPASA and to request for censure. Our comments, which were provided in June 2022 but which were not captured nor addressed in the latest draft of the EIA report, although we note with amusement that you corrected the incorrect references to Lonmin, etc., remain the same. Please see attached our comments submitted in June 2022, as well as Ms Smyth's acknowledgment of receipt of our comments.	Your comments received on 17 June 2022 in respect of the draft Scoping Report and the erroneous omission of said comments from the draft Environmental EIAR) and Environmental Management Programme (EMPr), which was made available for public review during the period 26 October 2022 to 25 November 2022, are acknowledged (June 2022 Comments). We hereby confirm that your June 2022 Comments, and the associated responses, were included in the final Scoping Report that was submitted to the Competent Authority (in this case the Department of Mineral Resources and Energy (DMRE)), and that the DMRE had sight of your comments during their decision-making process. A copy of the final Scoping Report, inclusive of your June 2022 Comments, which was made available to the DMRE for decision-making purposes, was also made available to you for your records on 27 June 2022. As per your June 2022 Comments, you represent the following Interested and Affected Parties (I&APs): • Yourself, Gwendolyn Wellmann, who is a shareholder of Tharisa Minerals; • Junicia Morongwe Ncheche, erf: 3, Lapologang; • Magdeline Salang, erf: 5, Lapologang; • Lydia Lebogang Lebelo, erf: 7, Lapologang;	

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			• Amelia Nana Skosana, erf: 12, Lapologang; • Tieho Losianes Ncheche, erf: 14, Lapologang; • Chimane Boetie Lebelo, erf: 18, Lapologang; • Alice Puleng Mokoena, erf: 23, Lapologang; • Thobi Johannes Serunye and Meite Catherine Serunye, erf: 24, Lapologang; • SC Pretorius, Portion 139 Kafferskraal (342 JQ); • GJ du Preez and MD du Preez, Portion 305 Kafferskraal (342 JQ); • N van der Hoven, Portion 196 Kafferskraal (342 JQ); • PHC Wolvaardt and HM Wolvaardt, Portion 110 Kafferskraal (342 JQ); • Nkoko Francina Mashabela, Portion 139 Kafferskraal (342 JQ); • Jan Hendrik Pretorius and Sindie Hendriena Pretorius, Portion 139 Kafferskraal (342 JQ); • Tlhopi Sanah Mashabela, Portion 139 Kafferskraal (342 JQ); • Petrus Molekwa, Portion 139 Kafferskraal (342 JQ); • Louis De Beer, Portion 139 Kafferskraal (342 JQ); • Johannes Lodewyk de Beer and Patricia de Beer; Portion 196 Kafferskraal (342 JQ); and • George Msokoli; 354 Maditlokwa.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
			The above listed I&APs may be affected by the establishment of the proposed West Above Ground Waste Rock Dump (West OG WRD), and the June 2022 Comments which were received and considered related to concerns with regards to the proposed West OG WRD on these I&APs. Please note, however, that for the purpose of the current application (being the establishment of the East Above Ground Waste Rock Dump - East OG WRD), the West OG WRD will **NOT** be processed by the DMRE at this stage. This is due to the following reasons: • In accepting the final Scoping Report, the DMRE imposed a condition that the establishment of the West OG WRD (which is in closer proximity to the neighbouring communities of Mmaditlhoka) will only be considered and an application for this processed once the neighbouring communities of Mmaditlhoka have been relocated away from the site. • For the duration that the communities of Mmaditlhoka and Lapologang are still located where they are currently, the establishment of the West OG WRD and any application process submitted or considered therefor should be put on hold. The abovementioned condition imposed by the DMRE under the acceptance of the Scoping Report was previously communicated to all I&APs as part of the notification of the availability of the draft EIAR and EMPr for review.	

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
			It is therefore confirmed that authorisation for the proposed West OG WRD will not be pursued by the mine at this stage, and that a separate process will be undertaken for the proposed West OG WRD when further information pertaining to the relocation of the Lapologang and Mmaditlhokwa communities is available. At that point, your June 2022 Comments will be incorporated and considered and another opportunity for participation and comments will be made available to you and the I&APs. In any event and for completeness purposes, your June 2022 Comments will be included in the final version of the EIAR and EMPr which will be submitted to the DMRE. You will be provided with a copy of the final EIAR and EMPr.	
Fiona Weeks	16 November 2022 via email	Where are the posters pinned for public comments? Most people in surroundings don't have a computer, therefore a printed copy should be made available. How, and when was this communicated with Bokamoso? They are allocated in the far side of the Glencore smelter?	Site notices were placed at the site, Motsepe car wash; Mambush spaza shop; Chauke's tuck shop; Gift tuckshop; Mutaung's Tuckshop; Lapologang's Tshisanyama; spaza shop located in Mmaditlhokwa. Printed copies of the EIR were made available at the following venues: • Bokamoso Community Hall • Lapologang Piet Retief School • Mmadikhlokwa Community Hall • Rustenburg Community Centre • Rustenburg Local Municipality • Piet Retief Primary school All registered I&APs were also notified via SMS.	Refer to Appendix C

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		How and when was it communicated with the farms? People are unaware of this.	Block advertisements were placed in two local newspapers. In this regard, advertisements were published in the Rustenburg Herald on 25 November 2021 and in the Brits Pos 26 November 2021. Due to changes in the project description, revised advertisement was published in the Rustenburg Herald and Brits Pos on 15 April 2022. All landowners and surrounding landowners on our database were informed via email or SMS.	Refer to Appendix C
		Statement for comment context: *The proposed Project area associated with East OG WRD and West OG WRD, has been altered due to the existing open cast mining related activities associated with the West and East mine. The natural topography associated with West OG WRD has been disturbed and altered as a result of the existing mining activities associated with West Mine and community related activities (particularly Maditlhokwa).* **Comment:** MEC requested that the local councillor speak to them on matters. Is this not conflict with interest for a political group be appointed to communicate with Tharisa. There are big concerns, especially	It is my understanding that local councillors and community leaders are provided with the necessary information to communicate to the communities in a way that can be understood by all parties and without bias.	N/A

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		when it comes to the handing in of CVs. This is also only through the councillor?		
		Statement for comment context: *During summer, the wind field is varied between most direction with more frequent winds from the north-eastern sector. The wind field shifts to south during autumn, with more frequent southerly winds during winter. During spring, the northerly winds increase with frequent north to north-east winds.* **Comment:** It is becoming a problem as soon as windy conditions occur. Deposits from the waste dump is blown towards farms and Maditlokhwa. The water, after rains, where the houses are flooded, has a clear indicated of iron/lead as the water discoloration is green. They have puddles of water now for 22 days consecutively. This is a big concern, especially for typhoid etc	All grievances relating to the current mining activities should be communicated to Tharisa. The dust from the proposed East OG WRD will not affect any communities.	Appendix F.
		Statement for comment context: *It should be noted that the ambient measurements account for all emission contributions in the region, not just the mine.*	This information can be requested from Tharisa as part of their continuous monitoring.	Appendix F.

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		Comment: Requests to observe was made directly to the DMRE. They stated that all is in order, hence sometimes you cant even see the waste dumps, due to no watering down of roads or controlling the dust. We would like to obtain readings, especially after blasts.		
		Statement for comment context: *The Witbank soil form is considered to be of very low agricultural potential due to the soils having been subjected to physical disturbance because of human interventions* **Comment:** The exact locations please?	A map showing this information is attached as Map 11.	Map 11.
		Statement for comment context: *The study area is located within two vegetation types, namely the Marikana Thornveld in the east and the Moot Plains Bushveld in the east, i.e., the reference vegetation types. Overall, the habitat within the study area was characterised by transformed areas (because of mining activities) in which vegetation cover ranged from almost absent to low. When vegetation was present, it was generally dominated by alien and invasive*	The area affected by the proposed Project was surveyed and the vegetation types mapped Map 9.	Map 9

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		plant (AIP) species and/or native pioneer species that favour disturbed habitats. Given the level of transformation within the study area because of mining activities, the presence of indigenous vegetation1 was confirmed to be absent. **Comment** The whole of Portion JQ342 should be taken into consideration. There is far more ie the whole citrus farm?		
		During the relocation for people at Maditlokwa, enclosed toilets were put up. There is a huge problem, as the rain water made them flood. The entire Maditlokwa has a urine smell. Also, no consideration was taken in erecting this on the 1/100 year flood line?	This comment is noted. All grievances relating to current mining activities outside of the proposed Project scope should be directed to Tharisa.	N/A
		Statement for comment context: *Water from the Sterkstroom River is used by the surrounding community for domestic purposes such as washing and bathing, livestock watering and for agricultural purposes. An irrigation canal flows from north to south, along the eastern boundary of TSF1. There are no users of this irrigation canal downstream of the TSF.*	This comment is noted.	N/A

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		Comment: Water is contaminated as it runs from east side.		
		Statement for comment context: *The proposed WRDs will be within existing disturbed (open cast mining) areas, and therefore no freshwater ecosystems occur directly within the study area. However, two valley bottom wetlands are located immediately north of the proposed West Above Ground WRD, and an estimated 1 km reach of the Sterkstroom River is located approximately 235 m west of the East Above Ground WRD.* **Comment** These wetlands are no overflown with sanitation.	This comment is noted.	N/A
		Statement for comment context: *The wetlands were previously assessed by SAS (2013) and found to be moderately modified at the time; however, the ecological integrity of the wetlands has subsequently decreased and at the time of this assessment in May 2022, were found to be seriously modified (channelled valley bottom wetland) and critically modified (unchanneled valley bottom wetland).*	Both wetlands have undergone serious modification (reduced functioning and biological integrity), initially due to impacts associated with agricultural activities, and subsequently as a result of mining-related impacts. The UCVB wetland in particular is considered a 'remnant' wetland due to the hydraulic isolation from the downstream reaches arising from the placement of a WRD (associated with a neighbouring mine) over a portion of the wetland. The headwaters of both systems have been destroyed by opencast mining within the Tharisa Mine MRA, although according to SAS (2013) these headwaters of the wetlands were already moderately modified and of	Section 9.1.8, Appendix E and Freshwater ecosystems specialist report (Appendix H).

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		Comment Please specify modifications	reduced EIS prior to being mined out. Disturbances to soil, increased availability of sediment and removal of natural vegetation over the course of decades have contributed to the proliferation of alien invasive and encroacher plant species, affecting habitat integrity and provision as well as ecological service provision.	
		Statement for comment context: *The Tharisa Mine is underlain by a shallow upper weathered aquifer and a deeper fractured aquifer. The weathered overburden is highly variable in thickness from 3 m to more than 30 m based on existing borehole logs and evidence of borehole depths. The deeper fractured bedrock aquifer is characterized by very low matrix permeability, poorly connected joints/fractures and dolerite/diabase dykes (that may act as barriers to groundwater flow).* **Comment** Another study should be done, as the connected joints/fractures might have moved due to blasting. Sinkholes can occur due to blasting, through disturbances	Your comment has been noted. The proposed study does not form part of the current scope of work.	Table 43
		2 boreholes are dried up next to Tharisa East, and the water delivery has increased at some places from 3000l/h, to 2000l/h. As the supply of water	This comment is noted. The concerns relating to the current mining activities should be communicated to Tharisa in accordance with their grievance mechanism.	N/A

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		goes to Maditlokwa, this is putting strain on the farmers higher up to support them with water.		
		There is a big concern for the traffic management between East and West pit/dumps as the buses and private cars drive there. The interaction is very poor as the big ADTs sometimes ignore the people who are standing with the flags, Tharisa employees, and drives over the road.	This comment is noted. The concerns relating to the current mining activities should be communicated to Tharisa in accordance with their grievance mechanism.	N/A
		Statement for comment context: *The combination of the mining, agricultural, open land and communities, create the sense of place for the study area. It comprises a variety of land uses common to the sub-region resulting in a landscape that exhibits little positive character, due to major evidence of alteration and degradation of its original natural features. The resultant sense of place is weak and of mixed character.* **Comment** As most of the ground was sold to Tharisa, influx of people arose in the settlements, The previous owners supplied work to the community, hence several are now without jobs. Negativity started during the harassment and assault by Tharisa to community people during an interview with ENCA	This comment is noted. The concerns relating to the current mining activities and communication structures should be communicated to Tharisa in accordance with their grievance mechanism.	N/A

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		during April 2022. MEC intervened, but instructed the mine to work through the councillor, this is definitely a political driven fixture, as they still havent apologised to the affected people. (Please see the public statement by MEC on the GOV platform).	This comment is noted. The concerns relating to the current mining activities and communication structures should be communicated to Tharisa in accordance with their grievance mechanism.	
		As there is now development for the dams right opposite the JvRensburg graveyard and close to the school, will this eventually be removed?	The graveyard will not be affected by the proposed Project.	N/A
		Tharisa moved the people at Maditlokwa and erected closed toilets. However, this was built with zink plates. Tharisa published a portion in the Herald which was identified to move these people, when will this start?	It is our understanding that an EIA for the relocation has been undertaken and is with the DMRE for authorisation. Please note that the relocation of the communities is handled as a separate process to this project.	N/A
		Statement for comment context: *Based on the observations during the site assessment, the dominant land uses within the proposed WRD footprint areas are mining related activities. No agricultural activities were observed in the immediate vicinity of the footprint areas* **Comment** Where is the footprint area, as there are still farming activities in the surroundings	Please refer to Map 11 showing the project footprint in relation to the local land uses. The proposed WRD will located on sections of backfilled portions of the east pit (already disturbed area). Thus, no farming activities will be affected by the proposed Project. Please refer to Map 11 showing the project footprint in relation to the local land uses. The proposed WRD will located on sections of backfilled portions of the east pit (already disturbed area). Thus, no farming activities will be affected by the proposed Project.	Appendix B Map 11

Interested and affected party	Date comment received	Issues raised	Response provided	Section and paragraph reference in this report where the issues and or responses were incorporated
		There used to be several animal species in the region. This is now virtually non existent due to mining. The portion on West side falls within the Magalies Biosphere.	This comment is noted. The proposed Project will not have a significant effect on faunal species.	Appendix E and Table 30
		Currently the noise level is high. Notifications are posted up (sometimes), and on boards on roads. However, sometimes no siren goes off, and if it does, about 5 minutes to vacate. Why, if the mine knows that rocks can fly, like 29 Oct, is the mine not taking more safety measures. People should not be told to leave there houses, some work shifts, and babies have to be transported. How are these people transported away from their houses and back, or should they walk to a certain point?	This comment is noted. Kindly refer all current mining related concerns to Tharisa through their grievance mechanism as this does not relate to the proposed Project.	N/A
		Can we please get readings (*noise measurements*) for the past 3 months?	A noise monitoring campaign was undertaken as part of the specialist assessment. The proposed WRD will not affect any communities with mitigation measures implemented. Noise monitoring data can be requested from Tharisa as part of their ongoing noise monitoring campaign.	Appendix E and the specialist assessment in Appendix J.
		What type of entrepreneurship is envisaged?	Tharisa will, through its social labour plan continue with community development and job opportunities where possible. It is currently not anticipated that many opportunities for community development as part of this project exist, as this is an exiting and ongoing mine.	N/A

9. ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITE

The baseline information is aimed at providing the reader with a perspective of the existing status of the biophysical, cultural, and socio-economic environment. Baseline information for this Report draws extensively on information contained in reports from previous studies conducted at the Tharisa Mine as well as specialist reports undertaken for the proposed Project.

The EIA Regulations, 2014 requires that the section below describes the baseline environment for all project related alternatives where applicable. Given that the proposed Project is not associated with any alternatives, this is not applicable to the section below.

9.1 BASELINE BIOPHYSICAL ENVIRONMENT AFFECTED BY THE PROPOSED PROJECT

9.1.1 Geology

The geology of an area provides information on the presence of mineral resources (and informs the mine plan), the geochemistry and related potential for contamination from mined material and the presence of geological structures (such as faults and dykes) that act as barriers or conduits (preferential flow paths) for groundwater flow. Geological processes also influence soils forms, the type and nature of groundwater aquifers and the potential for palaeontological resources.

Geological information was sourced from the approved EMPr (SLR, 2014), update geochemistry prepared for the mine (SLR, 2019) and the updated resource estimate for the mine.

9.1.1.1 Regional Geology

In general, Tharisa Mine and the surrounding area are underlain by igneous rocks of the Rustenburg Layered Suite (RLS), which forms part of the Bushveld Igneous Complex (BIC) and is approximately 2 050 million years old. The RLS layered sequence is generally planar in nature and gently folds around a thickened part of floor rocks known as the Magaliesberg Quartzite Formation (MQF). The general stratification of the RLS, BIC is illustrated in Figure 1. The Magaliesberg Mountain Range is formed by quartzites (Transvaal Sequence), which are common as floor or basement rocks to the BIC. All the chromitite and platinum mineralisation is in the RLS. These layered rocks have a maximum thickness of up to about 8 km consisting of pyroxenite, norite, gabbro and other mafic to ultramafic lithogens.

The RLS comprises five stratigraphic zones representing the sequential fractional crystallisation that accompanied the cooling of this magmatic body:

- The Marginal Zone, which comprises pyroxenites and norites with no economic potential.
- The Lower Zone which comprises ultramafic rocks, such as pyroxenites and harzburgites, containing thin, high-grade chromitite seams.
- The Critical Zone pyroxenites, norites and anorthosites that host all the significant platinum group metals chromite deposits.
- The Main Zone, which consists mainly of homogeneous norites and gabbros that are locally exploited as dimension stone.
- The Upper Zone norites, gabbros and diorites, which host over 20 massive magnetite seams, some of which are exploited for vanadium and iron ore.

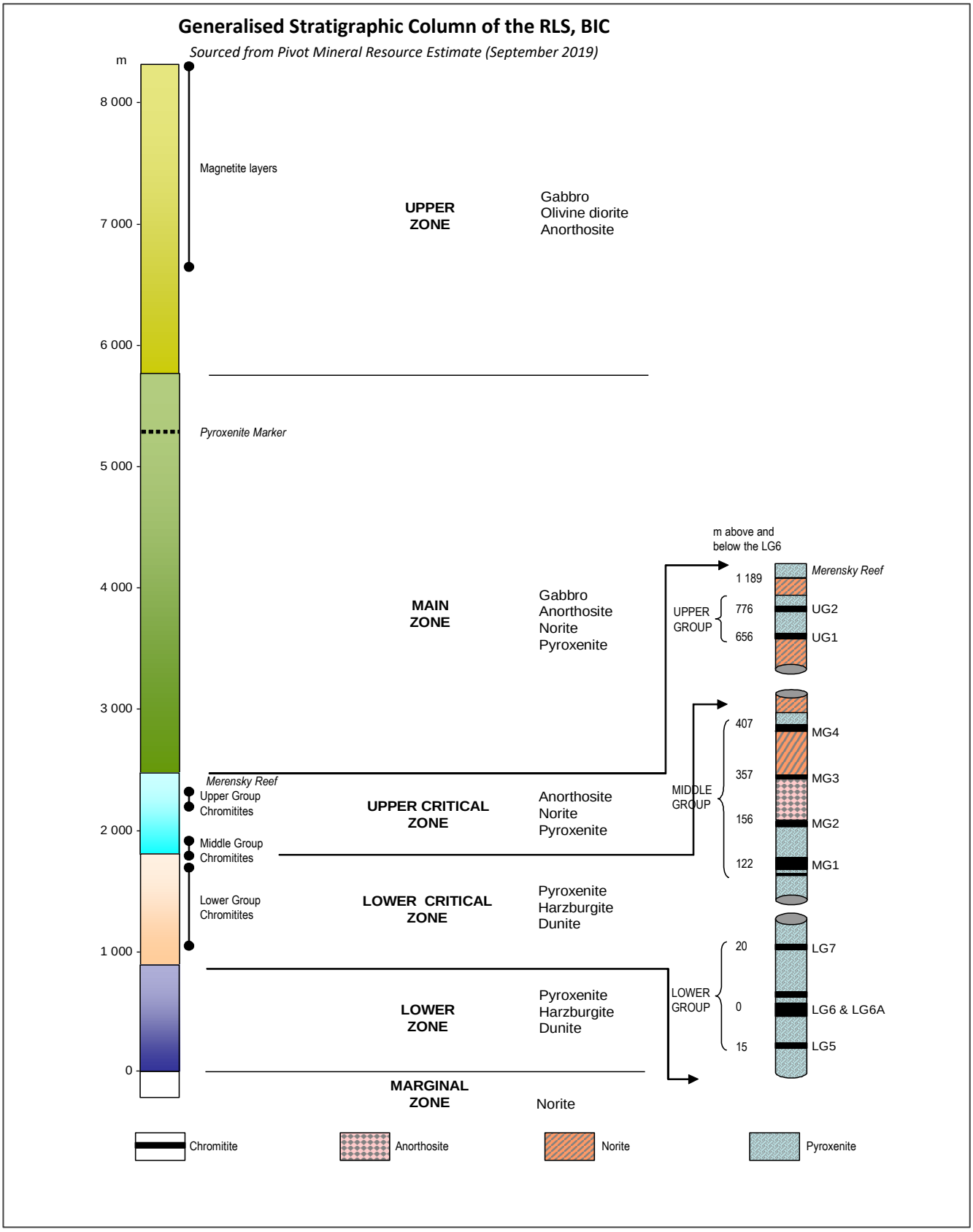

Figure 1: Stratigraphy of the regional Geology

9.1.1.2 Local Geology

Tharisa Mine is located on the south western limb of the BIC in the Marikana section. The Marikana section is separated from the Brits section to the east by the Wolhulterskop fault and the Rustenburg section to the west by the Spruitfontein upfold (see Figure 2). The target ore body is the Middle Group (MG) Chromitite Layers (MG1 –MG4). The MG Chromitite Layers outcrop on the farm 342 JQ striking roughly east - west and dipping at 12-15° to the north. Towards the western extent of the outcrop, the stratigraphy typically narrows, and the dip is steeper, with a gentle change in strike to north west- south-east. The entire MG package is developed over a true thickness of 47 m on the eastern portion of 342 JQ and thins to 25 m to the west near the Spruitfontein upfold.

The MG package has four main groups of chromitite layers hosted in anorthosite, norite and feldspathic pyroxenite (refer to Figure 2). These chromitite layers are important as they contain significant concentrations of chromite and PGMs.

Of the four main chromite layers (seams), the MG1 has the highest chrome content. It is common for the MG1 to be divided into more than one band. Shearing in the MG1 is also common but the location varies. The MG2s have three subdivisions, with the MG2A, MG2B and MG2C identifiable from the base upwards. MG2A and MG2B usually occur as one layer but are distinguishable by their definite analytical signature. Of the three subdivisions, MG2C contains the highest content of PGMs followed slightly by MG2A. MG2B has a much lower content in comparison. The MG2s are hosted in a felspathic pyroxenite but directly underlay the anorthositic marker. The anorthositic marker is a prominent anorthosite and often a norite separating the MG2s and the overlying MG3. Chrome stringers are sometimes present within the marker and can be high in PGM content. The MG3 appears as a banded layer of chrome stringers and bands within norite and anorthosite. The MG4s are subdivided into the MG4(0) at the base, MG4 and MG4A at the top (refer to Figure 2).

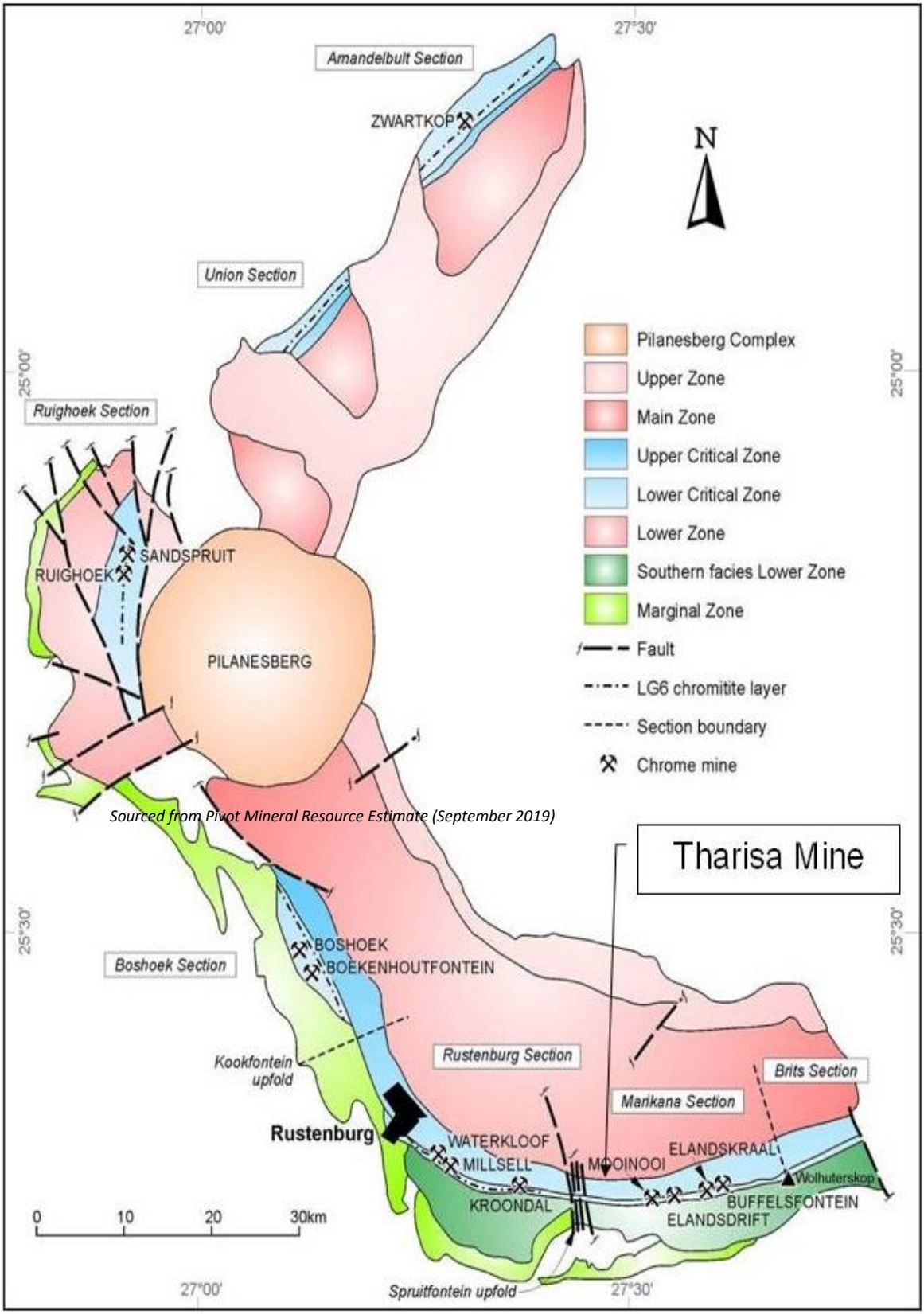

Figure 2: Western BIC showing the location of the Tharisa Mine

9.1.1.3 Lithologies of Waste Rock Material

The waste rock associated with the PGM at the Tharisa Mine generally comprises lithologies of the RLS as follows (SLR, 2019):

- Pyroxenite
  - Ultramafic rock with less than 45 % total silica.
  - Composed almost entirely of one or more pyroxenes (inosilicate mineral).
  - Other minerals may include biotite, hornblende, olivine and iron oxides.
- Anorthosite
  - Basic rock with less than 55 % total silica.
  - Quartz virtually absent.
  - Composed at least 90 % plagioclase feldspar.
  - Other minerals may include olivine, pyroxene and iron oxides.
- Norite
  - Basic rock with less than 55 % total silica.
  - Composed of plagioclase feldspar and pyroxene.
  - Orthopyroxene is dominant over clinopyroxene.
  - Other minerals may include olivine, biotite, hornblende and cordierite.

9.1.1.4 Structural Features

As mentioned previously, the Wolhulterskop fault and the Spruitfontein upfold occur to the east and west of the Tharisa Mine, respectively. Within the Mining Right area, minor faults and some dykes occur, but there are no major displacements.

9.1.2 Topography

The presence of project infrastructure and mining activities has the potential to change the natural topography. A change in topography has the potential to influence surface water flow, the location of soils, the visual character of a landscape and the safety of third parties and animals.

Information in this section was sourced from the approved EMPr (SLR, 2014) and topographical data.

9.1.2.1 Immediate and Surrounding Topographical Environment

In general, the area surrounding the Tharisa Mine comprises flat plains with a gentle slope (1%) towards the north. The Magaliesberg Mountain range lies approximately 2 km to the south of the mine. Peaks in this part of the Magaliesberg Mountain range rise to approximately 1 400 mamsl.

The natural topography immediately surrounding the Tharisa Mine has been largely influenced by the following activities and features (refer to Map 2):

- Mining activities associated with the surrounding Marikana Platinum Mine to the west, Western Platinum Mine to the north and Samancor Western Chrome Mine to the east.
- Community related activities associated with the Bokamoso community (located east of Far East WRD.
- The perennial Sterkstroom River, located between East Mine and West Mine, flowing in a northerly direction adjacent to the D1325 (Marikana Road).
- The N4 located immediate south of the Tharisa Mine together with farming related activities.

The proposed Project area associated with East OG WRD and West OG WRD, has been altered due to the existing open cast mining related activities associated with the West and East mine. The natural topography

associated with West OG WRD has been disturbed and altered as a result of the existing mining activities associated with West Mine and community related activities (particularly Maditlhokwa).

9.1.3 Climate

Climate can influence the potential for environmental impacts and related facility design. Specific issues include:

- Rainfall could influence erosion, evaporation, vegetation growth, rehabilitation planning, dust suppression and surface water management planning.
- Temperature could influence air dispersion through impacts on atmospheric stability and mixing layers, vegetation growth, and evaporation which could influence rehabilitation planning.
- Wind could influence erosion, the dispersion of potential atmospheric pollutants and rehabilitation planning.

9.1.3.1 Ambient Temperature

The area experiences hot temperatures during summer, with maximum of 36.4°C for the month of October. Winter temperatures are relatively low especially in the months of May to July. The monthly temperature pattern is provided in Figure 3.

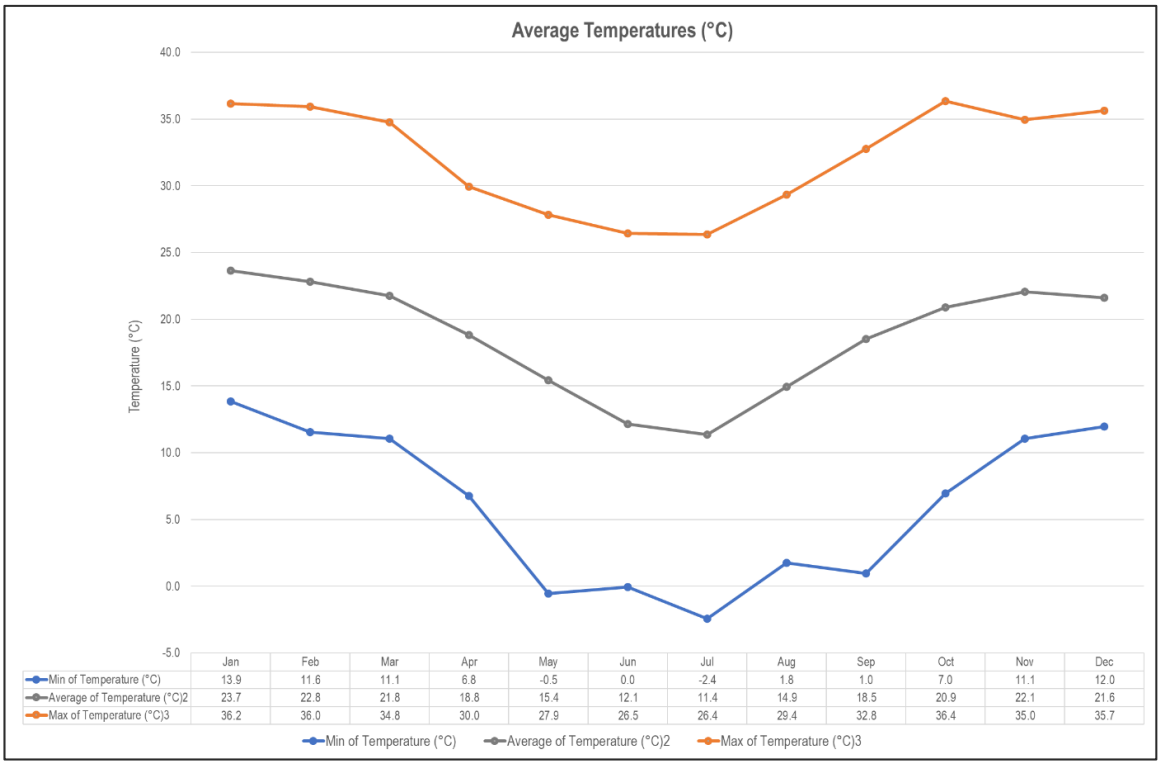

Figure 3: Minimum, average, and maximum temperatures (WRF data; 2019 to 2021)

9.1.3.2 Precipitation

Precipitation is important to air pollution studies since it represents an effective removal mechanism for atmospheric pollutants and inhibits dust generation potentials. Monthly rainfall for the Project site (based on WRF data for 2019 – 2021) is given in Figure 4. Months wherein the most rain occurred stretched from October to April. The total annual rainfall for the Project site is given to range between 873 mm and 939 mm.

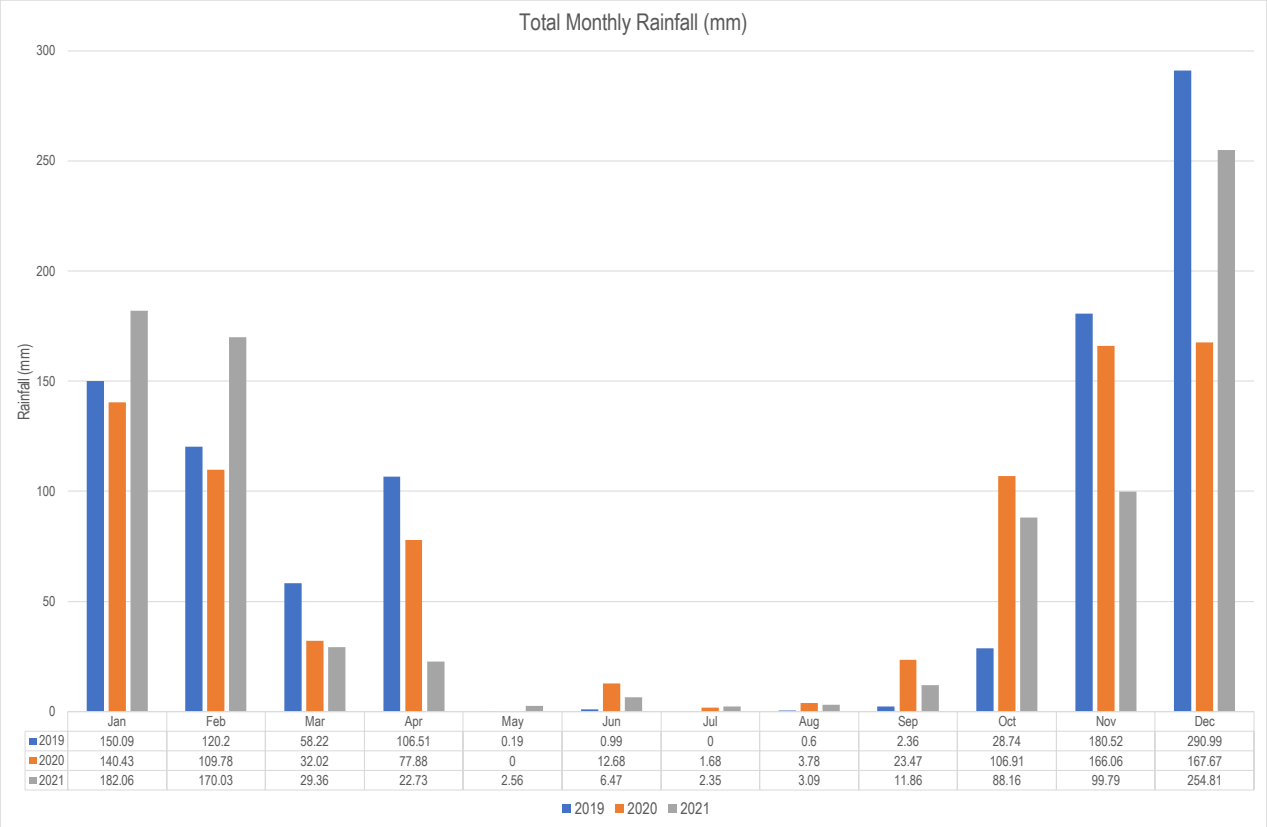

Figure 4: Monthly precipitation (WRF data; 2019 to 2021)

9.1.3.3 Surface Wind Field

The wind field determines both the distance of downward transport and the rate of dilution of pollutants. The wind field for the study area is described with the use of wind roses. Wind roses comprise 16 spokes, which represent the directions from which winds blew during a specific period. The colours used in the wind roses below, reflect the different categories of wind speeds; the yellow area, for example, representing winds in between 4 and 5 m/s. The dotted circles provide information regarding the frequency of occurrence of wind speed and direction categories. Calm conditions are periods when the wind speed was below 1 m/s. These low values can be due to “meteorological” calm conditions when there is no air movement; or, when there may be wind, but it is below the anemometer starting threshold.

The period wind field and diurnal variability in the wind field are shown in Figure 5. The average wind field is predominately from the south and north, with calm conditions 7.6% of the time. The daytime wind field is mainly from the north, ranging between north-west to north-east with 5.1% calm conditions. During the night, the wind field shifts to the south and south-southwest with less frequent winds from the south-easterly sector. The frequency of night-time calm conditions increases to 10.3%.

A distinct seasonal variation in the wind field in visible from Figure 6. During summer, the wind field is varied between most direction with more frequent winds from the north-eastern sector. The wind field shifts to south during autumn, with more frequent southerly winds during winter. During spring, the northerly winds increase with frequent north to north-east winds.

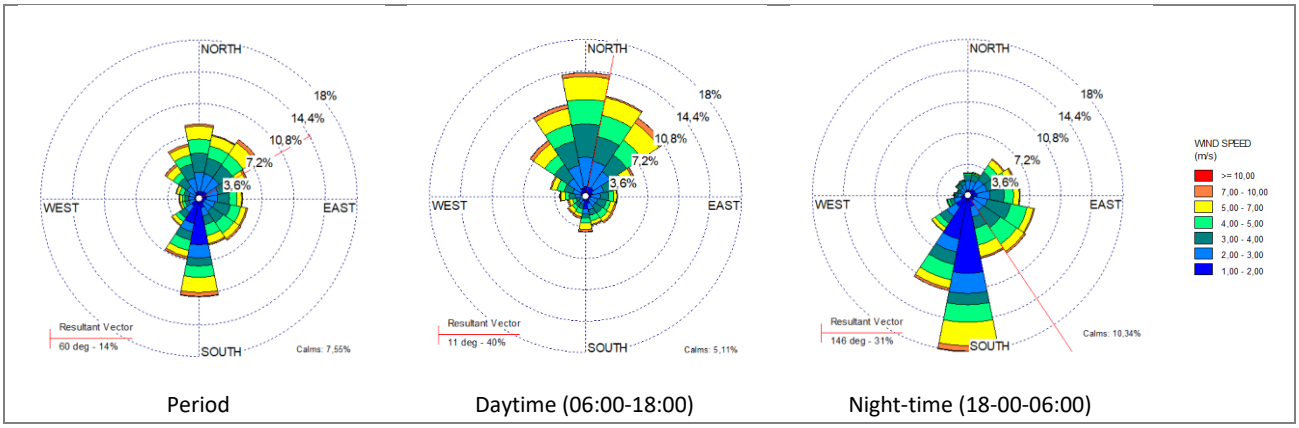

Figure 5: Period, day- and night-time wind roses (WRF data; 2019 to 2021)

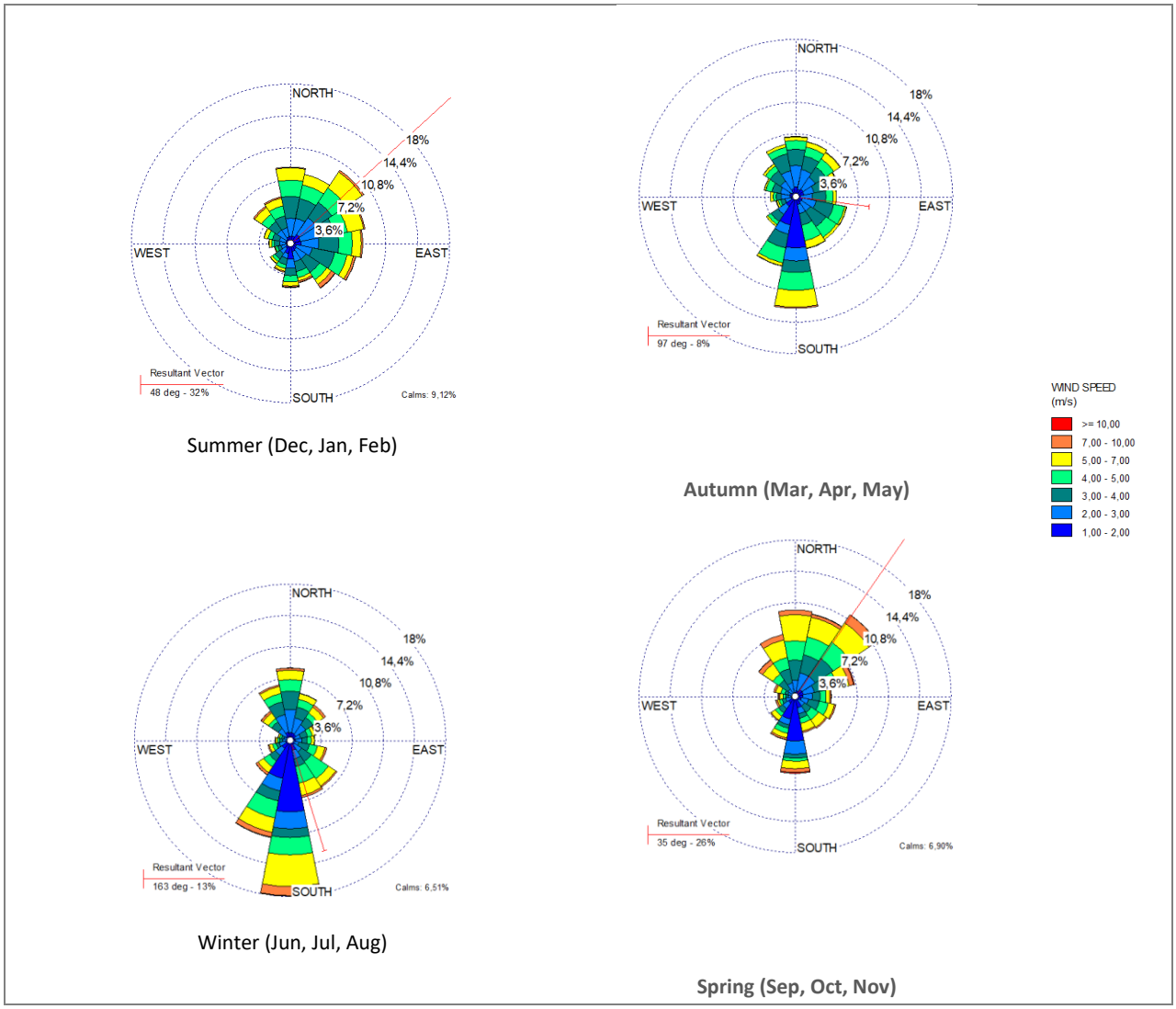

Figure 6: Seasonal wind roses (WRF data; 2019 to 2021)

According to the Beaufort wind force scale, wind speeds between 6-8 m/s equates to a moderate breeze, with wind speeds between 14-17 m/s near gale force winds. Based on the three years of WRF data, wind

speeds exceeding 7 m/s occurred for only 3.3% of the time, with a maximum wind speed of 16.1 m/s. The average wind speed over the three years is 3.2 m/s with calm conditions (wind speeds < 1 m/s) occurring for 7.6% of the time.

9.1.4 Air quality

This chapter provides details of the receiving environment which is described in terms of:

- The identification of Air Quality Sensitive Receptors (AQSRs) from available maps and Google Earth imagery.
- A study of the atmospheric dispersion potential of the area taking into consideration local meteorology, land-use and topography.
- The identification of existing sources of emissions in the study area.
- The analysis of all available ambient air quality information/data to determine pre-development ambient pollutant levels and dustfall rates.

The closest residential developments to Tharisa Mine and the proposed Project consist of the Maditlhokwa and Lapologang communities, with the town of Marikana approximately 1.5 km to the north of the mining rights boundary. Individual farmsteads also surround the project area (Map 7).

It is expected that various local and far-a-field sources are expected to contribute to ambient concentrations in the region. Local sources include wind erosion from exposed areas, fugitive dust from agricultural activities and mining activities, vehicles on roadways and veld burning. Long range particulates can result from remote tall stack emissions and from large scale biomass burning in countries to the north of South Africa. These have been found to contribute significantly to background fine particulate concentrations over the interior of South Africa ((Andreae, 1996), (Garstang, 1996), (Piketh, Annegarn, & Kneen, 1996)).

Particulates represent the main pollutant of concern in the assessment of mining operations. The particulates in the atmosphere may contribute to visibility reduction, pose a threat to human health, or simply be a nuisance due to their soiling potential.

9.1.4.1 Existing Sources of Emissions near the Project Site

Mining and processing activities, farming and residential land-uses occur in the region. These land-uses contribute to baseline pollutant concentrations via vehicle tailpipe emissions, household fuel combustion, biomass burning and various fugitive dust sources. Long-range transport of particulates, emitted from remote tall stacks and from large-scale biomass burning in countries to the north of South Africa, has been found to contribute to background fine particulate concentrations within the South African boundary (Andreae, et al., 1996; Garstang, Tyson, Swap, & Edwards, 1996; Piketh, Annegarn, & Kneen, 1996).

- Mining and Industrial Operations
    - Fugitive emissions from opencast and underground mining operations mainly comprise of land clearing operations (i.e. scraping, dozing and excavating), materials handling operations (i.e. tipping, off-loading and loading, conveyor transfer points), vehicle entrainment from haul roads, wind erosion from open areas, drilling and blasting. These activities mainly result in particulates and dust emissions, with small amounts of oxides of nitrogen (NO_x), carbon monoxide (CO), SO_2, methane and CO_2 being released during blasting operations.
    - Lonmin Platinum Mine is located approximately 1 km to the northeast of Tharisa and the smelter approximately 3 km to the northwest. Samancor western chrome mine is roughly 3.3

km to the east, and Glencoire WKP UG2 about 3.8 km to the west. Further afield is Bleskop Mines, Kroondal Mine, and Rustenburg Platinum Mine. Anglo Platinum Smelter Operation (Waterval Smelter) and Impala Platinum are all located around Rustenburg, about 20 km to the west-northwest. Rhovan Vanadium is to the north of Brits and Vanchem to the east, both with associated mining operations. Most of the smelters have mining operations associated with it, with tailings storage facilities, unpaved roads and other materials handling activities generating dust.

- Agricultural operation
    - Agriculture is a land-use within the area surrounding the site. Particulate matter is the main pollutant of concern from agricultural activities deriving from windblown dust, biomass burning, and dust entrainment as a result of vehicles travelling along dirt roads. The quantity of windblown dust is a function of the wind speed, the extent of exposed areas and the moisture and silt content of such areas.
    - Amongst the mining and industrial operations between Brits and Rustenburg, there are a number of citrus farms and other agricultural activities. Crop farming and mixed crop farming include land tilling operations, fertiliser and pesticide applications, and harvesting. By applying fertiliser and pesticides use are typically made of vehicles (tractors) driving on unpaved roads and exposed soil. Land tilling includes dust entrainment on exposed surfaces, windblown dust and scraping and grading type activities resulting in fugitive dust releases. Both particulate matter (PM) and gaseous air emissions (mainly NO, NO_2, NH_3, SO_2 and VOCs) are generated from the application of nutrients as fertilizers or manures (EPA, 1999).
- Unpaved Roads
    - Vehicle entrained dust emissions from paved and unpaved roads represent a potentially significant source of fugitive dust in the area surrounding Tharisa Mine. Unpaved roads include industrial, mine, local farming, and community access roads. The extent of particulate emissions from the main roads will depend on the number of vehicles using the roads and the silt loading on the roadways. The extent, nature and duration of road-use activity and the moisture and silt content of soils are required to be known in order to quantify fugitive emissions from this source.
- Vehicle Tailpipe Emissions
    - Air pollution from vehicle emissions may be grouped into primary and secondary pollutants. Primary pollutants are those emitted directly into the atmosphere, and secondary, those pollutants formed in the atmosphere as a result of chemical reactions, such as hydrolysis, oxidation, or photochemical reactions. Notable primary pollutants emitted by vehicles include CO_2, CO, hydrocarbons (HCs), SO_2, NOx, DPM and Pb. Secondary pollutants include: NO_2, photochemical oxidants (e.g. ozone), HCs, sulphur acid, sulphates, nitric acid, nitric acid and nitrate aerosols. Hydrocarbons emitted include benzene, 1.2-butadiene, aldehydes and polycyclic aromatic hydrocarbons (PAH). Benzene represents an aromatic HC present in petrol, with 85% to 90% of benzene emissions emanating from the exhaust and the remainder from evaporative losses. Vehicle tailpipe emissions are localised sources and unlikely to impact far-field.
    - Both small and heavy private and industrial vehicles travelling along the N4 and the R104 as well as the unpaved roads, are notable sources of vehicle tailpipe emissions.
- Household Fuel Burning

- Domestic households are known to have the potential to be one the most significant sources that contribute to poor air quality within residential areas. Pollutants arising from the combustion of wood include respirable particulates, CO and SO_2 with trace amounts of polycyclic aromatic hydrocarbons (PAHs), in particular benzo(a)pyrene and formaldehyde. Particulate emissions from wood burning have been found to contain about 50% elemental carbon and about 50% condensed hydrocarbons.
- Informal settlements in the region are likely to use coal and wood as energy sources. Coal burning emits a large amount of gaseous and particulate pollutants including SO_2, total and respirable particulates including heavy metals and inorganic ash, CO, polycyclic aromatic hydrocarbons (PAHs), NO^2 and various toxins such as benzo(a)pyrene. Pollutants from wood burning include respirable particulates, NO_2, CO, PAHs, particulate benzo(a)pyrene and formaldehyde. Particulate emissions from wood burning have been found to contain about 50% elemental carbon and about 50% condensed hydrocarbons.

- Crop Burning and Wildfires
  - Crop-residue burning, and general wildfires (veld fires) represent significant sources of combustion-related emissions associated with agricultural areas. Emissions are greater from sugar cane burning that for savannas wildfires due to sugar cane areas being associated with a greater availability of available material to be burned. The quantity of dry, combustible matter per unit area is on average 4.5 ton per hectare for savannas areas.

The quantification of background particulate concentration, which is of particular importance for the current study, is complicated due to the large number of sources in the region. Sources of particulates also include a significant proportion of fugitive emissions from diffuse sources (e.g. vehicle-entrained dust from roadways, wind-blown dust from stockpiles and open areas, dust generated by materials handling) which are more difficult to quantify than are emissions from point sources. Dust fallout typically impacts in close vicinity of the emission source (up to 3 km) whereas PM_{10} can remain in the atmosphere for days and impact far afield.

9.1.4.2 Air quality monitoring data

Tharisa Mine has a dustfall monitoring network in place and does passive sampling of NO_2 and SO_2 (Map 8). Data analysed for the ambient air quality is limited to the period January to March 2021 and January to March 2022. Both NO_2 and SO_2 are screened against National Ambient Air Quality Standards (NAAQS) while dustfall is screened against the National Dust Control Regulations (NDCR).

It should be noted that the ambient measurements account for all emission contributions in the region, not just the mine.

9.1.4.3 Ambient nitrogen dioxide and sulphur dioxide concentrations

The current monitoring network comprises of three radiello® passive monitors for nitrogen dioxide (NO_2) and sulphur dioxide (SO_2). The results of the NO_2 and SO_2 monitoring are represented in Table 12 and Table 13.

While the NO_2 and SO_2 cannot validly be compared, the results obtained to the annual standard unless it is continuously sampled for a year and an average obtained, the radiello® passives technique provide an indication of possible high incidences of NO_2 and SO_2 levels at Tharisa Mine. Results obtained for NO_2 and SO_2 for the months in review were well below the NAAQS.

Table 12: Summary of NO_2 concentrations for 2021

Station	Jan 2021 (µg/m³)	Feb 2021 (µg/m³)	Mar 2021 (µg/m³)	NAAQS Annual (µg/m³)
1.Lapologang village	5	3.7	7.1	40
2.Swanepoel	2.3	5.4	10.6	40
3.Glenross farmhouse	4.6	2.2	0.7	40

Table 13: Summary of SO_2 concentrations for 2021

Station	Jan 2021 (µg/m³)	Feb 2021 (µg/m³)	Mar 2021 (µg/m³)	NAAQS Annual (µg/m³)
1.Lapologang village	0.3	1.1	1.1	50
2.Swanepoel	1.4	0.3	3.9	50
3.Glenross farmhouse	0.7	0.9	1.6	50

9.1.4.4 Dustfall monitoring network

The latest results were taken from the available dustfall monitoring reports which included 15 single dust buckets at and around Tharisa Mine (Map 8). From the results of the monitoring campaign, it was found that dustfall at Sites 2 (toll gate) and 8 (school) exceeded the NDCR for residential areas (exceed 600 mg/m²/day) in January 2021 and in February 2021, respectively.

As the NDCR allow for a permitted frequency of exceeding the dustfall rate of two within a year (not sequential months), it cannot be determined if the site is compliant or not, as there is not a full year of data available.

9.1.4.5 Atmospheric dispersion potential

Physical and meteorological mechanisms govern the dispersion, transformation, and eventual removal of pollutants from the atmosphere. The analysis of hourly average meteorological data is necessary to facilitate a comprehensive understanding of the dispersion potential of the site. Parameters useful in describing the dispersion and dilution potential of the site i.e. wind speed, wind direction, temperature, and atmospheric stability, are subsequently discussed.

Tharisa Mine does not have a weather station and use was made of simulated WRF data for the period 1 January 2019 – 31 December 2021.

9.1.4.6 Existing sources of emissions near the project site

Mining and processing activities, farming and residential land-uses occur in the region. These land-uses contribute to baseline pollutant concentrations via vehicle tailpipe emissions, household fuel combustion, biomass burning and various fugitive dust sources. Long-range transport of particulates, emitted from remote tall stacks and from large-scale biomass burning in countries to the north of South Africa, has been found to contribute to background fine particulate concentrations within the South African boundary (Andreae, et al., 1996; Garstang, Tyson, Swap, & Edwards, 1996; Piketh, Annegarn, & Kneen, 1996).

9.1.4.7 Existing sources of emissions near the project site

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9.1.4.8 Mining and industrial operations

Fugitive emissions from opencast and underground mining operations mainly comprise of land clearing operations (i.e. scraping, dozing and excavating), materials handling operations (i.e. tipping, off-loading and loading, conveyor transfer points), vehicle entrainment from haul roads, wind erosion from open areas, drilling and blasting. These activities mainly result in particulates and dust emissions, with small amounts of oxides of nitrogen (NO_x), carbon monoxide (CO), SO_2, methane and CO_2 being released during blasting operations.

Lonmin Platinum Mine is located approximately 1 km to the northeast of Tharisa and the smelter approximately 3 km to the northwest. Samancor western chrome mine is roughly 3.3 km to the east, and Glencoire WKP UG2 about 3.8 km to the west. Further afield is Bleskop Mines, Kroondal Mine, and Rustenburg Platinum Mine. Anglo Platinum Smelter Operation (Waterval Smelter) and Impala Platinum are all located around Rustenburg, about 20 km to the west-northwest. Rhovan Vanadium is to the north of Brits and Vanchem to the east, both with associated mining operations. Most of the smelters have mining operations associated with it, with tailings storage facilities, unpaved roads and other materials handling activities generating dust.

9.1.4.9 Agricultural operations

Agriculture is a land-use within the area surrounding the site. Particulate matter is the main pollutant of concern from agricultural activities deriving from windblown dust, biomass burning, and dust entrainment as a result of vehicles travelling along dirt roads. The quantity of windblown dust is a function of the wind speed, the extent of exposed areas and the moisture and silt content of such areas.

Amongst the mining and industrial operations between Brits and Rustenburg, there are a number of citrus farms and other agricultural activities. Crop farming and mixed crop farming include land tilling operations, fertiliser and pesticide applications, and harvesting. By applying fertiliser and pesticides use are typically made of vehicles (tractors) driving on unpaved roads and exposed soil. Land tilling includes dust entrainment on exposed surfaces, windblown dust and scraping and grading type activities resulting in fugitive dust releases. Both particulate matter (PM) and gaseous air emissions (mainly NO, NO_2, NH_3, SO_2 and VOCs) are generated from the application of nutrients as fertilizers or manures (EPA, 1999).

9.1.4.10 Unpaved roads

Vehicle entrained dust emissions from paved and unpaved roads represent a potentially significant source of fugitive dust in the area surrounding Tharisa Mine. Unpaved roads include industrial, mine, local farming, and community access roads. The extent of particulate emissions from the main roads will depend on the number of vehicles using the roads and the silt loading on the roadways. The extent, nature and duration of road-use activity and the moisture and silt content of soils are required to be known in order to quantify fugitive emissions from this source.

9.1.4.11 Vehicle tailpipe emissions

Air pollution from vehicle emissions may be grouped into primary and secondary pollutants. Primary pollutants are those emitted directly into the atmosphere, and secondary, those pollutants formed in the

atmosphere as a result of chemical reactions, such as hydrolysis, oxidation, or photochemical reactions. Notable primary pollutants emitted by vehicles include CO_2, CO, hydrocarbons (HCs), SO_2, NO_x, DPM and Pb. Secondary pollutants include: NO_2, photochemical oxidants (e.g. ozone), HCs, sulphur acid, sulphates, nitric acid, nitric acid, and nitrate aerosols. Hydrocarbons emitted include benzene, 1.2-butadiene, aldehydes, and polycyclic aromatic hydrocarbons (PAH). Benzene represents an aromatic HC present in petrol, with 85% to 90% of benzene emissions emanating from the exhaust and the remainder from evaporative losses. Vehicle tailpipe emissions are localised sources and unlikely to impact far-field.

Both small and heavy private and industrial vehicles travelling along the N4 and the R104 as well as the unpaved roads, are notable sources of vehicle tailpipe emissions.

9.1.4.12 Household fuel burning

Domestic households are known to have the potential to be one the most significant sources that contribute to poor air quality within residential areas. Pollutants arising from the combustion of wood include respirable particulates, CO and SO_2 with trace amounts of polycyclic aromatic hydrocarbons (PAHs), in particular benzo(a)pyrene and formaldehyde. Particulate emissions from wood burning have been found to contain about 50% elemental carbon and about 50% condensed hydrocarbons.

Informal settlements in the region are likely to use coal and wood as energy sources. Coal burning emits a large amount of gaseous and particulate pollutants including SO_2, total and respirable particulates including heavy metals and inorganic ash, CO, polycyclic aromatic hydrocarbons (PAHs), NO_2 and various toxins such as benzo(a)pyrene. Pollutants from wood burning include respirable particulates, NO2, CO, PAHs, particulate benzo(a)pyrene and formaldehyde. Particulate emissions from wood burning have been found to contain about 50% elemental carbon and about 50% condensed hydrocarbons.

9.1.4.13 Crop burning and wildfires

Crop-residue burning, and general wildfires (veld fires) represent significant sources of combustion-related emissions associated with agricultural areas. Emissions are greater from sugar cane burning that for savannas wildfires due to sugar cane areas being associated with a greater availability of available material to be burned. The quantity of dry, combustible matter per unit area is on average 4.5 ton per hectare for savannas areas.

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9.1.5 Soils and land capability

9.1.5.1 Dominant soil forms

The entire footprint area of the East Above Ground WRD is located in a disturbed area as a result of the ongoing open pit mining and waste rock dumping activities. Whereas a significant portion of the West Above Ground WRD footprint area has also been subjected to significant disturbance as a result of similar mining activities. The soil form associated with the disturbed areas was classified as a Witbank soil form while the

excavated areas where no soil exist were classified as Cullinan soil form. The remaining patches of natural soils within the West Above Ground footprint area were classified as Acardia (black turf) soil form.

The Witbank soil form is considered to be of very low agricultural potential due to the soils having been subjected to physical disturbance because of human interventions. Such interventions include transportation and deposition of the earth material containing soil. As a result, these soils are unable to support agricultural production unless significant amelioration and rehabilitation takes place. Whereas the Cullinan soil form is characterised by voids with no soil layer, and thus the agricultural potential thereof is very low.

The remaining soils of Arcadia and Sepane soils are associated with poor physical properties induced by high clay content and very strong structure, waterlogging during heavy rainfall, and thus rendering the soil conditions unfavourable for most cultivated crops. Nonetheless, should the soils be cultivated, intensive management practices would to be implemented.

Table 14 below represents the soil forms identified within the study area as well as their diagnostic horizons respectively.

Table 14: Dominant soil forms within the study area

Soil Form	Code	Diagnostic Horizon Sequence
Arcadia	Ar	Vertic/Lithic
Sepane	Se	Orthic/Pedocutanic/Gleyic
Cullinan	Cu	N/A (Open Pit)
Witbank	Wb	Transported Technosols

9.1.5.2 Land capability classification

Agricultural land capability in South Africa is generally restricted by climatic conditions, with specific mention to water availability (rainfall). Even within similar climatic zones, different soil types typically have different land use capabilities attributed to their inherent characteristics. High potential agricultural land is defined as having the soil and terrain quality, growing season and adequate available moisture supply needed to produce sustained economically high crop yields when treated and managed according to best possible farming practices (Scotney et al., 1987). For this assessment, land capability was inferred in consideration of observed limitations to land use due to physical soil properties and prevailing climatic conditions. Climate Capability (measured on a scale of 1 to 8) was therefore considered in the agricultural potential classification. The study area falls into Climate Capability Class 4 due a good yield potential for a moderate range of adapted crops but planting date options more limited than C3. The identified soils were classified into land capability and land potential classes using the Camp et. al, and Guy and Smith Classification system (Camp et al., 1987; Guy and Smith, 1998), as presented Map 11 illustrates the Land Potential associated with the study area when incorporating other factors such as climate, slope and soil conditions together. The identified land capability limitations for the identified soils are discussed in comprehensive “dashboard style” summary tables presented from Table 15 below. The dashboard reports aim to present all the pertinent information in a concise and visually appealing fashion. Table 15 below presents the dominant soil forms and their respective land capability, agricultural potential as well as areal extent expressed as hectares as well as percentages.

Table 15: Identified soil forms within the proposed footprint area and their respective land capability

Soil Form	Land capability	Land Potential	Area (ha)	Percentage (%)
Acardia	Grazing (Class V)	Moderate Potential (L4)	2.65	1.61

Soil Form	Land capability	Land Potential	Area (ha)	Percentage (%)
Sepane			1.33	0.81
Witbank	Wilderness (Class VIII)	Very Low Potential (L8)	99.17	60.28
Cullinan			59.39	36.10
Total enclosed			**164.5**	**100**

***Infrastructural areas of 1.96 ha (1.20%) were not included in the table above since they not considered in the land capability ratings**

Table 16: Summary discussion of the Grazing (Class V) land capability class

Land Capability: Grazing (Class V) and Restricted land potential			
			
Terrain Morphological Unit (TMU)	Relatively flat landscapes of < 0.2% slope gradient	**Photograph notes**	View of the vertic and pedocutanic horizons associated with the Arcadia and Sepane soil forms occurring within the soil profile of the identified soil forms.
Soil Form(s)	Acardia	**Area Extent**	3.98 ha (2.42%)
Physical Limitations	Arcadia and Sepane are characterized by high clay content in the subsoil and strong structure and thus limiting rooting depth and also prone to waterlogging during high rainfall events.	**Land Capability** The identified soil forms are of (Class V) land capability, Land has very serious permanent limitations that restrict the choice of alternative crops or the intensity of crop production to a great extent.	
Land Potential	**L5 (Restricted Potential)**: Regular and/or moderate to severe limitations due to soil type characterised by high clay content, low temperatures, and low rainfall without any supplementary irrigation schemes.		

Table 17: Summary discussion of the Wilderness (Class VII) land capability class.

Land Capability: Wildlife/Wilderness (Class VIII) and Low land potential			
  			
Terrain Morphological Unit (TMU)	Not applicable; highly disturbed areas	**Photograph notes**	View of the identified Witbank and Cullinan soil forms
Soil Form(s)	Witbank (Anthrosols) and Cullinan (Open void)	**Area Extent**	
Physical Limitations	Comprises significantly disturbed areas due to open pit and water rock dumping activities to an extent that no recognisable diagnostic soil horizon properties could be identified. These soils are characterised by various limitations, primarily the absence of the A horizon as a growth medium.	**Land Capability** These identified Witbank and Cullinan soils have very poor (Class VIII) land capability and Low land potential class attributed the ongoing mining activities. This land capability class also includes areas where the original soil has been buried and/or extensively modified by mining and related activities. These soils are not considered to make contribution to agricultural productivity even on a local scale.	
Land Potential	**L8 (Very Low potential):** Severe limitations due to the disturbed nature of soils thus rendering them non-arable.		

9.1.6 Biodiversity

Scientific Terrestrial Services CC (STS) was appointed to conduct a Biodiversity Assessment in 2022. This section outlines the findings of the report.

9.1.6.1 Species diversity and habitat integrity:

The study area is located within two vegetation types, namely the Marikana Thornveld in the east and the Moot Plains Bushveld in the east, i.e., the reference vegetation types. Overall, the habitat within the study area was characterised by transformed areas (because of mining activities) in which vegetation cover ranged from almost absent to low. When vegetation was present, it was generally dominated by alien and invasive plant (AIP) species and/or native pioneer species that favour disturbed habitats. Given the level of transformation within the study area because of mining activities, the presence of indigenous vegetation[7] was confirmed to be absent.

The Transformed habitat (of low floral and faunal sensitivity) comprised of approximately 165 ha and was associated with areas of 1) historic mining activities (i.e., in which low vegetation cover was identified and AIP and native pioneer species were recorded), 2) current mining activities (i.e., in the existing pits in which vegetation cover was largely absent), and 3) associated road and building infrastructure.

9.1.6.2 Conservation significance

The Screening Tool indicated that the Terrestrial Biodiversity Theme for the study area was of very high sensitivity. Triggering features included Critical Biodiversity Areas (CBA2), Ecological Support Areas (ESA1 and ESA2), focus areas for land-based expansion and a Vulnerable ecosystem, namely the Marikana Thornveld. As the presence of representative, intact CBA and ESA habitat, as well as intact habitat of the threatened ecosystem was not confirmed during the site visit, together with the location of the study area within an active mining footprint area, the very High Sensitivity assigned to the Terrestrial Biodiversity Theme by the screening tool was not supported.

9.1.6.3 Species of Conservation Concern (SCC)

The Online Screening Tool indicated that the Plant Species was of low sensitivity for the study area. This sensitivity was confirmed during the field assessment as suitable habitat for Red Data Listed (RDL) species was not recorded within the study area, and suitable habitat to support such species is absent throughout the study area. The Screening Tool indicated that the Animal Species was of medium sensitivity for the study area and triggering species included Chrysospalax villosus (Rough-haired golden mole, VU), Crocidura maquassiensis (Maquassie Musk Shrew, VU), Dasymys robertsii (African marsh rat, VU), and Sagittarius serpentarius (Secretary bird, LC). Following the site assessment, the specialist study disputes the findings of the screening tool. The site has been significantly transformed resulting in no habitat being present for either of the faunal species as indicated in the screening tool.

No South African National Biodiversity Institute (SANBI) Red Data List (RDL) species or any other nationally (e.g., species under The National Forest Act, 1998 (Act No. 84 of 1998) (NFA) or the 2007 Threatened or Protected Species (TOPS) List) or provincially protected species (e.g., species listed under the Transvaal Nature Conservation Ordinance, 1983 (Ordinance No. 12 of 1983) (TNCO)) were observed during the field assessment. Furthermore, no suitable habitat to support populations thereof was identified within the study

7 **The NEMA definition of indigenous vegetation**: "Indigenous vegetation: refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding 10 years.

area. A lack of suitable habitat for such species of conservation concern (SCC) is attributed to the significantly degraded nature of the Transformed Habitat.

No faunal SCC were observed during the field assessment and no faunal SCC are expected to occur within or be associated with the study area due to the degraded nature of the available habitat.

9.1.7 Surface water

Surface water resources include drainage patterns and paths of preferential flow of stormwater runoff. Water quality and quantity are key indicators of the resource value and status and can have significant effect on downstream hydrology, aquatic ecology and suitability for use. Mine-related activities have the potential to influence the natural drainage of surface water through the collection of runoff from stormwater management infrastructure and collection in the open pits. The project also has the potential to result in the contamination of the surface water resources through seepage and/or runoff from waste rock dumps.
Information in this section was sourced from the approved EMPr (SLR, 2014) and recent monitoring data (Aquatico, March 2022).

9.1.7.1 Regional hydrology

The Tharisa Mine is located within the Crocodile West and Marico Water Management Area. Four drainage systems occur in the Tharisa Mining Right area. These include the perennial Sterkstroom, non-perennial tributaries of the Brakspruit (a tributary of the Sterkstroom), non-perennial tributaries of the Maretlwane (a tributary of the Sterkstroom) and a non-perennial tributary of the Elanddriftspruit. Apart from the Sterkstroom, drainage lines within the mining area were not well defined and did/do not have distinct channels. The Mining Right area falls within the quaternary catchment A21K, which falls within the Lower Crocodile Secondary Catchment. The A21K catchment area has a total catchment area of 856km^2 and an estimated mean annual runoff of 22.46 million m^3/year.

9.1.7.2 Local hydrology

The perennial Sterkstroom flows from the Buffelspoort Dam, south of the N4, through the mining operations, between the East and West mining areas. Two unnamed non-perennial tributaries of the Brakspruit originate in the north-west of the mine and drain the western side of the Mining Right area. Mining of the west pit has taken place within the headwaters of these tributaries. The eastern mining area is drained by two non-perennial drainage lines that formed a tributary to the Maretlwane. Mining of the East Pit has taken place within the headwaters of these drainage lines. In the south eastern corner of the mine, a tributary of the Elandsdriftspruit which originated just south of the mine, falls within the footprint of TSF 2. The diversion of this tributary was included in the approved EIA and EMP report (Metago, 2008). The local hydrology is illustrated in Map 5.

None of the proposed WRDs will intersect perennial or non-perennial drainage lines at the Tharisa Mine. In this regard, the East OG WRD is approximately 260 m from the Sterkstroom and the West OG WRD is approximately 267 m South from tributaries of the Brakspruit.

9.1.7.3 Surface water use

Water from the Sterkstroom River is used by the surrounding community for domestic purposes such as washing and bathing, livestock watering and for agricultural purposes. An irrigation canal flows from north to south, along the eastern boundary of TSF1. There are no users of this irrigation canal downstream of the TSF.

9.1.7.4 Surface water quality

Tharisa monitors surface water quality on a monthly basis as part of its surface water monitoring programme. Surface water monitoring is undertaken at the Sterkstroom and Tharisa process water facilities (TM SW07, TM SW08, TM SW10, TM SW11, TM SW12, TM SW13 and TM SW14). The surface water quality is compared against the amended Integrated Water Use Licence (IWUL) (Licence No. 03/A21K/ABCGIJ/1468 of November 2020) surface water quality guideline limits. In addition to this, given that surface water in the area is mainly used for domestic and irrigation purposes, surface water quality data is also compared against the Target Water Quality Guideline Ranges (TWQGR) for domestic use and irrigation.

The results of the March 2022 surface water monitoring report (Aquatico, March 2022) indicate the following:

- The physico-chemical water quality in terms of pH of most of the surface water localities sampled can be described as neutral except TM SW10 and TM SW13 which are alkaline.
- The SAWQG domestic water guidelines were exceeded by the parameters; EC, Ca,Mg, Na, SO4 and NO3-N at the majority of the process water localities (TM SW07 to TM SW14). All the variables measured at the Sterkstroom remained well within the SAWQG domestic water guidelines.
- The Mg, Na, SO4 and NO3-N measured at TM SW02 and TM SW03 exceeded the Baseline Data Guidelines while majority of the variables at TM SW01 remained below the guideline.
- The water quality at the downstream localities of Sterkstroom generally improved when compared to the previous month and when compared to upstream locality.
- Dissolved Oxygen (DO) levels measured at Sterkstroom localities as well as TM SW10, TM SW11, TM SW012, TM SW13 and TM SW14 were lower than the amended IWUL: 2020 guideline while the rest were higher than the guideline.
- From January 2021 to December 2021 a constant pH level can be observed while an increasing trend is visible from January 2022 to February 2022. TM SW10 plotted higher than the amended IWUL: 2020 upper limit as well as TM SW13 for the past two months.
- The EC levels at TM SW02 and TM SW03 show increasing trends from August 2021 to November 2021 with a drop in December 2021 and then increased again. A drop in EC is seen at TM SW02, TM SW03, TM SW08 and TM SW11 during March 2022
- Long-term decreasing trend in most of the surface water locality but from December 2021, an increase is observed. During March 2022, the concentration of NO3-N at majority of the localities decreased.

9.1.7.5 Flood lines

As part of the 2008 EIA and EMP (Metago, 2008), peak flow rates and flood volumes for the 1:20, 1:50 and 1:100-year storm events were estimated by Metago for the Sterkstroom and Elandsdriftspruit tributary and are presented in Table 18 (SLR, 2014). Using the peak flows presented, the 1:50, 1:100-year and Regional Maximum Flood (RMF) flood-lines for the Sterkstroom River were modelled and are presented alongside the 100 m offsets in Table 18. The 100 m buffers are presented for the other watercourses and considering the relatively small catchments of these other watercourses (Brakspruit Tributaries and Maretlwane Tributaries) which will generate only modest flood flows, the 100 m buffers are likely to be significantly wider than the 1:50 or 1:100-year flood-lines, and the 100 m buffers will be taken as the developmental constraint in these locations. None of the proposed WRD encroach on any of the flood lines.

Table 18: Flood peaks and volume for Sterkstroom and Elandriftspruit tributary (SLR, 2014)

Catchment	Area (km^2)	Return Period			
		1:20	1:50	1:100	RMF
Peak Flow Rate (m^3/s)					
Sterkstroom	140.3	314	444	544	1185
Elandsdriftspruit tributary	3.3	25	35	43	181
Flood Volume ($x10^6$ m^3)					
Sterkstroom	140.3	7.36	10.39	12.73	-
Elandsdriftspruit tributary	3.3	0.14	0.19	0.24	-

9.1.8 Freshwater ecosystems

A site assessment was undertaken on 26th April 2022 towards the end of the summer rainfall period to verify the Ecostatus of the identified freshwater ecosystems within 500 m of the study area, and to confirm the absence of freshwater ecosystems within the study area. The proposed WRDs will be within existing disturbed (open cast mining) areas, and therefore no freshwater ecosystems occur directly within the study area. However, two valley bottom wetlands are located immediately north of the proposed West Above Ground WRD, and an estimated 1 km reach of the Sterkstroom River is located approximately 235 m west of the East Above Ground WRD.

The wetlands were previously assessed by SAS (2013) and found to be moderately modified at the time; however, the ecological integrity of the wetlands has subsequently decreased and at the time of this assessment in May 2022, were found to be seriously modified (channelled valley bottom wetland) and critically modified (unchanneled valley bottom wetland).

The Sterkstroom River was previously assessed by SAS (2013) and The Biodiversity Company (TBC). During all assessments undertaken, including this assessment, the river is deemed to be moderately modified. The outcome of the assessments is summarised in the table below:

Table 19: Summary of results of the ecological assessment of the freshwater ecosystems.

Freshwater Ecosystem	PES	EIS	Ecoservices
Sterkstroom River	B/C (IHI) / C (VEGRAI)	Moderate	Low to moderate
Unchannelled Valley Bottom Wetland	F	Low/marginal	Low to moderate
Channelled Valley Bottom Wetland	D	Low/marginal	Low to moderate

Neither of the proposed WRDs will encroach directly on any of the freshwater ecosystems and are therefore deemed to pose no direct risk to the freshwater ecosystems.

Table 20: Characterisation of the freshwater ecosystems identified within the investigation area, according to the Classification System (Ollis et al, 2013).

Drainage system	Level 2: Regional Setting	Level 3: Landscape unit	Level 4: Hydrogeomorphic Unit
			HGM Type
Unchannelled valley bottom wetland	Central Bushveld Group 5 WetVeg Group	Valley floor: The typically gently sloping, lowest surface of a valley.	Unchannelled valley-bottom: A valley-bottom wetland without a river channel running through.
Channelled valley bottom wetland	Central Bushveld Group 2 WetVeg Group	Valley floor: The typically gently sloping, lowest surface of a valley	Channelled valley-bottom: A valley-bottom wetland with a river channel running through.
Sterkstroom River	Central Bushveld Group 2 WetVeg Group	Valley floor: The typically gently sloping, lowest surface of a valley	River: a linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water.

9.1.9 Groundwater

Groundwater is defined as water which is located beneath the ground surface in soil/rock pore spaces and in the fractures of lithological formations and is a valuable resource. In arid areas groundwater is frequently the sole source of water and thus essential to agriculture and other development. Groundwater quality and quantity are key indicators of the resource value and status and can have significant effect on the suitability and availability for use. Mine-related activities have the potential to influence the quality and availability of groundwater through seepage of contaminants that may reach underlying aquifers.

Information pertaining to aquifer characteristics was sourced from the Aquifer Classification Map of South Africa. Other information in this section as sourced from the approved 2014 EMPr (SLR, 2014) and recent monitoring data (Aquatico, September 2021).

9.1.9.1 Aquifer classification

The Tharisa Mine is underlain by a shallow upper weathered aquifer and a deeper fractured aquifer. The weathered overburden is highly variable in thickness from 3 m to more than 30 m based on existing borehole logs and evidence of borehole depths. The deeper fractured bedrock aquifer is characterized by very low matrix permeability, poorly connected joints/fractures and dolerite/diabase dykes (that may act as barriers to groundwater flow).

In the vicinity of the water courses, alluvium either fully or partially replaces the weathered overburden and the water courses do lose and gain water to the alluvium aquifer. Recharge of the alluvial aquifers is also through lateral groundwater flow from the shallow weathered aquifer and by rainfall events. The thickness of the alluvial sediments has been estimated at 3 to 5 m with its lateral distribution restricted to the immediate banks of the current active channel.

The interface between the overlying weathered or alluvial aquifer and the deeper fractured aquifer features is relatively impermeable. Its effective permeability is determined by interconnected and open fracture systems. These fracture systems can potentially allow for rapid vertical groundwater flow from the weathered overburden as well as surface water bodies to greater depths. Whilst in general the weathered aquifer and lower fractured aquifer are poorly connected; this is not always the case.

The aquifer system is defined as a minor aquifer region with potential for higher yielding zones (defined by the groundwater specialist in accordance with Parsons (1995). Pump tests of a range of boreholes indicated that the average upper aquifer yield is between 1 and 2.5 litres /second (SLR, 2014).

9.1.9.2 Groundwater recharge

Quaternary catchment A21K receives an estimated average annual groundwater recharge of 24.4 million m^3 (Mm^3), of which 3.4 Mm^3 per annum or 13.8% is required for the Reserve, consisting of both basic human needs (estimated at 0.5Mm^3/a) and an ecological component (estimated at 2.9Mm^3/a). This equates to an approximate recharge across the catchment of about 28 mm/a (SLR, 2014).

9.1.9.3 Groundwater levels and flow

The regional groundwater flow is closely related to the topography, and groundwater flows from higher lying ground in the south towards lower lying areas in the north and towards watercourses, which occur in lower lying areas. Of major importance for groundwater flow in the area is the presence of a relatively impermeable interface between the upper shallow weathered aquifer and the deeper, fractured aquifer. The pre-mining groundwater levels within the Tharisa Mine area were on average 10 mbgl with a range of 2 to 30 mbgl (SLR, 2014). Based on groundwater monitoring data (Aquatico, September 2021) for the period January 2021 to March 2021, groundwater levels range between 2 to 22 mbgl.

9.1.9.4 Groundwater use

The majority of the groundwater in the broader region is used in the form of third-party boreholes. Most of the boreholes are used for domestic and agricultural (livestock and irrigation) purposes. The weathered aquifer, as well as the alluvial aquifer along the Sterkstroom River, supports most irrigation and domestic water-supply boreholes throughout the region (SLR, 2014). Boreholes (community boreholes/third party) located within the Tharisa Mining Right area are used for domestic purposes and agricultural purposes (livestock and irrigation).

9.1.9.5 Groundwater quality

Tharisa monitors groundwater quality on a monthly basis as part of its groundwater monitoring programme. The current water quality monitoring network consists of 3 surface water, 14 groundwater and 6 process water monitoring localities. A detailed data analysis study was conducted on the ambient, 2013 baseline, off-site and on-site surface and groundwater quality.

During the July 20022 hydrocensus 21 groundwater and 3 surface water locations were visited and sampled for hydrochemical analysis.

The results showed that only one downstream sample (OC BH 02) showed an exceedance of the Manganese SANS 241 Drinking Water Limit (could occur naturally due to the local geological setting). The concentrations for most of the parameters of borehole OC BH 02 are also elevated above that of the P95 2013 upstream baseline values. This borehole is located directly downstream of an informal settlement, which could be the source for the elevated concentrations of TDS and ammonium (NH4-N). Apart from borehole OC BH 02, minimal upstream baseline (2013) exceedances are observed for sodium, sulphate, nitrate, and copper. These baseline exceedances are not significant and below the SANS 241 Drinking Water Limits for the respective constituents.

From the surface water samples taken (Upstream TM SW01 and downstream TM SW04), the results show that only Cu concentrations exceed the P95 2013 upstream baseline, with no SANS 241 Drinking Water Limit exceedances.

From the long-term monitoring data analysis, it is evident that nitrate is the only parameter of concern in the process water and on-site groundwater. More than 86% of the samples exceed the SANS 241 Drinking Water Standard limit for the process water, and > 79% of samples exceed the SANS 241 Drinking Water Standard limit for the on-site groundwater.

Considering the downstream groundwater and surface water monitoring localities, no significant nitrate exceedance was observed in the groundwater. The downstream surface water results indicated that < 7% of samples exceeded the SANS 241 limit. Only the P95 (13.82 mg/L) and maximum downstream surface water concentration marginally exceeded the SANS 241, indicating that the impact is insignificant and rather due to short pulse surface water driven events.

A notable observation is that nickel and manganese were not found to significantly exceed SANS 241 in the process water1. The on-site groundwater indicated that < 6% of samples had a SANS 241 nickel exceedance, no significant manganese exceedance was observed (ACS, 2022).

The upstream groundwater indicated ± 5 % samples exceeded the nickel SANS 241 Drinking Water Limit. Manganese was found to exceed SANS 241 in ± 6% of upstream off-site samples with only the upper range (P95) concentration exceeding the manganese SANS 241 Drinking Water Limit. Upstream surface water also exceeds the Manganese SANS 241 Drinking Water Limit in ± 14% of samples (ACS, 2022).

This confirms that that both nickel and manganese are likely naturally occurring (geological setting) or due to upstream/off-site anthropogenic processes.

9.1.10 Noise

This section has been informed by the Noise Impact Assessment undertaken by Airshed in 2022.

Acusolv have been undertaking noise measurements for the Tharisa Mine since 2012. The general ambient noise profile of the area, as concluded by Acusolv (van Zyl, 2021), is summarised below.

Tharisa Mine is located in a district where the character of ambient noise is already affected by industrialisation and economic activity, which over time, has resulted in an increase in road traffic noise and noise generated by intensive mining activities. Road traffic noise emanates from the N4 and secondary roads, such as the D1325 between Buffelspoort and Marikana. The N4 has a wide noise footprint. It has a significant impact on people living within a zone of approximately 1.2 km either side of the road and is clearly audible in most of the study area. In addition, mining noise affects communities in the immediate surroundings of mines.

Against this background, the area surrounding Tharisa Mine in its current state cannot be considered a typical rural environment anymore.

Moreover, background noise levels (i.e., excluding noise from Tharisa) in the assessment area are not homogeneous but vary over a considerable range. Depending on the locations and distances of houses or communities relative to the N4 and relative to other roads and other mines in the area, background noise levels measured in surveys conducted by Acusolv have been found to vary between broadly 50 to 60 dBA (daytime) and 40 to 55 dBA night-time, respectively.

Residences within a zone of 250 m from the N4, for example, are subject to night-time road traffic noise levels of between 45 and 55 dBA, depending on topography and distance from the N4. This has been confirmed by noise surveys conducted in earlier studies.

The location of the noise sampling sites is provided in Table 21 and Map 6.

Table 21: Location of the noise sampling sites for surveys conducted by Acusolv for the annual Tharisa Mine noise surveys

Sampling Location	Description	Latitude	Longitude
M1	Madithlokwa Village near church	25°43'39.6" S	27°29'18.6" E
M2	School	25°44'19.8" S	27°28'36.0" E
M3	Lapologang Village	25°44'14.1" S	27°28'14.4" E
M4	Bokamoso Village	25°43'27.0" S	27°32'01.9" E
M5	Residence Potgieter D	25°44'53.6" S	27°30'53.7" E
M6	Residence Potgieter H	25°45'00.7" S	27°29'35.2" E

Although no formal baseline surveys had been carried out prior to the initial start-up of Tharisa Mine, various efforts have been made in previous surveys conducted by Acusolv to acquire data representative of prevailing background conditions (in the absence of Tharisa Mine). These estimated nominal background daytime and night-time noise levels under normal conditions (outside lockdown restrictions), are summarised in Table 22.

Table 22: Estimated background levels8 in the areas surrounding Tharisa Mine (based on information obtained from the 2021 noise survey (van Zyl, 2021))

Sampling Location	Description	Main Sources of Background Noise	Background Noise Levels (dBA)	
			Day-Time	Night-Time
M1	Madithlokwa Village opposite East Pit mining operations	• D1325 Road Noise • Community activities • Distant mining activities in the area	60	50
M2	School and surroundings	• Community activities • Mining activities in the district	50	45
M3	Lapologang south of Tharisa Far West mining operations	• Community activities • Mining activities in the district	50	45
M4	Bokamoso Village in the vacinity of the dump operations north-east of Tharisa East Mine	• Road traffic noise from tarred public road • Community activities	55	45
M5	Residence Potgieter D south of the N4 opposite Tharisa TSF	• N4 highway traffic • Distant mining activities in the district	60	50

8 Daytime and night-time background noise ratings in the absence of Tharisa noise. Derived from measurements and observations made in previous surveys. Rounded to the nearest 5 dB interval as per SANS 10103 practice.

Sampling Location	Description	Main Sources of Background Noise	Background Noise Levels (dBA)	
			Day-Time	Night-Time
M6	Residence Potgieter H between Tharisa Mine and the N4	• N4 highway traffic • Distant mining activities in the district	60	50

9.1.10.1 Measured noise levels for the 2022 survey

Noise measurements were undertaken by Thlago Environmental Health and Safety Solutions (Thlago) on 24 and 25 May 2022 at five selected sampling locations (summarised in Table 23). A summary of the measured baseline noise levels for this period is provided in Table 24.

Table 23: Location of the sampling sites for the noise survey conducted by Thlago for the Tharisa Mine in May 2022

Sampling Location	Description	Latitude	Longitude
R1	Potgieter residence	25°45'00.39" S	27°29'35.89" E
R2	Pretorius residence	25°44'22.75" S	27°28'19.34" E
R3	van der Hoven residence	25°43'59.78" S	27°27'47.31" E
R4	Kgoitsi house (residence)	25°43'42.76" S	27°28'44.67" E
R5	Church	25°43'40.31" S	27°29'16.41" E

Table 24: Measured baseline noise levels for 2022 in the areas surrounding Tharisa Mine (based on information obtained from the 2022 noise survey

Sampling Location	Description	Measured noise levels obtained from the 2022 survey (dBA)	
		Day-Time	Night-Time
R1	Potgieter residence	58.9	55.3
R2	Pretorius residence	59.7	54.7
R3	van der Hoven residence	60.0	55.7
R4	Kgoitsi house (residence)	58.3	55.6
R5	Church	58.1	56.5

Considering the estimated background noise levels, the noise levels measured at R2 (day-time), R3 (day-time) and R5 (night-time) are equivalent or exceed the 1992 Noise Control Regulations (The Republic of South Africa, 1992) “disturbing noise” definition (greater than 7dBA from ambient sound levels).

9.1.11 Visual

The visual character of an area is determined by considering landscape character, scenic quality, sensitivity of the visual resource, sense of place and visual receptors. Mine-related infrastructure and activities has the potential to alter the visual aspects in a project area and surrounding area.

9.1.11.1 Landscape character

Tharisa mine is in the mining belt that stretches from northwest of Rustenburg through to Brits and the Project's WRD's are in the mine's MRA adjacent to existing mining infrastructure and WRDs.

The landscape character of the study is therefore dominated by mining infrastructure as indicated in Map 2. Mining activities occur to the north, and immediate west and east of Tharisa Mine. Amongst the mining activities north of the mine is open land mostly owned by mining companies and the community of Marikana. Immediately north of the mine, in the MRA, is the Maditihokwa Community. And east of the MRA is community.

Immediately south of the MRA, between it and the N4 road, are nine homesteads and the Lapologang community, with its associated primary school. The eastern section of Lapologang is in the MRA. All homesteads except one, located south west of the mine, occur within the MRA.

South of the N4 is cultivated agricultural lands and open land, which extends to the Magaliesberg.

9.1.11.2 Scenic quality

The scenic quality surrounding the mine and at Tharisa Mine is linked to the type of landscapes that occurs within the area. In this regard, scenic quality can range from high to low as follows:

- High – these include the natural features such as mountains and koppies and drainage systems.
- Moderate – these include agricultural activities, smallholdings, and recreational areas.
- Low – these include towns, communities, roads, railway line, industries and existing mines.

The Project WRDs occur within the mine and would therefore not be considered 'out of context' with the sub-region's main land-use types.

Whilst a few areas immediately south of the MRA and west of Marikana Road have some visual appeal and exhibit positive character, any long view (i.e. beyond the immediate surrounds of a residential property) from within these areas would be dominated by mining activities and would not be sensitive to change in general.

9.1.11.3 Sense of place

According to Lynch (1992), a sense of place is how a person can recognize or recall a place as being distinct from other places - as having a vivid, unique, or at least particular, character of its own. The sense of place for the study area derives from the local landscape character types described above, their relative 'intactness,' and their impact on the senses. The mining activities and land use in the study area are expected within the sub-region as they are well established and form part of the mining belt north of the N4 national road.
The combination of the mining, agricultural, open land and communities, create the sense of place for the study area. It comprises a variety of land uses common to the sub-region resulting in a landscape that exhibits little positive character, due to major evidence of alteration and degradation of its original natural features. The resultant sense of place is weak and of mixed character.

The proposed Project occurs in landscape rated low in visual resource value. The development of the WRDs within the MRA and immediately adjacent to current mining activities, will not cause major changes to the existing mixed character of the landscape

9.2 BASELINE CULTURAL ENVIRONMENT AFFECTED BY THE PROPOSED PROJECT

9.2.1 Heritage/cultural and palaeontological resources

The area proposed for the creation of the waste rock storage has been subject to heritage impact assessments in the past. In the assessment completed by Pistorius (2009) for the Tharisa Mine, it is noted that the following heritage resources that exist within the mine area: Stone walled settlements which date from the Late Iron Age; Historical structures such as farmhouses with outbuildings, agricultural infrastructure and the van Rensburg School (now called the Retief Primary School); At least six graveyards as well as objects with heritage significance such as outdated and discarded agricultural implements.
None of these known sites is anticipated to be impacted by the proposed creation of waste rock storage areas.

Pistorius conducted an additional field assessment in 2014 for the proposed north-eastern waste rock dump area which identified no heritage resources of significance. A subsequent heritage field assessment was conducted by Pelser (2018) for the proposed north-eastern waste rock dump which included the Lapologang Village. The Lapologang Village initially fell within one of the areas proposed for development however the proposed layout has subsequently been amended to ensure no impact to the village or its context Pelser (2018) identified a number of sites and structures, with only 2 (cemeteries) of any significance recorded. The others were the remains/ruins of fairly recent buildings and not deemed of any
significance. Neither of the cemeteries identified by Pelser (2018) are likely to be impacted by the establishment of additional waste rock storage proposed in this application.

According to the SAHRIS Palaeo sensitivity, the area proposed for development is underlain by sediments of zero palaeontological sensitivity. As such, it is very unlikely that the proposed establishment of additional waste rock storage will impact on significant palaeontological heritage and no further assessment of impacts to palaeontological heritage is recommended.

9.3 SOCIO-ECONOMIC BASELINE ENVIRONMENT

Typically mining projects have the potential to result in both positive and negative socio-economic impacts. The positive impacts are usually economic in nature with projects contributing directly towards employment, procurement, skills development and taxes on a local, regional and national scale. In addition, projects indirectly contribute to economic growth in the national, local and regional economies. The negative impacts can be both social and economic in nature and related to the influx of people seeking job opportunities (with related social ills and pressures on existing services) and a change to existing land uses (with related changes to social structures and way of life).

Information in this section was sourced from FEED 2018/19 Overview of Provincial Revenue and Expenditure, Bojanala 2020/2021 Review IDP, North West Province Integrated Waste Management Plan 2016.

The Tharisa Mine is located in the Bojanala District Municipality and Rustenburg Local Municipality of the North West Province. The nearest formal towns to the mine are the towns of Marikana and Mooinooi, located approximately 4 km north west and 6 km south east of the Tharisa Mine, respectively. Smaller communities such as Lapologang village (480 m south of West Pit), Mmaditlhokwa/Silver City (immediately north of West Pit) and Buffelspoort (450 m south of the N4) are located in close proximity to the mine. Various other clusters of land dwellers/informal settlements are in the located in the general vicinity as well.

9.3.1 North West Province

The North West Province had a population of approximately 4 million people in 2019. In 2016 the unemployment rate in the Province was estimated at 32%, which was slightly higher than the unemployment rate in South Africa (29%). The North West Province is the fourth largest contributor to South Africa's GDP, with a contribution of 6.7% and a GDP per capita of R55 320. Mining, agriculture and manufacturing contribute to the largest portion of provincial output. Only 9% of the population in the province has tertiary education, while only 67% of the total population has secondary education. Service delivery within in the Province remains a challenge, with only 63% and 87.7% of households having access to piped water (inside dwelling and inside yard) and electricity, respectively.

9.3.1.1 Bojanala District Municipality and Rustenburg Local Municipality

The socio-economic environment at district and local municipal levels can be summarised as follows:

- The population of the District Municipality is estimated to be 1 670 000. This is approximately 41.75% of the total population of the North-West Province. The Rustenburg Municipality is the largest municipality within the District, with a population concentration of approximately 37% of the total population of District Municipality (617 900). The total number of households within District Municipality increased at an average annual rate of 3.63% from 2006 to 2016, which is higher than the average annual increase of in the number of households in South Africa (1.97%).
- In 2016, the largest share of population was within the young working age (25-44 years) age category which constituted 36.4% of the total population.
- In 2016, the mining sector was the largest economic contributor within the District Municipality, accounting for R 63.5 billion or 51.1% of the total Gross Value Added (GVA) in the District Municipality's economy. The sector that contributes the second most to the GVA of the District Municipality is the community services sector (12.7%), followed by the finance sector (10.4%).
- The unemployment rate within the District Municipality was estimated at 23.2% in 2014.
- The District Municipality can largely be classified as rural with very low population densities that make the provision of basic services very difficult and expensive. It is estimated that the district has the following dwelling types: very formal- 19.24%, formal – 50.05%, informal- 29.45%, traditional- 0.58% and other dwelling types- 0.67%. The Local Municipality has high proportional and actual number of households residing in informal dwellings, as compared to other local municipalities. Within the Local Municipality, it is estimated that as much as 30% of households are residing in informal dwellings.
- It is estimated that approximately 452 000 of the households in the District Municipality have electricity for lighting and other purposes. The Rustenburg Local Municipality accounts for 40.9% of those households.
- The District Municipality had a total number of 275 000 households with piped water inside the dwelling and piped water inside the yard. The Rustenburg Local Municipality accounts for 29.1% of those households.
- The amount of waste collected by the different municipalities within the District Municipality on a weekly basis as part of their legal mandate has been estimated at 314 235 tonnes per annum. These municipalities collect more than half of the domestic and garden waste generated by the population as this collection figure includes for business waste in certain of the municipalities. Of the five local municipalities in the district, the Rustenburg Local Municipality provides the greatest percentage of waste collection and cleaning services to their communities. There are currently 12 operational landfills/waste sites within the district identified, four of which are located within the Rustenburg Local Municipality.

9.3.2 Traffic

Traffic from mining projects has the potential to affect the capacity of existing road networks, as well as result in public road safety issues.

Information in this section was sourced through the review of available literature and topographical maps, as well as from the approved EMPr (SLR, 2014).

Road networks

A network of roads exists in and around Tharisa Mine. These include (refer to Map 4):

- N4;
- P2-4 (Old N4);
- D2565 – a gravel road in the far western section of the area;
- D1526/1566 - the main gravel road servicing the western part of the area;
- D1325 – Marikana Road;
- D108 – road between Marikana and Rustenburg;
- internal Lonmin tarred road to the north of the area, that runs east – west;
- D1270 – a gravel road linking the eastern part of the area with Mooinooi; and
- Various unnamed, private gravel/dirt roads.

Mine-related traffic is largely limited to internal mine roads. The mine does however make use of external roads for the transport of staff and PGMs for sale to third parties.

9.4 DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURES AND INFRASTRUCTURE ON SITE

The environmental features and infrastructure in the project area are described in Section 9.1. A summary of the key noticeable features associated with each proposed Project component are tabulated below.

Table 25: Key noticeable environmental features associate with each proposed component

Aspect	East OG WRD	West OG WRD
Topography	Altered due to the existing open cast mining related activities at the East Mine.	Disturbed and altered because of the existing mining activities associated with West Mine.
Soils	No natural soil forms associated with this WRD as it will be established on backfilled portions of the open pit.	
Biodiversity	• Natural vegetation has already been removed as part of current opencast activities. • Very little evidence of natural animal life. • High Biodiversity Importance in terms of the Mining and Biodiversity Guideline (DEA et al, 2013). • Located in a partially protected IBA. • Located in the transitional zone Magaliesberg Biosphere.	• Intersects the endangered Marikana Thornveld Vegetation Type. • Could be associated with the proposed species (Morula Tree) as this is present at the Tharisa Mine. • Very little evidence of natural animal life. • High Biodiversity Importance in terms of the Mining and Biodiversity Guideline (DEA et al, 2013). • Located in Ecological Support Areas 1 and 2 of the North West Biodiversity Section Plan, 2015.

Aspect	East OG WRD	West OG WRD
		• Located in a partially protected IBA. • Located in the transitional zone of the Magaliesberg Biosphere.
Surface water	• Does no intersect any rivers or streams. • Sterkstroom River water used for domestic and for agricultural purposes. An irrigation canal flows from north to south, along the eastern boundary of TSF1. There are no users of this irrigation canal downstream of the TSF.	• Does no intersect any rivers or streams. • Sterkstroom River water used for domestic and for agricultural purposes. An irrigation canal flows from north to south, along the eastern boundary of TSF1. There are no users of this irrigation canal downstream of the TSF.
Groundwater	Most of the boreholes are used for domestic and agricultural (livestock and irrigation) purposes.	
Air quality	• Dust fallout remain within the required limits; • Passive sampling (NO2 and SO2) remain within the required limits; and • PM10 concentrations are elevated.	
Noise	Generally, there are audible noise levels in the area because of traffic, mining and community related activities.	
Visual	Visual characteristics of the site have been extensively disturbed by surrounding mining companies and on-site mining, farming, and community related activities.	
Heritage/cultural and palaeontological	No known sites of heritage/cultural importance. This will be confirmed with specialist input. Paleosensitivity is low.	
Land uses	Tharisa mining related activities and isolated vegetation patches in the northern section of West OG WRD.	

9.5 LAND USES

Mining-related activities have the potential to affect land uses both within the mine area and in the surrounding areas. This can be caused by physical land transformation and through direct or secondary impacts. The key related potential environmental impacts are loss of soil, loss of biodiversity, air pollution, noise pollution and visual impacts.

Mining Right and land ownership details were sourced from Tharisa. Surface right information was sourced from a deed search undertaken by SLR. On-site and surrounding land use data was sourced from site observations, the review of topographical maps and satellite imagery and from the approved EMPr (SLR, 2014).

9.5.1 Mining rights

Tharisa holds a Mining Right (MR) (Reference No.: 358 MR) issued by the Department of Minerals and Energy (DME) (currently the Department of Mineral Resources and Energy (DMRE)) on 19 September 2008. Neighbouring mines with Mining Rights include Samancor Western Chrome Mine and Mamba Chrome Mine to the east.

9.5.1.1 Surface rights in the proposed Project area

Most of the land within the Mining Right Area is owned by Tharisa, while some properties are privately-owned. Land surrounding the Mining Right Area is owned by mining companies, businesses, trusts, the South African Government, and private owners. A list of all portions and the corresponding owners located in the proposed Project area are provided in Table 26 below.

Table 26: Surface rights within the proposed Project area

Farm name	Portion number	Landowner
West Above Ground WRD		
342 JQ	12, 150, 109, 11, 358, 357, 190, 29, 30, 105, 118, 13, 117, 48, 47, 41, 334, 335, 336 19, 266, 318, 213, 212, 262, 259, 26, 28, 27, 25, 74, 16, 214, 15 and 206	Tharisa Minerals (Pty) Ltd
East Above Ground WRD		
342 JQ	152, 138, 96, 183, 218, 219, 220, 184, 186 and 251	Tharisa Minerals (Pty) Ltd

9.5.2 Land claims

The Land Claims Commissioner has been contacted to confirm if any land claims have been lodged on the properties that the project activities are located on. On 24 May 2021 the Land Claims Commissioner confirmed that a land claim was associated with the project property, however the claim was dismissed on the basis that minimum requirements in terms of the Land Rights Act No. 22 of 1994 were not met. Proof of correspondence is included in Appendix C.

9.5.3 Land use within the proposed Project area

The proposed Project is located within the existing Tharisa Mining Right Area. Land uses within the proposed Project area is tabulated below.

Table 27: Land use within the proposed Project areas

Proposed Project area	Land use within proposed Project footprint
West OG WRD	• Tharisa mining related activities which will be located over backfilled portions of the open pit; and • Isolated vegetation patches in the northern section.
East OG WRD	• Tharisa mining related activities and will be located over backfilled portions of the open pit

Based on the observations during the site assessment, the dominant land uses within the proposed WRD footprint areas are mining related activities. No agricultural activities were observed in the immediate vicinity of the footprint areas. Refer to Figure 7 for some of the current land uses associated with the footprint areas.

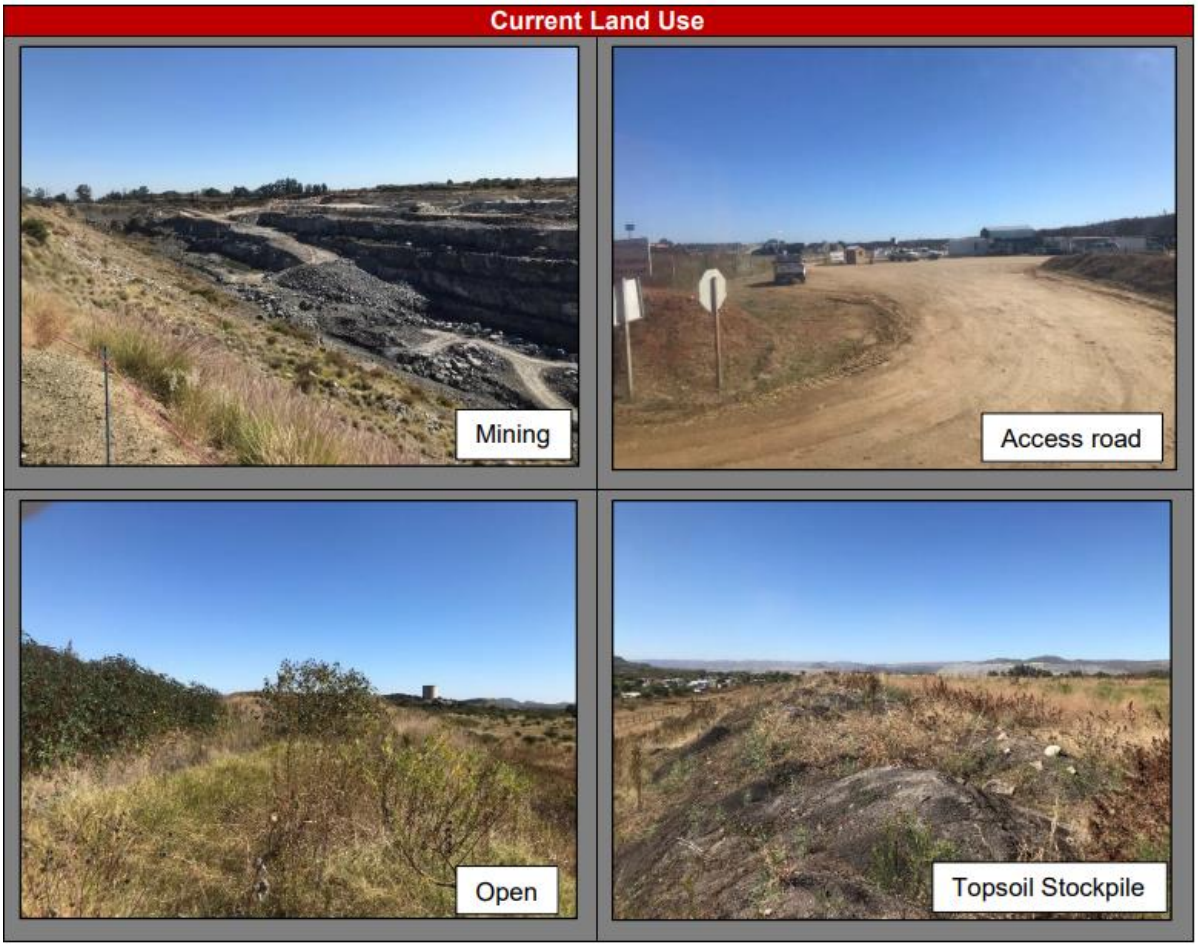

Figure 7: Photographs illustrating the dominant land use associated with the proposed footprint area and surrounding areas

9.5.4 Land uses surrounding the proposed Project area

9.5.4.1 Agriculture

There are several land users that are actively involved in subsistence and/or commercial farming activities such as livestock, piggery, growing citrus fruits and vegetables in the vicinity of the Tharisa mine. There are also land users who own small businesses such as accommodation (bed and breakfast places and lodges), shops and restaurants.

Due to overgrazing and subsistence farming practices by informal dwellers, as well as the collection of vegetation mainly for firewood, parts of the area have been transformed by misuse.

9.5.4.2 Residential and towns

Residential land use i.e., formal, informal and farmsteads is one of the mainland uses near the mine. The nearest town / residential areas to the Tharisa Mine include:

- Lapologang located approximately 640 m south of the proposed West OG WRD.
- Mmaditlhokwa located immediately north of the proposed West OG WRD.
- Bokamoso located approximately 13 km from the proposed West OG WRD.

- Private property owner of Portion 110 – Mr PHC Wolvaardt and Mrs HM Wolvaardt located approximately 500m south of the proposed West OG WRD.
- Private property owner Portion 139 – Mr GJC Pretorius and Mrs SC Pretorius located approximately 1.1 km south of the proposed West OG WRD.
- Private property owner Portion 196 – Ms N van der Hoven located approximately 550m south of the proposed West OG WRD.
- Private property owner Portion 305 – Mr GJC du Preez and Mrs MD du Preez located approximately 1.8 km south of the proposed West OG WRD.
- Buffelspoort located approximately 2.7 km south of the N4.
- Various other clusters of land dwellers/informal settlements in the general vicinity.
- Formal towns such as Marikana and Mooinooi located approximately 4.7 km north west and 5.5 km south east, respectively.

9.5.4.3 Community facilities

- Retief Primary School located approximately 1.2 km south west of the proposed West OG WRD and 1.1 km east if the proposed West OG WRD.
- Mmaditlhokwa community centre located approximately 500 m from the proposed West OG WRD.
- A graveyard located approximately 1.1 km south west of the proposed East OG WRD.

9.5.4.4 Infrastructure and servitudes

Infrastructure present in the area is directly linked to the type of land uses in the area as described above. The following infrastructure and servitudes have been identified in and around the proposed Project area:

- Railway: There is a railway siding at Marikana town to the north of Tharisa Mine and an associated railway line running in an east-west direction.
- Irrigation supply: Infrastructure (pipes and canals) associated with the Buffelspoort Irrigation Board canals traverse various sections of the mine area in a south-north direction.
- Power supply and communication: A 275kV power line, and associated ESKOM servitude, cross through the eastern part of the mine area in a north-south direction, to the east of the eastern open pit. Smaller rural power lines and telephone lines currently service the residential areas within the western and eastern sections of the mine area.
- Villages: Within the towns and villages, there are varying degrees of infrastructure and service provision.

9.5.4.5 Surrounding mines

Various other mining operations located in the immediate vicinity of the Tharisa Mine, these include:

- Mamba Chrome Mine;
- Xstrata Wonderkop;
- Phula mine;
- Samancor; and
- Various other small businesses (light industry, transport operations).

9.5.4.6 Other land uses of interest

There are also other land uses of interest around the Tharisa mine. These include:

- The Protected Natural Environment of the Magaliesberg (3 km south of the mine). This constitutes: an area with a high aesthetic value due to its mostly intact natural features and its tourism potential.

- Rustenburg Town lies approximately 28 km to the west.
- Hartbeespoort lies approximately 43 km to the south east.
- Sun City lies approximately 60 km to the north of the mine.
- The Rustmo Solar Plant (Adams Solar PV Project Two (Pty) Ltd) owned by Hulisani Ltd is situated approximately 5 km south west of Tharisa mine.

10. IMPACTS AND RISKS IDENTIFIED INCLUDING THE NATURE, SIGNIFICANCE, CONSEQUENCE, EXTENT, DURATION AND PROBABILITY

This section provides a list of potential impacts on environmental and socio-economic aspects that have been identified in respect of each of the main project actions / activities and processes for each of the project phases in terms of the project alternatives. With reference to Section 7 no project alternatives were considered and as such an assessment of alternatives is not applicable to the project.

11. METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

The method to be used for the assessment of impacts is set out in the table below. This assessment methodology enables the assessment of environmental impacts including cumulative impacts, the intensity of impacts (including the nature of impacts and the degree to which impacts may cause irreplaceable loss of resources), the extent of the impacts, the duration and reversibility of impacts, the probability of the impact occurring, and the degree to which the impacts can be mitigated.

Table 28: SLR impact assessment methodology

PART A: DEFINITIONS AND CRITERIA*		
Definition of SIGNIFICANCE		Significance = consequence x probability
Definition of CONSEQUENCE		Consequence is a function of intensity, spatial extent and duration
Criteria for ranking of the INTENSITY of environmental impacts	**VH**	Severe change, disturbance or degradation. Associated with severe consequences. May result in severe illness, injury or death. Targets, limits and thresholds of concern continually exceeded. Substantial intervention will be required. Vigorous/widespread community mobilization against project can be expected. May result in legal action if impact occurs.
	H	Prominent change, disturbance or degradation. Associated with real and substantial consequences. May result in illness or injury. Targets, limits and thresholds of concern regularly exceeded. Will definitely require intervention. Threats of community action. Regular complaints can be expected when the impact takes place.
	M	Moderate change, disturbance or discomfort. Associated with real but not substantial consequences. Targets, limits and thresholds of concern may occasionally be exceeded. Likely to require some intervention. Occasional complaints can be expected.
	L	Minor (Slight) change, disturbance or nuisance. Associated with minor consequences or deterioration. Targets, limits and thresholds of concern rarely exceeded. Require only minor interventions or clean-up actions. Sporadic complaints could be expected.
	VL	Negligible change, disturbance or nuisance. Associated with very minor consequences or deterioration. Targets, limits and thresholds of concern never exceeded. No interventions or clean-up actions required. No complaints anticipated.
	VL+	Negligible change or improvement. Almost no benefits. Change not measurable/will remain in the current range.
	L+	Minor change or improvement. Minor benefits. Change not measurable/will remain in the current range. Few people will experience benefits.
	M+	Moderate change or improvement. Real but not substantial benefits. Will be within or marginally better than the current conditions. Small number of people will experience benefits.
	H+	Prominent change or improvement. Real and substantial benefits. Will be better than current conditions. Many people will experience benefits. General community support.
	VH+	Substantial, large-scale change or improvement. Considerable and widespread benefit. Will be much better than the current conditions. Favourable publicity and/or widespread support expected.
	VL	Very short, always less than a year. Quickly reversible
	L	Short-term, occurs for more than 1 but less than 5 years. Reversible over time.

Criteria for ranking the DURATION of impacts	**M**	Medium-term, 5 to 10 years.
	H	Long term, between 10 and 20 years (likely to cease at the end of the operational life of activity).
	VH	Very long, permanent, +20 years (Irreversible, Beyond closure).
Criteria for ranking the EXTENT of impacts	**VL**	A part of the site/property.
	L	Whole site.
	M	Beyond the site boundary, affecting immediate neighbours.
	H	Local area, extending far beyond site boundary.
	VH	Regional/National

PART B: DETERMINING CONSEQUENCE

INTENSITY = VL

DURATION	Very long	**VH**	**Low**	**Low**	**Medium**	**Medium**	**High**
	Long term	**H**	**Low**	**Low**	**Low**	**Medium**	**Medium**
	Medium term	**M**	**Very Low**	**Low**	**Low**	**Low**	**Medium**
	Short term	**L**	**Very low**	**Very Low**	**Low**	**Low**	**Low**
	Very short	**VL**	**Very low**	**Very Low**	**Very Low**	**Low**	**Low**

INTENSITY = L

DURATION	Very long	**VH**	**Medium**	**Medium**	**Medium**	**High**	**High**
	Long term	**H**	**Low**	**Medium**	**Medium**	**Medium**	**High**
	Medium term	**M**	**Low**	**Low**	**Medium**	**Medium**	**Medium**
	Short term	**L**	**Low**	**Low**	**Low**	**Medium**	**Medium**
	Very short	**VL**	**Very low**	**Low**	**Low**	**Low**	**Medium**

INTENSITY = M

DURATION	Very long	**VH**	**Medium**	**High**	**High**	**High**	**Very High**
	Long term	**H**	**Medium**	**Medium**	**Medium**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**Medium**	**High**	**High**
	Short term	**L**	**Low**	**Medium**	**Medium**	**Medium**	**High**
	Very short	**VL**	**Low**	**Low**	**Low**	**Medium**	**Medium**

INTENSITY = H

DURATION	Very long	**VH**	**High**	**High**	**High**	**Very High**	**Very High**
	Long term	**H**	**Medium**	**High**	**High**	**High**	**Very High**
	Medium term	**M**	**Medium**	**Medium**	**High**	**High**	**High**
	Short term	**L**	**Medium**	**Medium**	**Medium**	**High**	**High**
	Very short	**VL**	**Low**	**Medium**	**Medium**	**Medium**	**High**

INTENSITY = VH

DURATION	Very long	**VH**	**High**	**High**	**Very High**	**Very High**	**Very High**
	Long term	**H**	**High**	**High**	**High**	**Very High**	**Very High**
	Medium term	**M**	**Medium**	**High**	**High**	**High**	**Very High**
	Short term	**L**	**Medium**	**Medium**	**High**	**High**	**High**
	Very short	**VL**	**Low**	**Medium**	**Medium**	**High**	**High**
			VL	**L**	**M**	**H**	**VH**
			A part of the site/ property	Whole site	Beyond the site, affecting neighbours	Extending far beyond site but localised	Regional/ National
			EXTENT				

PART C: DETERMINING SIGNIFICANCE							
PROBABILITY (of exposure to impacts)	Definite/ Continuous	**VH**	**Medium**	**Medium**	**High**	**Very High**	**Very High**
	Probable	**H**	**Low**	**Medium**	**Medium**	**High**	**Very High**
	Possible/ frequent	**M**	**Low**	**Low**	**Medium**	**Medium**	**High**
	Conceivable	**L**	**Very Low**	**Low**	**Low**	**Medium**	**Medium**
	Unlikely/ improbable	**VL**	**Negligible**	**Very Low**	**Low**	**Low**	**Medium**
			VL	**L**	**M**	**H**	**VH**
			CONSEQUENCE				

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	**Decision guideline**
Very High	Potential fatal flaw unless mitigated to lower significance.
High	It must have an influence on the decision. Substantial mitigation will be required.
Medium	It should have an influence on the decision. Mitigation will be required.
Low	Unlikely that it will have a real influence on the decision. Limited mitigation is likely required.
Very Low	It will not have an influence on the decision. Does not require any mitigation
Negligible	Inconsequential, not requiring any consideration.

12. THE POSITIVE AND NEGATIVE IMPACTS THAT THE PROPOSED ACTIVITY AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND THE COMMUNITY THAT MAY BE AFFECTED

As noted in Section 7.1, no location or layout alternatives are being considered and as such an assessment of alternatives is not applicable to the project. The positive and negative impacts are presented in the stipulated format in Table 30. The detailed impact assessment is attached as Appendix E.

For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time due to pending relocation processes. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process due to pending relocation processes. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available.

13. POSSIBLE MANAGEMENT ACTIONS THAT COULD BE APPLIED AND THE LEVEL OF RISK

This section provides the proposed mitigation measures that will be implemented by the Tharisa mine to minimise the risk to the biophysical and social environment.

A list of the potential impacts identified by SLR and/or raised by I&APs, as well as the possible management and mitigation measures, is provided in Table 43. The level of residual risk after management or mitigation, associated with the proposed Project, is also estimated.

Table 29: Possible management actions that could be applied and the level of risk

Issue and concern raised	Possible management actions or alternatives to address issue	Impact significance of the possible management action before and after mitigation	
		Unmitigated	**Mitigated**
Dust is so visible from the communities? How much dust are communities inhaling daily? The establishment of the additional WRDs will only worsen the situation.	For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available.	Low for simulated future operations	Very Low
The waste rock dump (WRD) in the west looks close to Lapologang. How will the impacts of dust and blasting affect our community?	For the purpose of this proposed Project, it is important note, that while the DMRE has indicated that the EIA Phase of the proposed Project may proceed, the department will not consider the expansion of the West OG WRD at this point in time. This is further supported by comments received from I&AP concerning the Lapologang, Mmaditlhoka community, nearby landowners and the impacts pertaining to the West OG WRD as set out in this report, and as such, the West OG WRD will not be processed by the DMRE as part of this application process. It follows a separate process will be undertaken at a later stage for the West OG WRD, once more information pertaining to relocation is available.	Low for simulated future operations	Very Low

Issue and concern raised	Possible management actions or alternatives to address issue	Impact significance of the possible management action before and after mitigation	
		Unmitigated	**Mitigated**
The proposed infrastructure is close to the Lapologang community. There are already existing mining activities that affect the community e.g., noise pollution from the blasting and dust – how do you as a consultant expect that the new infrastructure will affect us?	No blasting will be undertaken as part of the proposed Project. Grievances outside the project scope should be directed to Tharisa The west OG WRD would have a high impact on the community, but it is not currently being processed and the east OG WRD will not affect the community.	Low	Very Low
Will the proposed WRD's be lined?	the WRDs must be appropriately lined with a Class D liner to prevent pollution of groundwater.	Medium	Low
There is possibility of seepage from the waste rock dump (WRD) into surface and groundwater, which may contain elevated levels of chromium and other elements; therefore continuous water monitoring should be done on the existing and proposed waste rock dump (WRD)	the WRDs must be appropriately lined with a Class D liner to prevent pollution of groundwater.	Medium	Low
We do not sleep at night because of the noise from the blasting and the vehicles. The dust is also unbearable.	No blasting will be undertaken as part of the proposed Project. Grievances outside the project scope should be directed to Tharisa. Mitigation measures have been proposed to reduce the impact on communities, which include the relocation of the Mmadiklokwa and Lapologang communities.	High	Low

14. MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

The WRD's will be placed on previously disturbed areas, thereby minimising the proposed Project footprint. It follows that no alternative for the location of the proposed additional WRD's have been considered for the proposed Project.

15. STATEMENT MOTIVATING THE PREFERRED ALTERNATIVE

Refer to Section 14 and 7.1. No location or layout alternatives were considered and as such this section is not applicable.

16. FULL DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY, ASSESS AND RANK THE IMPACTS AND RISKS THE ACTIVITY WILL IMPOSE ON THE PREFERRED SITE THROUGH THE LIFE OF THE ACTIVITY

This Section provides information how the impact assessment for the proposed Project was informed and the impacts and risks identified to date.

16.1 DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY IMPACTS

Biophysical and socio-economic impacts associated with the proposed Project were identified through site visits undertaken by SLR and specialists, specialist studies and input from I&APs during the public participation process.

16.2 DESCRIPTION OF THE PROCESS UNDERTAKEN TO ASSESS AND RANK THE IMPACTS AND RISKS

A description of the assessment methodology used to assess the severity of identified impacts (including the nature of impacts and the degree to which impacts may cause irreplaceable loss of resources), the extent of the impacts, the duration and reversibility of impacts, the probability of the impact occurring, and the degree to which the impacts can be mitigated is provided in Section 11.

16.3 DESCRIPTION OF THE IMPACTS AND RISKS IDENTIFIED DURING THE ENVIRONMENTAL ASSESSMENT PROCESS

A description of the environmental impacts and risks identified during the EIA is included in Appendix E.

16.4 ASSESSMENT OF THE SIGNIFICANCE OF EACH IMPACT AND RISK AND AN INDICATION OF THE EXTENT OF TO WHICH THE ISSUE AND RISK CAN BE AVOIDED OR ADDRESSED BY THE ADOPTION OF MANAGEMENT ACTIONS

The assessment of the significance of potential impacts, including the extent to which impacts can be avoided or mitigated, is included in Section 12 and Appendix E.

17. ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

A summary of the assessment of the most significant and applicable biophysical and socio-economic impacts associated with the proposed Project is provided in Table 30. **A detailed description of the assessment is included in Appendix E**.

Table 30: Assessment of Significant Impacts and Risks

Activity Whether listed or not listed	Potential impact	Aspects affected	Phase	Significance	Mitigation type[9]	Significance If mitigated
Geology						
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss and sterilisation of mineral resources	Geology	Construction	**Medium**	Management through best practises	**Low**
Summary of Air Quality						
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Air Quality Impacts on Human Health and the Environment	Air quality	Construction	**Low**	Manage through air quality controls and monitoring	**Very Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Simulated PM10 daily ground level concentrations (GLCs), with current mitigation measures in place, are in non-compliance with the NAAQS over a portion of the Maditlhokwa Community and to the north-east of the mining rights boundary, but at no other AQSRs. Annual average GLCs are within compliance with the NAAQS at all AQSRs, except at Maditlhokwa Community. Simulated PM2.5 daily ground level concentrations (GLCs), with current mitigation measures in place, are in	Air quality	Operational Phase (Current)	**High**	Manage through air quality controls and monitoring	**Medium**

9 Please refer to the EMPr for details of the mitigation measures

Activity Whether listed or not listed	Potential impact	Aspects affected	Phase	Significance	Mitigation type[9]	Significance If mitigated
	non-compliance with the NAAQS for an area to the north-east of the mining rights boundary (mostly over the WRD), but not at any AQSRs. Over an annual average the GLCs are within the NAAQS at all AQSRs.					
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	PM10 daily GLCs, for unmitigated activities, are likely to exceed the NAAQS for a distance of up to 3.5 km from the mining rights boundary on the eastern side and for about 1 km to the west and north. $PM_{2.5}$ daily GLCs, for unmitigated activities, are likely to exceed the NAAQS for a few hundred meters outside mining rights boundary	Air quality	Operational Phase (Future)	**High**	Manage through air quality controls and monitoring	**Medium**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Air Quality Impacts on Human Health and the Environment	Air quality	Decommissioning & Rehabilitation Phase	**Low**	Manage through air quality controls and monitoring	**Very Low**
Summary of Soils, Land Use and Land Capabilities						
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Soil erosion	Soils, Land Use and Land Capabilities	Construction Phase	**Low**	Continued implementation and where relevant the adaptation of the soil conservation management plan and waste management plan.	**Very Low**

Activity Whether listed or not listed	Potential impact	Aspects affected	Phase	Significance	Mitigation type[9]	Significance If mitigated
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Soil erosion	Soils, Land Use and Land Capabilities	Operational Phase	**Low**	Continued implementation and where relevant the adaptation of the soil conservation management plan and waste management plan.	**Very Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Soil erosion	Soils, Land Use and Land Capabilities	Decommissioning Phase	**Low**	Continued implementation and where relevant the adaptation of the soil conservation management plan and waste management plan.	**Very Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Soil Compaction	Soils, Land Use and Land Capabilities	Construction Phase	**Low**	Continued implementation and where relevant the adaptation of the soil conservation management plan and waste management plan.	**Very Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Soil Compaction	Soils, Land Use and Land Capabilities	Operational Phase	**Medium**	Continued implementation and where relevant the adaptation of the soil conservation management plan and waste management plan.	**Very Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Soil Compaction	Soils, Land Use and Land Capabilities	Decommissioning Phase	**Low**	Continued implementation and where relevant the adaptation of the soil conservation management	**Very Low**

Activity Whether listed or not listed	Potential impact	Aspects affected	Phase	Significance	Mitigation type[9]	Significance If mitigated
					plan and waste management plan.	
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Soil Contamination	Soils, Land Use and Land Capabilities	Construction Phase	**Low**	Continued implementation and where relevant the adaptation of the soil conservation management plan and waste management plan.	**Very Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Soil Contamination	Soils, Land Use and Land Capabilities	Operational Phase	**Low**	Continued implementation and where relevant the adaptation of the soil conservation management plan and waste management plan.	**Very Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Soil Contamination	Soils, Land Use and Land Capabilities	Decommissioning and Closure Phases	**Low**	Continued implementation and where relevant the adaptation of the soil conservation management plan and waste management plan.	**Very Low**
Summary of Loss of Agricultural Land Capability						
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss of Agricultural Land Capability	Land Use and Land Capabilities	Construction Phase	**Low**	Avoid / minimise through design and operational controls	**Very Low**

Activity Whether listed or not listed	Potential impact	Aspects affected	Phase	Significance	Mitigation type[9]	Significance If mitigated
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss of Agricultural Land Capability	Land Use and Land Capabilities	Operational Phase	**Low**	Avoid / minimise through design and operational controls	**Very Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss of Agricultural Land Capability	Land Use and Land Capabilities	Decommissioning and Closure Phases	**Low**	Avoid / minimise through design and operational controls	**Very Low**
Summary of Surface Water						
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Alteration of natural drainage patterns affecting flow of water in downstream systems	Surface Water	Construction Phase	**Very Low**	Avoid / minimise through design and operational controls	**Insignificant**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Impacts on Water Quality- In the absence of pollution containment measures the intensity of the potential impact is expected to be high	Surface Water	Construction Phase	**High**	Avoid / minimise through design and operational controls	**Low**
Summary of Groundwater						
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Contamination to groundwater systems	Groundwater	Construction Phase	**Low**	• Road compaction and service facilities for mine vehicles with spillage sumps • Monitoring systems to detect leaking and as well as visual	**Very Low**

Activity Whether listed or not listed	Potential impact	Aspects affected	Phase	Significance	Mitigation type[9]	Significance If mitigated
					observations of facilities conditions • Best practise storage facilities and spill kits	
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Dewatering and loss of yield from I & AP boreholes in close proximity to mining developments (South of West Pit) due to maximum impact ZOI	Groundwater	Operational	**High**	Avoid / minimise through design and operational controls	**Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Dewatering and loss of yield from boreholes downstream of mining developments (Marikana Informal settlement) due to maximum impact ZOI	Groundwater	Operational	**High**	Avoid / minimise through design and operational controls	**Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Drawdown effect on the Sterkstroom due to open pit dewatering from East and West Pit.	Groundwater	Operational	**High**	Avoid / minimise through design and operational controls	**Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Existence of hydraulic connections between the East Pit and Samancor Underground and groundwater leakage into East Pit.	Groundwater	Operational	**Medium**	Avoid / minimise through design and operational controls	**Very Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Contamination to groundwater and surface water systems due to Nitrate migration from current and new mine residue facilities	Groundwater	Operational	**Medium**	Avoid / minimise through design and operational controls	**Low**

Activity Whether listed or not listed	Potential impact	Aspects affected	Phase	Significance	Mitigation type[9]	Significance If mitigated
Summary of Biodiversity						
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss of floral habitat and diversity	Transformed Habitat	Operational Phase	**Medium**	Close monitoring of all movements of equipment, site personnel and workers should be carried out so as to minimize unauthorised activities in any part of the project area	**Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss of habitat and species diversity in the Transformed Habitat	Transformed Habitat	Decommissioning & Rehabilitation Phase	**Medium**	Close monitoring of all movements of equipment, site personnel and workers should be carried out so as to minimize unauthorised activities in any part of the project area	**Very Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss of Floral SCC Habitat and Diversity	Transformed Habitat	Operational Phase	**Low**	Close monitoring of all movements of equipment, site personnel and workers should be carried out so as to minimize unauthorised activities in any part of the project area	**Very Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss of Floral SCC Habitat and Diversity	Transformed Habitat	Decommissioning & Rehabilitation Phase	**Very Low**	Close monitoring of all movements of equipment, site personnel and workers should be carried out so as to minimize unauthorised	**Insignificant**

Activity Whether listed or not listed	Potential impact	Aspects affected	Phase	Significance	Mitigation type[9]	Significance If mitigated
					activities in any part of the project area	
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss of faunal habitat and species diversity	Transformed Habitat	Operational Phase	**Medium**	Close monitoring of all movements of equipment, site personnel and workers should be carried out so as to minimize unauthorised activities in any part of the project area	**Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss of faunal habitat and species diversity	Transformed Habitat	Decommissioning & Rehabilitation Phase	**Medium**	Close monitoring of all movements of equipment, site personnel and workers should be carried out so as to minimize unauthorised activities in any part of the project area	**Very Low**
Noise						
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	The significance of construction phase noise impacts on nearby NSRs is considered medium (without mitigation). Due to the close proximity to the NSRs (assuming no NSRs are relocated), it is unlikely the significance will reduce unless the Mmaditlhokwa and Lapologang communities can be relocated.	Noise	Construction	**Medium**	Avoid / minimise through design and operational controls	**Medium**

Activity Whether listed or not listed	Potential impact	Aspects affected	Phase	Significance	Mitigation type[9]	Significance If mitigated
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	The significance of operation phase noise impacts on nearby NSRs is considered high	Noise	Operational	**High (H)**	It is recommended that the adoption of good practice noise mitigation and management measures be undertaken and that a noise berm be implemented along the perimeter of the West OG WRD. This would reduce the significance to medium but would still exceed IFC noise guidelines for residential areas at the closest NSRs to the West OG WRD. In order to reduce the significance to low, the project operations would have to (in addition to mitigation measures recommended, such as noise berm along the perimeter of the West OG WRD), limit project operations on West OG WRD to day-time hours only or relocate Mmaditlhokwa Community (directly east of West OG WRD), NSR1 (farmstead ~650 m south of West OG	**Medium**

Activity Whether listed or not listed	Potential impact	Aspects affected	Phase	Significance	Mitigation type[9]	Significance If mitigated
					WRD), NSR3 (Wolvaardt residence ~400 m south of West OG WRD) and NSR4 (van der Hoven residence ~470 m south of west OG WRD)).	
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	The significance of closure and decommissioning phase noise impacts on nearby NSRs (**assuming no NSRs are relocated**) is considered medium	Noise	Closure	**Medium**	Avoid / minimise through design and operational controls	**Medium**
Summary of Freshwater Ecosystems						
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss of freshwater habitat and ecological structure and impacts on hydrology	Freshwater Habitat, Ecological Structure, Hydrology, Changes to Socio-Cultural, Sediment Balance and Water Quality	Construction Phase	**Very Low**	Close monitoring of all movements of equipment, site personnel and workers should be carried out so as to minimize unauthorised activities in any part of the project area	**Insignificant**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss of freshwater habitat and ecological structure and impacts on hydrology	Freshwater Habitat, Ecological Structure, Hydrology,	Operational Phase	**Very Low**	Close monitoring of all movements of equipment, site personnel and workers should be carried out so as to minimize unauthorised	**Very Low**

Activity Whether listed or not listed	Potential impact	Aspects affected	Phase	Significance	Mitigation type[9]	Significance If mitigated
		Changes to Socio-Cultural, Sediment Balance and Water Quality			activities in any part of the project area	
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Loss of freshwater habitat and ecological structure and impacts on hydrology	Freshwater Habitat, Ecological Structure, Hydrology, Changes to Socio-Cultural, Sediment Balance and Water Quality	Closure/ Rehabilitation Phase	**Very Low**	Close monitoring of all movements of equipment, site personnel and workers should be carried out so as to minimize unauthorised activities in any part of the project area	**Very Low**
Summary of Visual						
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Change to the Landscape Characteristics and Key Views	Project Area/ Proposed Footprint Area	Operational Phase	**Low**	Avoid / minimise through design and operational controls	**Low**
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Change to the Landscape Characteristics and Key Views	Project Area/ Proposed Footprint Area	Decommissioning and Closure Phases	**Very Low**	Avoid / minimise through design and operational controls	**Very Low**
Summary of Socio-Economic						

Activity Whether listed or not listed	Potential impact	Aspects affected	Phase	Significance	Mitigation type[9]	Significance If mitigated
All activities involving employment and procurement of goods and services	Procurement of local goods and services by the mine, employees and contractors will stimulate local business and create opportunities for entrepreneurship.	Project Area/ Proposed Footprint Area	Operational and Closure Phase	**Medium +**	Ensure that procurement of suppliers is sourced locally	**Medium +**

18. SUMMARY OF SPECIALIST REPORT FINDINGS

The environmental baseline, findings and recommendations of the specialist studies undertaken as part of the S&EIR Process, have been incorporated into this EIR and EMPr.

The findings of the specialist studies are summarised in Table 31. Copies of the individual specialist study reports are attached as appendices to this report.

Table 31: Summary of Specialist Reports

List of Studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
Groundwater	The findings from the impact assessment can be summarised as follows: • Waste assessment – Based on the geochemical analysis, all waste types (WRD and tailings), classify as Type 3 based on TCT0 exceedances. The TCT0 exceedances are irrelevant for the surface and groundwater pathways. The 2020 Vulcan Tailings sample classifies as Type 3 due to Cr exceedances. For the 2022 Vulcan tailings and all WRD samples, there are no LCT0 exceedances, and the waste can be classified as equivalent to Type 4. Although geochemical analysis of the solids and leaching components are important, it can differ from the actual field conditions. • Monitoring Data – The long-term water quality monitoring data from 2013 to 2021 of 232 process water samples were analysed statistically. From the analysis none of the samples exceeded the chromium SANS 241 Drinking Water Limit. Chromium is therefore not a parameter of concern at the site. The monitoring results confirmed that only Nitrate is a potential contaminant parameter. • Dewatering – The calibrated model showed combined East Pit and Samancor Underground simulated inflows in the order of ± 5 600 m3/d. The average inflow rate simulated for the west and far west pits over the transient state calibration simulation period are ± 460 m3/d and ± 600 m3/d respectively. The water level data analysis shows that the dewatering cone from the respective open pits are of local extent (< 500 m) and do not currently point to major dewatering effects on neighbouring I & APs north and south of the west open pit. • At the deepest point of mining, the East Pit would dewater at a rate of ± 2 600 m3/d, with the Samancor Underground dewatering being ± 3 900 m3/d. The	X	Section 6.4 Section 8 Section 11 Section 16 Section 17 Section 19 Section 21 Section 25 Section 26 Section 29 Part B-EMP

List of Studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
	West Pit will dewater at a rate of ± 1 600 m3/d (these abstraction volumes do not include additional water due to rainfall-runoff within the pit). The modelling results show that the West Pit cone extends ± 700 m to the south and would potentially affect 4 I & APs near the mine (1 – 10 m drawdown). These include borehole AMG11, The Retief Primary School borehole, as well as the Wolvaart and van der Hoven residences. Potential groundwater users within the Marikana informal settlement are also situated within the modelled ZOI (1 -10 m drawdown). The source of their water needs to be verified as it is inferred that they receive Magalies water. All the hydrocensus boreholes downstream of the site will be affected to an extent (1 – 10 m drawdown). It must be noted that most of the land uses are industrial and mining related. Due to the East Pit and West Pit's proximity to the Sterkstroom, the stream section directly adjacent to the open pits will most likely experience a drawdown effect (10 – 25 m). • Residue Facilities - From the unmitigated maximum impact nitrate mass migration results, the nitrate plumes do not travel < 500 m from the current and proposed new facilities for both East Pit and West Pit, with the main receptors being the Sterkstroom, Marikana settlement directly downstream of the mine, I & APs directly next to Far W WRD 1 (The Wolvaart and van der Hoven residences) and west of W WRD 1 (Retief Primary School borehole). The ZOI would also minimise nitrate mass migration off site and therefore migration impacts are low for the proposed new facilities. Nitrate is only an operational concern as it would decay to below SANS 241 Drinking Water Standard Limits after 5 - 10 years post operations. • Nitrate plume migration from current and proposed new residue facilities does not migrate more than < 500 m, with the open pits acting as a groundwater sink		

List of Studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
	limiting migration (medium impact rating). The recommended Multiple-Capturing-Barrier-System mitigation and sustainable groundwater management plan should be included in the mine planning. The management plan should be activated based on monitoring, early warning, and verification of simulated potential impacts. Nitrate is only an operational concern as it would decay to below SANS 241 Drinking Water Standard Limits after 5 - 10 years post operations. The mitigation proposed would ensure management of the impact to a low-risk rating. • Post Closure - The backfilled open pits were simulated take 90 - 110 years to reach the decant level and would decant at estimated 200 m3/d to 600 m3/d. The water quality would be usable. Post closure re-watering and mass migration is not a significant impact. The flooded backfilled pits would form excellent artificial aquifers with usable water quality during the post-operational phase. Options to use these as water resources and enhance recharge yield by diverting surface water into these during flood conditions should be considered and evaluated via further modelling and studies. Nitrate degradation due to denitrification also causes the plumes to dissipate within a maximum of 5 - 10 years. **Conclusion** The simulated maximum cone of depression is < 700 m from the open pit boundaries (localised in extent) and potentially impact 4 I&APs as well as potential groundwater users at the Marikana Informal Settlement. Groundwater level and chemistry monitoring based on the updated monitoring protocol and if impacts are measured, mitigate by supply of alternative water to any impacted users. If specific fractures are		

List of Studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
	intersected during mining these could be grouted/sealed to manage the impact. If verified based on monitoring data, the impact can be managed and reversed from a High to a Low impact.		
Soil Land Use and Land Capability	The findings from the impact assessment can be summarised as follows: • The proposed WRD footprint areas are already comprised open void (pit) and waste rock material with limited natural soil. The soil erosion impact is therefore anticipated to be Low (L) during all phases. However, mitigation measures will be required to further reduce the impacts. The post mitigation measures the impact is anticipated to be Very Low (VL). • The severity of impact on soil compaction is anticipated to be low for the disturbed soils (i.e., Witbank and Cullinan) and high for the natural soils due to their high clay content. The impact significance can however be reduced significantly, should the proposed activities be restricted to access roads, vehicle hard stand areas and equipment and machinery laydown areas. • The soil contamination impact is therefore anticipated to be Medium during the pre-construction, construction and operational phases. Hence it should have an influence on the decision and mitigation measures will be required. Post mitigation measures the significant impacts are anticipated to be Very Low during the construction, operational and rehabilitation phases. • The impact on soil land capability is anticipated to be Low without mitigation and Very Low with mitigation. However, mitigation measures are deemed necessary, particularly for the conservation of topsoil for use during the closure and rehabilitation phase to meet the post closure land use objectives.	X	Section 6.4 Section 8 Section 11 Section 16 Section 17 Section 19 Section 21 Section 25 Section 26 Section 29 Part B-EMP

List of Studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
	Conclusion From a soil, land use and land capability point of view, this project regarded as being of low impact significance due to the inherent soil constraints of the area and the severe disturbance of the majority of the soils on site. However, mitigation measures and recommendations outlined in this document need to be implemented accordingly in efforts to conserve soil resources in the post mining landscape. The cumulative loss is considered limited since the dominant soils within each footprint area are disturbed as a result of the ongoing mining activities and the soil are not considered ideal to support agricultural activities. In addition, the proposed footprint areas are surrounded by active mining related activities as well as wilderness areas and are isolated from any large-scale agricultural activities in the area. If use of the natural soils within the footprint is made for closure of the mine, the significance of the impact will be further reduced.		
Air Quality	The findings from the impact assessment can be summarised as follows: • Construction Phase: Construction activities were not assessed separately since most of the expansion operations will be on disturbed surfaces with little additional land clearing or preparation required. Also, these activities will occur concurrently with the current mining activities. The significance of air quality impacts due to construction are therefore expected to be Low without mitigation and Very Low with mitigation measures in place. • Current Operations: • Simulated PM_{10} daily ground level concentrations (GLCs), with current mitigation measures in place, are in non-compliance with the NAAQS over a portion of the Maditlhokwa Community and to the north-east of the mining rights boundary,	X	Section 6.4 Section 8 Section 11 Section 16 Section 17 Section 19 Section 21 Section 25 Section 26 Section 29 Part B-EMP

List of Studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
	but at no other AQSRs. Annual average GLCs are within compliance with the NAAQS at all AQSRs, except at Maditlhokwa Community. • $PM_{2.5}$ GLCs are much lower compared to PM_{10} with exceedances of the NAAQS only at Madithlokwa when no mitigation is applied and no exceedances at any of the AQSRs with mitigation measures applied. • Simulated maximum daily fall out dust rates for current mitigated operations are within the NDCR non-residential limit (1 200 mg/m²/day) and the residential limit (600 mg/m²/day) at all the AQSRs. • The significance of air quality impacts due to the current operational activities are **High** without mitigation in place and **Medium** with mitigation measures. • Future Project operations: • PM_{10} GLCs without mitigation in place exceed the daily NAAQS at 14 of the AQSRs, including the communities of Lapologang and Madithlokwa, and the annual NAAQS at four (4) AQSRs. With mitigation in place the area of exceedance is reduced to fall mostly within the mining rights boundary with non-compliance of the daily and annual NAAQS only at Madithlokwa. • Without mitigation measures in place, $PM_{2.5}$ GLCs exceed only the daily NAAQS outside the mining rights boundary and at Madithlokwa. With mitigation in place the impact area reduces to fall within the mining rights boundary with no exceedances at any of the AQSRs. • Fall out dust rates only exceed the NDCR non-residential limit (1 200 mg/m²/day) and the residential limit (600 mg/m²/day) at the southeast of Madithlokwa without mitigation and reduce to a small area in the southeast of Madithlokwa with mitigation in place.		

List of Studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
	• Metals associated with the mine dust include aluminium (Al), barium (Ba), chromium (VI)(particulates), copper (Cu), iron (Fe), manganese (Mn), and nickel (Ni). The hazard quotient (HQ) was below 1 for all the metals evaluated, implying that adverse non-cancer effects are unlikely to occur due to exposure from these elements. The Excess Lifetime Cancer Risk associated with CrVI exposure was Moderate (one in ten thousand to less than one in a thousand) with a low risk (greater than one in a million to less than one in ten thousand) associated to Fe and a very low risk (equal to or less than one in a million) to Ni. It should be noted that the assumption that all Cr is CrVI is regarded as overly conservative. • The future Project operations will result in High significance without mitigation, reducing to Medium significance with mitigation measures in place. • Closure: The likely activities to result in dust impacts during closure will be similar to construction, resulting in a Low significance without mitigation and Very Low with mitigation measures in place. • **Conclusions** Impacts due to the future Project were assessed with respect to the expansion of the existing and approved Far West WRD 1 (with a portion above ground and a portion located on backfilled areas of the West Pit), and the new East WRD which will be in the East Pit. Exceedances of the NAAQS were predicted at 14 AQSRs for PM_{10} and at one AQSR for $PM_{2.5}$ under the unmitigated project scenario. With mitigation measures in place, exceedances of the NAAQS are limited to Madithlokwa. For the current mitigated operations exceedances of the NAAQS for PM_{10} are limited to Maditlhokwa. Simulated		

List of Studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
	dustfall levels also only exceeded NDCR for residential areas at Maditlhokwa for mitigated current and future Project operations. No significant differences in air quality impacts from the future Project were found in comparison to the current operations, assuming mitigation measures will be in place. The contribution from vehicle entrainment on the surface roads are likely to be less due to the future Project with a more significant contribution from the in-pit operations due to part of the WRD expansion falling within the East Pit. The community of Maditlhokwa is currently impacted negatively by the current mining operations with mitigation measures in place and is likely to be similarly impacted on by the future Project operations with mitigation measures in place. From an air quality perspective, the proposed Project can be authorised permitted the recommended mitigation and monitoring measures are applied, and PM_{10} monitoring is done in Maditlhokwa to ensure compliance with the NAAQS and NDCRs.		
Environmental Noise	The findings from the impact assessment can be summarised as follows: • Noise levels due to project operations are predicted to exceed the day-time IFC noise guideline of 55 dBA for residential areas up to a distance of ~110 m from the proposed West OG WRD and ~250 m from the East OG WRD. Noise levels due to project operations are predicted to exceed the night-time IFC noise guideline of 45 dBA for residential areas up to a distance of ~700 m from the proposed West OG WRD and ~1100 m from the East OG WRD. • With the 5 m noise berm in place, the predicted increase in noise levels from the current baseline due to proposed Project operations is not expected to result in a community reaction.	X	Section 6.4 Section 8 Section 11 Section 16 Section 17 Section 19 Section 21 Section 25 Section 26 Section 29 Part B-EMP

List of Studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
	• The predicted increase in noise levels from an estimated background due to project activities, assuming a 5 m noise berm, would result in the following community: • Mmaditlhokwa Community: • Night-time – 'little' reaction with sporadic complaints • Considering the estimated background noise levels as provided, the noise levels due to the project with a 5 m berm on the perimeter of the proposed WRDs will not exceed the 1992 Noise Control Regulations (The Republic of South Africa, 1992) definition of "disturbing noise" (greater than 7dBA from ambient sound levels). • The significance of construction phase noise impacts on nearby NSRs is considered medium (without mitigation). Due to the close proximity to the NSRs (assuming no NSRs are relocated), it is unlikely the significance will reduce unless the Mmaditlhokwa and Lapologang communities can be relocated. • The significance of operation phase noise impacts on nearby NSRs is considered high (without mitigation). It is recommended that the adoption of good practice noise mitigation and management measures be undertaken and that a noise berm be implemented along the perimeter of the West OG WRD. This would reduce the significance to medium but would still exceed IFC noise guidelines for residential areas at the closest NSRs to the West OG WRD. In order to reduce the significance to low, the project operations would have to (in addition to mitigation measures recommended, such as noise berm along the perimeter of the West OG WRD), limit project operations on West OG WRD to day-time hours only or relocate Mmaditlhokwa Community (directly east of West OG WRD),		

List of Studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
	NSR1 (farmstead ~650 m south of West OG WRD), NSR3 (Wolvaardt residence ~400 m south of West OG WRD) and NSR4 (van der Hoven residence ~470 m south of west OG WRD)). • The significance of closure and decommissioning phase noise impacts on nearby NSRs (assuming no NSRs are relocated) is considered medium (without and with mitigation). **Conclusion** The noise impacts due to the project are predicted to exceed calculated background levels and IFC guidelines at the closest residential dwellings to the project site. Mitigation measured (such as noise berm on the West OG WRD), may be implemented but potentially will not reduce noise levels sufficiently within calculated background levels and IFC guidelines at the closest NSRs for night-time conditions. Further attenuation measures will need to be implemented including operating the proposed WRDs during day-time hours only (with a 5m noise berm along the perimeter of the West OG WRD) or relocating the nearest NSRs (i.e., Mmaditlhokwa Community (directly east of West OG WRD), NSR1 (farmstead ~650 m south of West OG WRD), NSR3 (Wolvaardt residence ~400 m south of West OG WRD) and NSR4 (van der Hoven residence ~470 m south of west OG WRD)). A complaints register must be kept throughout the life of the operations. It is the specialist opinion that, from an environmental noise perspective, the project may be authorised **if**: • Activities on the proposed West OG WRD: • Operations are restricted to day-time hours only and a noise berm of at least 5m is implemented along the perimeter of the WRD; or,		

List of Studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
	• That the Mmaditlhokwa Community, NSR1, NSR3 and NSR4 are relocated (as night-time activities due to West OG WRD exceed IFC residential guidelines at these NSR). • Activities on the proposed East OG WRD: • Operations are restricted to day-time hours only; or, • That the Mmaditlhokwa Community is relocated (as night-time activities due to East OG WRD exceed IFC residential guidelines at this NSR).		
Biodiversity	The findings from the impact assessment can be summarised as follows: • The impacts arising from the proposed mining activities from a i) floral habitat and species diversity perspective, and ii) from a SCC perspective, both ranged from medium to very low prior to the implementation of mitigation measures. With mitigation measures fully implemented, it is the opinion of the specialist that all impacts can be effectively reduced to very low and insignificant levels. From a faunal perspective: the perceived impact significance of the proposed mining activities, prior to mitigation, ranges from medium-high to very low (based on habitat sensitivity). Following mitigation, impacts are anticipated to range from very low and insignificant levels. • The study area is located within areas of conservation significance, including a Critical Biodiversity Area (CBA2), Ecological Support Areas (ESA1 & ESA2) and the remaining extent of the vulnerable (VU) Marikana Thornveld threatened ecosystem (of national importance). The impact of the proposed mining activities on these areas within the study area (i.e., immediate local area) are not anticipated to be determinantal as the areas in which the proposed WRDs are	X	Section 6.4 Section 8 Section 11 Section 16 Section 17 Section 19 Section 21 Section 25 Section 26 Section 29 Part B-EMP

List of Studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
	located are within existing transformed habitat. Furthermore, no suitable habitat for protected species was recorded within the study area. **Conclusion:** Due to the area already being exposed to disturbances (e.g., mining activities) and edge effect impacts (e.g., AIP proliferation), the Transformed Habitat is susceptible to continued and worsening AIP proliferation. Care must be taken to limit edge effects on the surrounding natural areas. Furthermore, it is recommended that an AIP species management plan be developed to manage the proliferation AIPs within the study area and thus limit the spread of such species to neighbouring areas.		
Freshwater Ecosystems	The findings from the impact assessment can be summarised as follows: • As neither WRD is expected to encroach on the wetlands or the Sterkstroom River, the perceived impact significance is considered low to negligible. • No freshwater systems were identified directly within the study area. Two valley bottom wetlands were identified immediately north of and within 50 m of the West Above Ground WRD, whilst the Sterkstroom River, which drains in a northerly direction through the centre of the Tharisa Mine MRA, is located approximately 200 m west of the East Above Ground WRD. • The wetlands were previously assessed by SAS (2013) and found to be moderately modified at the time; however the ecological integrity of the wetlands has subsequently decreased and at the time of this assessment in May 2022, were found to be seriously modified (channelled valley bottom wetland) and critically modified (unchanneled valley bottom wetland).	X	Section 6.4 Section 8 Section 11 Section 16 Section 17 Section 19 Section 21 Section 25 Section 26 Section 29 Part B-EMP

<table>
<tr><th>List of Studies undertaken</th><th>Recommendations of specialist reports</th><th>Specialist recommendations that have been included in the EIA report (mark with an x where applicable)</th><th>Reference to applicable section of report where specialist recommendations have been included.</th></tr>
<tr><td></td><td>
The Sterkstroom River was previously assessed by SAS (2013) and The Biodiversity Company (TBC). During all assessments undertaken, including this assessment, the river is deemed to be moderately modified. The outcome of the assessments discussed in Section 4 of the specialist report are summarised in the table below:
Table 32: Summary of results of the ecological assessment of the freshwater ecosystems.
<table>
<tr><th>Freshwater Ecosystem</th><th>PES</th><th>EIS</th><th>Ecoservices</th></tr>
<tr><td>Sterkstroom River</td><td>B/C (IHI) / C (VEGRAI)</td><td>Moderate</td><td>Low to moderate</td></tr>
<tr><td>Unchannelled Valley Bottom Wetland</td><td>F</td><td>Low/marginal</td><td>Low to moderate</td></tr>
<tr><td>Channelled Valley Bottom Wetland</td><td>D</td><td>Low/marginal</td><td>Low to moderate</td></tr>
</table>
Conclusion
Neither of the proposed WRDs will encroach directly on any of the freshwater ecosystems and are therefore deemed to pose no direct risk to the freshwater ecosystems. The quantum of significance of potential indirect impacts is deemed to be low to very low/negligible. Notwithstanding this, edge effects, some of which could potentially contribute to cumulative or residual impacts to the freshwater ecosystems, may potentially occur and therefore the strict implementation of mitigation measures (provided in Section 6.1 of the specialist report) must take place.
</td><td></td><td></td></tr>
</table>

List of Studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
	Considering that the majority of the WRD footprints will be located within existing disturbed areas, specifically within backfilled areas of existing opencast pits, it is the opinion of the specialist that the proposed activities may be considered for authorisation provided that appropriate mitigation measures are implemented to minimise the potential indirect, cumulative and latent risks potentially associated with the proposed development activities		
Heritage and Paleontological Screening	The findings from the impact assessment can be summarised as follows: • The area proposed for the creation of the waste rock storage has been subject to heritage impact assessments in the past. In the assessment completed by Pistorius (2009) for the Tharisa Mine, the following heritage resources that exist within the mine area: • Stone walled settlements which date from the Late Iron Age; • Historical structures such as farmhouses with outbuildings, agricultural infrastructure and the van Rensburg School (now called the Retief Primary School); • At least six graveyards as well as objects with heritage significance such as outdated and discarded agricultural implements. • The area proposed for development has been either previously surveyed for heritage resources and as such, it is very unlikely that the proposed development will impact negatively on any significant archaeological heritage resources. **Conclusion**	X	Section 6.4 Section 8 Section 11 Section 16 Section 17 Section 19 Section 21 Section 25 Section 26 Section 29 Part B-EMP

List of Studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
	Based on the available information, the proposed development is not likely to impact on significant heritage resources and as such, it is recommended that no further heritage impact assessments are required in terms of section 38 of the NHRA		
Visual Assessment	The findings from the impact assessment can be summarised as follows: • The impact on the visual environment during the operational phase is assessed to have a low intensity and would occur over the long term (anticipated to be approximately twenty years). The unmitigated impact would be localized but extend beyond the site boundary, affecting neighbours (at least to 3,0km) resulting in a medium consequence. The significance of impact is rated low (i.e. Medium Consequence and Possible/frequent probability of exposure to impacts). Mitigation measures will not significantly reduce the visual impact of the mine and its infrastructure. • The impact on the visual environment during the closure phase is assessed to have a very low intensity and would occur over the short term (less than five years). The unmitigated impact would be localized but extend beyond the site boundary and effect neighbours and is assessed to be low consequence. The significance of impact is rated very low (i.e. Low Consequence and Possible/frequent probability of exposure to impacts). The impact would not be significantly reduced, even with the implementation of mitigation measures. After closure, when the rehabilitation of the WRDs takes hold, the impact could reduce significantly to Insignificant. **Conclusion**	X	Section 6.4 Section 8 Section 11 Section 16 Section 17 Section 19 Section 21 Section 25 Section 26 Section 29 Part B-EMP

List of Studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
	The specialist indicated that the Project would cause a minor change to the visual environment and sensitive receptor locations. The Project should be approved provided that the mitigation/management measures are effectively implemented and managed in the long-term.		
Geochemical Assessment	The findings from the impact assessment can be summarised as follows: • Three (3) WR composite samples from the Tharisa PGM and Chromite mine were subjected to comprehensive geochemical investigation and waste assessment to predict the leachate quality from the waste storage facilities on site and if they pose any risk to surface or groundwater resources. The laboratory results (LCT and SPLP) are based on first flush static tests that often give conservative (elevated) concentrations whereas the modelled source terms are calibrated to long term water quality monitoring data that is subject to field scale conditions and are regarded as more accurate indicators of site leachate quality. • The XRD analysis confirmed the dominant minerals for all waste materials at Tharisa mine to be Enstatite and Plagioclase, with minor Muscovite, Augite and Quartz present. The SPLP results for Tharisa waste materials returned only SANS 241: Operational and Aesthetic exceedances for Al and Fe, respectively. • According to NEMWA GN R. 635 and 636 guidelines, all the waste rock samples can be classified as equivalent to a Type 4 waste using a risk-based approach and will be required to be incorporated into a storage facility with a Class D barrier. • The geochemical source terms modelled for the Tharisa WR materials predicted the following CoCs for possible risk to water resources due to: • Exceedance of DWAF livestock TWQG nitrate levels for all the waste streams	X	Section 6.4 Section 8 Section 11 Section 16 Section 17 Section 19 Section 21 Section 25 Section 26 Section 29 Part B-EMP

List of Studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
	• However, nitrate is not sourced from the mined geochemistry but originates from operational blasting and decays with time. Based on the kinetics of the bacteria-controlled nitrate reduction, the half-life of nitrate is estimated to be between 500 – 1350 days (Eppinger and Walraevens, 1998) and proven to be between 108-162 days based on long-term site monitoring data. • The increase in the modelled pH levels relative to the SPLP input values is due to the dominant mineral Enstatite, which tends to uptake 2 H+ ions in exchange for Mg2+ on the mineral surface, which ultimately results in an increase in modelled leachate pH (Oelkers & Schott, 2001). **Conclusion** Although the predicted leachate quality from the Tharisa waste storage facilities is expected for mine effluent, SLR would recommend that the results of the source term assessment not be evaluated in isolation but together with numerical or reactive groundwater modelling risk assessment. The complete source, pathway and receptor should be considered in evaluating the overall potential risks to groundwater.		

19. ENVIRONMENTAL IMPACT STATEMENT

This section provides a summary of the findings of identified and assessed potential impacts on the receiving environment in both the unmitigated and mitigated scenarios, including cumulative impacts.

19.1 SUMMARY OF THE KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

A summary of the potential impacts, associated with the preferred alternatives, in the unmitigated and mitigated scenarios for all project phases is included in Table 30.

The table also provides an indication of the contribution of potential impacts, associated with the proposed Project, to the overall cumulative significance rating for the mine.

19.2 FINAL SITE MAP

The final preferred site layout plan is included in Map 4.

19.3 SUMMARY OF POSITIVE AND NEGATIVE IMPACTS AND RISKS OF THE ACTIVITY AND IDENTIFIED ALTERNATIVES

A summary of the potential impacts are presented Table 30.

20. PROPOSED IMPACT MANAGEMENT OBJECTIVES AND THE IMPACT MANAGEMENT OUTCOMES FOR INCLUSION IN THE EMPR

The key objectives of the EMPr are to set out the management and monitoring measures required to both minimise any potentially adverse environmental impacts and enhance the environmental benefits of the Project, and to ensure that responsibilities and appropriate resources are efficiently allocated to implement the plan.

The aspects which are considered to be of most importance to the development, including the respective management objectives and outcomes for the impacts associated with these aspects are provided in Table 33.

Table 33: Management objectives and outcomes

Aspect	Management objective	Outcome
Soil and land capability	• To rehabilitate disturbed areas in line with the management plans. • To accommodate the present land uses of communal grazing and/or wilderness. • Manage suitable onsite soil resources for rehabilitation activities. • Prevent the contamination of soil resources. • Managed response to the clean-up of accidental spillages and leaks.	• Rehabilitation that supports post-closure land uses. • Soil resources protected from contamination. • Accidental leaks and spillages responded to rapidly and all contamination remediated in accordance with legal requirements.
Geology	• To prevent unacceptable mineral sterilisation	• Avoid mineral sterilisation
Surface water	• To prevent unacceptable alteration of drainage patterns and related reduction of downstream surface water flow and to prevent pollution of surface water resources.	• Ensure surface water quality remains within acceptable limits for both domestic and agricultural purposes. • Ensure that the reduction of the volume of runoff into the downstream catchment is limited to what is necessary and that natural drainage patterns are re-established as part of rehabilitation in order to prevent unacceptable alteration of drainage patterns and related reduction of downstream surface water flow.
Groundwater	• To prevent pollution of groundwater resources and related harm to water users and to prevent losses to third party water users. • Managed response to the clean-up of accidental spillages and leaks. • Monitor groundwater to ensure that any changes in groundwater quality and quantity are identified and investigated.	• Good stakeholder relations with community members. • Accidental leaks and spillages responded to rapidly and all contamination remediated in accordance with legal requirements. • To ensure that groundwater continues to be available to current users.

Aspect	Management objective	Outcome
Air	• Control and minimise particulate and dust emissions. • To prevent air pollution health impacts.	• Ensure that any pollutants emitted as a result of the project remains within acceptable limits as per relevant standards so as to prevent health related impacts. • Air emissions from the development managed in accordance with legal requirements.
Noise	• To prevent public exposure to disturbing noise.	• Ensure that any noise generated as a result of the project remains within acceptable limits (as set out in the specialist report) to avoid the disturbance of third parties. • Good stakeholder relations with community members and authorities.
Visual	• To limit negative visual impacts.	• Limit negative visual views.
Socio-economic	• To enhance the positive economic impacts and limit the negative economic impacts. • To enhance the sustainability of the project into the future by building capacity.	• Work with existing structures and organisations to establish and maintain a good working relationship with surrounding communities, local authorities and landowners in order to limit the impacts associated with inward migration. • Good stakeholder relations with community members and authorities. • Enhance the positive economic impacts by working together with existing structures and organisations.
Traffic	• To prevent mine-related road disturbance.	• Ensure the mine's use of public roads is done in a responsible manner
Land uses	• To prevent unacceptable impacts on surrounding land uses and their economic activity.	• Co-exist with existing land uses. • Impact existing land uses as little as possible.
Heritage	• Protection of heritage resources.	• No heritage resources damaged or destroyed during construction activities.
Public involvement	• To build meaningful relationships with all stakeholders.	• Community conflict avoided.

21. FINAL PROPOSED ALTERNATIVES

No additional alternatives to those identified and assessed through the impact assessment process are proposed for the mine development.

22. ASPECTS FOR INCLUSION AS CONDITIONS OF THE AUTHORISATION

Management actions including monitoring requirements, as outlined in Sections 27 and 29 respectively, should form part of the conditions of the environmental authorisation.

With reference to Regulation 26 of GN R. 982 of NEMA, additional conditions that should form part of the environmental authorisation that are not specifically included in the EMPr report include compliance with all applicable environmental legislation whether specifically mentioned in this document or not and which may be amended from time to time.

Apart from the mitigation and monitoring measures presented in this report, specific conditions proposed by the specialists are presented below:

- The noise specialist assessment concluded that the project may be authorised if:
- Activities on the proposed West OG WRD:
    - Operations are restricted to day-time hours only and a noise berm of at least 5m is implemented along the perimeter of the WRD; or,
    - That the Mmaditlhokwa Community, NSR1, NSR3 and NSR4 are relocated (as night-time activities due to West OG WRD exceed IFC residential guidelines at these NSR).
- Activities on the proposed East OG WRD:
    - Operations are restricted to day-time hours only; or,
    - That the Mmaditlhokwa Community is relocated (as night-time activities due to East OG WRD exceed IFC residential guidelines at this NSR).
- The mine dewatering and mass transport model should be reviewed and updated once every two years and/or once the KMLCS pit dewatering modelling are completed as the open pits form important sinks in the mass transport model (for dewatering planning purposes).
- The multiple barrier and sustainable management plan approach as described in the EMPr should be followed to ensure any potential seepage is mitigated.
- The mine dewatering and mass transport model should be reviewed and updated once every two years and/or once the KMLCS pit dewatering modelling are completed as the open pits form important sinks in the mass transport model (for dewatering planning purposes).
- The multiple barrier and sustainable management plan approach as described in the EMPr should be followed to ensure any potential seepage is mitigated.
- The expansion of the Far waste rock dump which is closer to the community will only be considered once the neighbouring community of Mmaditlhoka village has been relocated away from the site.
- For the duration that the community is still located where it is currently, the expansion of the far waste rock dump should be put on hold from the mine's operation due to the environmental and social impacts already affecting the said community.
- No activity may commence prior to an environmental authorisation being granted by the competent authority".
- If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Elijah Katsetse/Phillip Hine 021 462 4502) must be alerted as per

section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule;

- If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Ngqalabutho Madida 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule;
- The following conditions apply with regards to the appointment of specialists:
    - If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.
- The expansion of the Far waste rock dump which is closer to the community will only be considered once the neighbouring community of Mmaditlhoka village has been relocated away from the site.
- For the duration that the community is still located where it is currently, the expansion of the far waste rock dump should be put on hold from the mine's operation due to the environmental and social impacts already affecting the said community.

23. ASSUMPTIONS, UNCERTAINTIES, LIMITATIONS AND GAPS IN KNOWLEDGE

Assumptions, uncertainties and limitations have been discussed throughout the EIA and EMPr and in the various specialist studies. The more significant of these are included in Table 34.

Table 34: Assumptions, Uncertainties, Limitations and Gaps in Knowledge

Aspect	Qualifications, assumptions and limitations
Environmental assessment limit	• The EIA focused on third parties only and did not assess health and safety impacts on workers because the assumption was made that these aspects are separately regulated by health and safety legislation, policies and standards, and that Tharisa adhere to these.
Predictive models in general	• All predictive models are only as accurate as the input data provided to the modellers. If any of the input data is found to be inaccurate or is not applicable because of project design changes that occur over time, then the model predictions will be less accurate.
General	• It is assumed that SLR has been provided with all relevant project information and that it was correct and valid at the time it was provided. • There will be no significant changes to the project description or surrounding environment between the completion of the EIA process and implementation of the proposed Project that could substantially influence findings and recommendations with respect to mitigation and management. • Specialists assessed potential impacts from the construction and operational phases separately. These have been assessed collectively in the EIA and EMPr by the EAP, using the information provided by specialists. This provides an assessment of the overall project.
Cumulative assessment	• Cumulative assessment commentary is included in the impact assessment under the various aspect headings. This takes account of current operations and the WRDs changes.
Climate data	• Meteorological data: no onsite meteorological data was available and simulated WRF data for the study site was obtained for the period January 2019 – December 2021.
Noise	• The mitigating effect of pit walls, buildings, and infrastructure acting as acoustic barriers were not considered providing a conservative assessment of the noise impacts off-site. • The quantification of sources of noise was limited to the operational phase of the project. Construction and closure phase activities are expected to be similar or less significant and its impacts only assessed qualitatively. Noise impacts will cease post-closure. • All activities were assumed to be 24 hours per day, 7 days per week. • Although other existing sources of noise within the area were identified, such sources were not quantified but were considered during the surveys undertaken. • Blast vibration and noise did not form part of the scope of work of this assessment. • The WRDs were modelled as single areas encompassing all quantified noise producing equipment. • It was assumed, as a conservative approach, that all equipment on the WRDs would be operational simultaneously. • Although the noise impact due to reverse signals is recognised, it is not considered as part of the environmental noise impact assessment as these signals are used for warning purposes which are excluded in impact assessments.

Aspect	Qualifications, assumptions and limitations
Visual	• The description of project components is limited to what has been supplied to the author before this report's completion date. • The basic simulations are indicative and used to illustrate the location, scale and bulk of the proposed WRDs. • The viewshed modelling assumes that at closure, bulking will occur, and some residual material will remain above natural ground level at the locations of the existing and proposed WRD sites, as well as above the two open pits. The offset used in the modelling is 10m. • No alternative sites have been proposed. • Site photos were taken at the end of summer and did not reflect the complete landscape character of the area as experienced through all seasons. However, due to the disturbed nature of the study area, this is not a major concern in assessing potential visual impacts.
Air	• Tharisa Mine has a dustfall network in place and conduct passive sampling campaigns to determine background SO_2 and NO_2 concentrations. Data available for inclusion in this study was limited to the period January to March 2021 and January to March 2022. • Operational hours for the mine were assumed to be 24-hours a day, 7-days per week. • Information required for the calculation of emissions from fugitive dust sources for the current and project operations were provided in the form of volume/ tonnages of topsoil, waste, and reef for a 12-month period covering October 2021– September 2022. • Throughputs were provided for current activities only. Since no other information was available, it was assumed that project operations will have the same throughput but at different locations (pit areas and WRDs). • Only routine emissions were estimated and modelled. This was done for the provided operational hours. • Gaseous emissions from vehicle exhaust and other auxiliary equipment were quantified but not modelled as the impacts from these sources are usually localized and unlikely to exceed health screening limits outside the project area. The main pollutant of concern from the operations at the study site is particulate matter and hence formed the focus of the study. • Particle size distribution (PSD) for waste rock, tailings and surface road material was based on analysis of composite samples taken by Airshed personnel during the site visit on 22 April 2022. PSD for ROM and product stockpiles were assumed to be similar to waste. • Impacts due to two operational phases (baseline and project) were assessed quantitatively, whilst the closure and decommissioning phases were assessed qualitatively due to the limited information available. Since it is an operational mine, construction activities will coincide with the current mining operations and were therefore not assessed. • The impact assessment was limited to airborne particulate (including TSP , and PM2.5).
Geochemistry	• Predicting water qualities from an evaporation and settling setting, requires some assumptions and has limitations. The statistician George Box said: all models are wrong, but some models are useful (Box, 1976). • This statement captures the essential truth that all model's approximate reality in that they reduce complex systems to a limited number of significant processes. How "useful" a model is depending on how closely the selected processes approximate reality. Predicting the water qualities of complex systems demands assumptions. Even a rigorous sampling and analysis programme cannot precisely determine the physical and geochemical characteristics of the

Aspect	Qualifications, assumptions and limitations
	system. Nor can they precisely indicate how these characteristics may change over time. Table 3-3 summarises the key limitations of the input data and the hydrogeochemical model used for this assessment
Groundwater	The following assumptions were made with listed limitations: • Prior to development, the system is in equilibrium and therefore in steady state. • The accuracy and scale of the assessment will result in acceptable deviations at specific points e.g., individual boreholes. • Site specific structural geological data was extrapolated to model boundaries, in line with precautionary principle. • Dykes inferred to be ± 20 - 30 m thick, with a permeable dyke contact zone of ± 5 m thick. • Fault zones inferred to be ± 10 m thick. • Seepages from surrounding facilities were included and modelled / calibrated to adequate level of accuracy (± 10%) as detailed modelling did not form part of the current study objectives (to give an overall hydrogeological impact before proposed facility impacts were added). • The potential current and future impact of surrounding mine dewatering and mass migration and its influence on the current site conditions were not included in this model. • Nitrate source terms were evaluated and estimated off existing site data and reports. • When assumptions were made or reference values used, a conservative approach was followed aligned with the precautionary principle (NEMA, 1998). A groundwater model is a representation of the real system. It is therefore an approximation, and the level of accuracy depends on the quality of the data that is available. The purpose of the model was not to simulate the actual field conditions (i.e., every dyke and fracture), but to simulate the proposed WRD activities and impact risk on the receiving environment. Based on the precautionary principle, the actual impacts would be smaller than the simulated impacts.
Surface water	• The watercourse assessment is confined to the study area as illustrated in Figures 1 and 2 and does not include the neighbouring and surrounding properties outside of the study area. The general surroundings and important catchment characteristics were, however, considered in the desktop assessment of the study area. • During the site assessment undertaken in April 2022, three freshwater ecosystems were identified in relation to the study area. Where access was possible the delineations and ecological status were ground-truthed. However, where access was prevented (taking into consideration mine safety protocols and sensitivities of the surrounding communities to mine activities), sections of the identified freshwater ecosystems were delineated on a desktop basis using topographic maps and digital satellite imagery, in line with Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998). Furthermore, relevant data obtained during the assessment undertaken in 2013 was utilised. • Notwithstanding the above, changes to the landscape driven by the expansion of mining activities in the catchments of the valley bottom wetlands associated with the West Above Ground WRD have altered the functional extents and hydroperiods of the wetlands.

Aspect	Qualifications, assumptions and limitations
	• 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 and high rainfall conditions. However, it is expected that the proposed activities have been accurately assessed and considered, based on the field observations.
Biodiversity	• The floral assessment was confined to the study area and does not include the neighbouring and adjacent properties. The entire study area and immediate surroundings were, however, included in the desktop analysis. • With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most floral communities have been accurately assessed and considered. Relevant online sources were further assessed to improve on the overall understanding of the study area's ecology. • The data presented are based on one site visit, undertaken on the 26th of April (autumn) and thus falls outside of the flowering season of several species within the region. A more comprehensive assessment would require that assessments take place in all seasons of the year. However, on-site data was augmented with all available desktop data. Together with project experience in the area, the overall degraded nature of the study area and its surroundings, and the use of background information from studies previously conducted in the area (e.g., SAS 213199 (2013), and STS 210061, 2021), the findings of this assessment are considered an accurate reflection of the floral ecological characteristics of the study area for the purposes of informed decision-making processes; and • An on-site visual investigation of the assessment areas was conducted to confirm the assumptions made during the consultation of the background maps and to determine whether the sensitivity of the terrestrial biodiversity associated with the assessment areas confirms the results of the online National Web-based Environmental Screening Tool, hereafter referred to as the "screening tool
Soils, Land Use and Land Capability	• The soil survey conducted as part of the land capability assessment was confined within the study area outline. However, consideration of the immediately adjacent areas was given. • Since soils occur in a continuum with infinite variances, it is often problematic to classify any given soils as one form, or another. for this reason, the classifications presented in this report are based on the "best fit" to the soil classification system of South Africa.
Closure Liability	• The boundaries of the site will remain in place and no fencing will be amended to accommodate the proposed Project.

Aspect	Qualifications, assumptions and limitations
	• Complete backfill of the open pit voids has been excluded in these liability calculations. In the event of premature mine closure it is anticipated that the open pits will not be backfilled (i.e. not sterilise remaining resources) and instead be allowed to fill with water to roughly 10m below NGL (the baseline groundwater levels). For the purpose of this costing quantum, it assumes the pits are fully backfilled and that the additional waste rock material pertains to the material above the natural ground level only. • There will be no requirement to cover the removal and/or destruction of surface infrastructure remnants and/or other undesirable objects such as trees, foundations, concrete slabs, etc. These will not be required in the Waste Rock Dump areas. • The WRD rehabilitation (i.e., shaping and re-vegetation) will occur within the boundary battery limits proposed in Figure 1 and an additional allowance would not be required. • Detail design closure items includes the planning component and assumes 2 weeks would be sufficient to compile conceptual design drawings. • The proposed Project configuration is based on the drawings provided by the project team at the time of calculating the quantum, July/August 2022. **Site Reinstatement:** • The areas assigned to the west and east WRD facilities are defined as already disturbed (i.e., brownfield) and as such, the general rehabilitation of these areas will have been provided for in previous CLE's. However, the shaping and revegetation of these slopes has been included given the change in the closure approach. • The access road removal was excluded, as the access road already exists into the waste rock storage facilities. • A provisional sum has been included to cover care and maintenance works at the two storage facilities during a 2–3-year post closure maintenance and aftercare program. **Specialist Studies:** • The development of an updated closure plan (based on the proposed Project) has been included the quantum; however, if required, any additional EIA/EMPr amendments for facility closure, in order to obtain all the necessary permits or approvals for decommissioning, demolition, remediation and rehabilitation of the site has not been included in this estimate. • Given the site location of the additional waste rock storage facilities will be placed upon an existing backfilled area of the same material, it is assumed the environmental impacts would be of a similar nature and as such, these costs would already be included into the annual financial provision. • Site specific aspects such as surface remediation have not been costed at this stage – the likelihood of such remediation would only be identified through ongoing surface monitoring and/or by carrying out risk assessment and water pollution potential studies/investigations during mine operations i.e., addressing it before closure and eliminating the need for related closure provisions. However, the hydrogeological impact was highlighted by the Specialist to be of significance and as such, a financial estimate was included into the quantum costs. It was assumed that only annual monitoring would be required upon

Aspect	Qualifications, assumptions and limitations
	completion of well network; however, these details would need to be finalised in a monitoring plan and discussed with the authorities to ensure compliance during the closure phase of the project. **General:** • The decommissioning costs are based on conceptual site plans made available by the client; • No assessment of the suitability of the WRD design details has been made; • Costs are based on SLR's knowledge of local market rates for engineering works of this nature, along with standard cost indices; • SLR has assumed that there are no constraints to the decommissioning process, and that the decommissioning contractor can programme the works to make most efficient use of his available resources; • Engagement with all necessary stakeholders and the site neighbours during the life of the facility(s) and at closure are covered under owners operating costs and not included in this estimate; • The costs include for preliminary and management costs, as well as contingencies, as standard percentages of overall cost; • An allowance for client supervision during the decommissioning works has not been included; and • The demolished infrastructure is assumed to have zero salvage value.

24. REASONED OPINION AS TO WHETHER THE ACTIVITY SHOULD OR SHOULD NOT BE AUTHORISED

The section below describes the opinion and recommendations of the EAP and specialists with regards to the proposed Project.

24.1 REASONS WHY THE ACTIVITY SHOULD BE AUTHORIZED OR NOT

The need and desirability for the Project has been established and although several negative impacts have been identified, none of these impacts are deemed to be significant to the extent that the development cannot be regarded as consistent with the principles for sustainable development, as described in the National Environmental Management Act 107 of 1998.

The “no-go” alternative would mean that the proposed WRD’s would not be established. This would restrict the mine’s ability to realise the economic benefits associated with extracting the mineral resources from the East and West Mines. The mine is continually generating more waste rock from mining activities than previous anticipated. The balance of waste rock which cannot be backfilled in the pit will require dumping on surface. It follows that no other no other feasible alternatives exist for waste storage. The “no-go” option would not allow for the optimisation of the current mining operations and could potentially result in the closure of the mine.

Accordingly, based on the findings of the impact assessment, and with the understanding that the mitigation measures will be implemented, and the conditions of the environmental authorisation enforced by the relevant authorities, the EAP is of the opinion that an environmental authorisation for the development may be granted.

24.2 CONDITIONS THAT MUST BE INCLUDED IN THE AUTHORISATION

24.2.1 Specific conditions for inclusion in the environmental management plan

Management actions including monitoring requirements, as outlined in Sections 27 and 29 respectively, should form part of the conditions of the environmental authorisation.

With reference to Regulation 26 of GN R. 982 of NEMA, additional conditions that should form part of the environmental authorisation that are not specifically included in the EMPr report include compliance with all applicable environmental legislation whether specifically mentioned in this document or not and which may be amended from time to time.

Apart from the mitigation and monitoring measures presented in this report, specific conditions proposed by the specialists are presented below:

- The noise specialist assessment concluded that the project may be authorised if:
- Activities on the proposed West OG WRD:
    - Operations are restricted to day-time hours only and a noise berm of at least 5m is implemented along the perimeter of the WRD; or,

  - That the Mmaditlhokwa Community, NSR1, NSR3 and NSR4 are relocated (as night-time activities due to West OG WRD exceed IFC residential guidelines at these NSR).
- Activities on the proposed East OG WRD:
  - Operations are restricted to day-time hours only; or,
  - That the Mmaditlhokwa Community is relocated (as night-time activities due to East OG WRD exceed IFC residential guidelines at this NSR).
- The mine dewatering and mass transport model should be reviewed and updated once every two years and/or once the KMLCS pit dewatering modelling are completed as the open pits form important sinks in the mass transport model (for dewatering planning purposes).
- The multiple barrier and sustainable management plan approach as described in the EMPr should be followed to ensure any potential seepage is mitigated.
- The expansion of the Far waste rock dump which is closer to the community will only be considered once the neighbouring community of Mmaditlhoka village has been relocated away from the site.
- For the duration that the community is still located where it is currently, the expansion of the far waste rock dump should be put on hold from the mine's operation due to the environmental and social impacts already affecting the said community.
- No activity may commence prior to an environmental authorisation being granted by the competent authority".
- If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Elijah Katsetse/Phillip Hine 021 462 4502) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule;
- If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Ngqalabutho Madida 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule;
- The following conditions apply with regards to the appointment of specialists:
  - If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.

24.2.2 Rehabilitation requirements

The rehabilitation requirements are conceptually described in the Closure Plan.

25. PERIOD FOR WHICH AUTHORISATION IS REQUIRED

All listed activities will cease at the end of operation. The mine has a remaining life of mine of 12-years (i.e. until 2034).

26. UNDERTAKING

I, Chané Coetzee, the Environmental Assessment Practitioner responsible for compiling this report, undertake that:

- The information provided herein is correct;
- Comments and inputs from stakeholders and I&APs have been included and correctly recorded in this report;
- Inputs and recommendations from the specialist reports have been included where relevant; and
- Any information provided to I&APs and any responses to comments or inputs made is correct or was correct at that time.

Chané Coetzee
Signature of EAP

01/02/2023
Date

Signature of commissioner of oath

01/02/2023
Date

COMMISSIONER OF OATHS
Oren Jan Van Vrede
Ex Officio – Professional Accountant (S.A.)
Member No.: 33335
Building D Monte Circle, 178 Montecasino Boulevard,
Fourways, Johannesburg, 2191
(011) 467-0945

I certify that the DEPONENT has acknowledged that he/she knows and understands the contents of this affidavit, that he/she does not have any objection to taking the oath, and that he/she considers it to be binding on his/her conscience, and which was sworn to and signed before me

at Fourways on this the 1st day of Feb 20 23 and that the administering oath complied with the regulations contained in Government Gazette No. R1258 of 21 July 1972, as amended.

PART B
ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

27. FINANCIAL PROVISION

The financial closure liability costs for the proposed Project were as per the *Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine* as published by the Department of Mineral Resources and Energy (DMRE) (previously known as the Department of Minerals and Energy [DME]), dated January 2005.

27.1 METHOD TO DERIVE THE FINANCIAL PROVISION

The quantities associated with the additional waste rock storage facilities were primarily measured off the infrastructure layout provided, as well as, from Google Earth.

The financial closure liability costs for the proposed Project were as per the Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine as published by the DMRE, dated January 2005.

The unit (Master) rates for each closure component are taken from the DMRE guideline (and inflated by the Consumer Price Index (CPI) to account for escalation since January 2005) and a Multiplication Factor applied depending on the Risk Ranking and the Environmental Sensitivity.

The average annual percentage change in the CPI as provided by Statistics South Africa is presented in Table 35.

Table 35: CPI as provided by Statistics South Africa

January to December						
2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
3.4 %	4.6 %	7.2 %	11.5 %	7.1 %	4.3 %	5.0 %
2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
5.6 %	5.7 %	6.1 %	4.6 %	6.4 %	5.3 %	4.7 %
2019	**2020**	**2021**	**2022**			
4.1 %	3.3 %	4.5 %	*6.18 %			

* Note: An average monthly percentage was utilised to account for the first 6 months of 2022.

A total of 262.91 % since January 2005 has been calculated (i.e., 1.034 x 1.046 x 1.072 … etc.).

27.2 TIME, FEE AND CONTINGENCY COSTS

The time, fee, weighting factors for urban area location, weighting factor for terrain and contingency costs were taken as per the guidance of the DMRE guideline, namely:

- Weighting Factors (Terrain and Urban Area), 10 % and 5 %, respectively;
- Preliminary and general, 6 %; and
- Contingency, 10 %.

This would account for contractor's preliminary and general costs covering site establishment, site demobilisation, supervision of works, site security, accommodation during site works etc.

27.3 CLOSURE LIABILITY CALCULATION

The current financial closure liability associated with the proposed additional Waste Rock Storage facilities (as of July/August 2022) is R 61 452 044.40 (including VAT). This amount has been calculated at Current Value (CV) as of 13 October 2022.

The calculated financial liability is considered to be Class 1 estimate (with an accuracy between +25% and -15%) based on the overall generic approach as stipulated by the DMRE Guideline Document.

It is currently not possible to meaningfully quantify certain closure liabilities (especially regarding any potential water and revegetation liabilities and related remediation) when material uncertainties exist. The hydrogeological costs included are based on current mitigation measures and should not be deemed the final closure strategy and cost. Any other specialist requirements will be highlighted in the closure plan; as such, site-specific aspects, have not been costed for at this stage.

Therefore, any uncertainties relating to closure should be highlighted in an updated closure plan (as per the FPR, 2019) requiring further analysis and/or monitoring. The remaining life of mine at Tharisa will further indicate the required accuracy of the closure liability calculations, as well as the level of investigations/studies that need to be undertaken.

27.4 CONFIRM THAT THE AMOUNT CAN BE PROVIDED FOR FROM OPERATING EXPENDITURE

In compiling and submitting their Mine Work Programme, the Applicant has confirmed that the required amount for financial provision for rehabilitation and closure can be derived from operating expenditure over the LOM.

28. DEVIATION FROM THE APPROVED SCOPING REPORT AND PLAN OF STUDY

No deviations from the impact assessment methodology outlined in the Scoping Report and Plan of Study are applicable.

29. OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

The impacts associated with socio-economic conditions are discussed in Appendix E*. Management and management actions identified to address any socio-economic impacts are included in Section 18.*

29.1 IMPACT ON THE SOCIO-ECONOMIC CONDITIONS OF ANY DIRECTLY AFFECTED PERSON

In 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 EIA report must include the:

(1) Impact on the socio-economic conditions of any directly affected person.

The socio-economic impact assessment has been undertaken and positive and negative socio-economic impacts were identified. Mitigation measures have been recommended and included in the EMPr.

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

No archaeological or paleontological resources have been identified in the study area.

29.2 OTHER MATTERS REQUIRED IN TERMS OF SECTION 24 (4) (A) AND (B) OF THE ACT

No other matters are required in terms of Section 24(4)(A) and (B) of the Act

PART B – ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

30. DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

SLR has been appointed as the independent EAP to undertake the S&EIA for the proposed Project. The details of the EAP project team that that were involved in the preparation of this S&EIA report are provided.

30.1 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER WHO PREPARED THE REPORT

The details of the EAP are provided in Part A, Section 1 of the EIR.

30.2 DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

The activities covered by this EMPr are fully described in Part A, Section 3.

31. COMPOSITE MAP

Please refer to Map 4.

32. DESCRIPTION OF THE IMPACT MANAGEMENT OBJECTIVES INCLUDING MANAGEMENT STATEMENT

32.1 DETERMINATION OF CLOSURE OBJECTIVES

The main rehabilitation and closure objective is to restore the pre-mining potential of the land – agricultural land with grazing and wilderness capabilities.

As is required by the relevant mining legislation (Act, 28 of 2002 and Regulation 527), a detailed closure plan will be submitted to the DMR prior to decommissioning and closure. This process will also involve other regulatory authorities and IAPs in a similar fashion to the involvement of people during the EIA process. The detailed closure plan will determine specific closure strategies and action plans taking regulatory, environmental, social, economic and sustainable development principles into account.

32.2 THE PROCESS FOR MANAGING ANY ENVIRONMENTAL DAMAGE, POLLUTION, PUMPING AND TREATMENT OF EXTRANEOUS WATER OR ECOLOGICAL DEGRADATION AS A RESULT OF UNDERTAKING A LISTED ACTIVITY

The management actions outlined in Section 34 and Section 32.9 have been identified in order to manage and reduce impacts associated with the proposed Project in order to prevent unnecessary damage to the environment.

32.3 POTENTIAL RISK OF ACID MINE DRAINAGE

The waste rock material comprises pyroxenite, anorthosite and norite. The geochemical work undertaken for waste rock samples at Tharisa indicate that the waste rock is non-acid generating and based on leachate tests chemicals of concern that are likely to leach from the WRD's when compared to water quality standards include: Elevated concentrations of Al, Chromium (Cr), Iron (Fe), Manganese (Mn), Lead (Pb).

32.4 STEPS TAKEN TO INVESTIGATE, ASSESS, AND EVALUATE THE IMPACT OF ACID MINE DRAINAGE

Waste Rock (WR) samples were collected on 26 January 2022 for geochemical analysis (Figure 3-1). Three rock samples were collected from the East Dump, four from the West Dump and Far West Dump encompassing all the main WR lithologies. All the samples were then transported to Waterlab geochemistry laboratory, accompanied by chain of custody documentation for comprehensive analysis. Before joining the analysis que, the hand WR samples were crushed, milled, partitioned, and constituted into three composite samples representing the overall WR lithology for the main WRDs as per Table 36 below.

Table 36: Tharisa Mine Waste Rock composite lithological proportions

Composite #	Location	Lithology	%	Sample #	Total %
Comp 1	East Dump	Pyroxenite	19	THED-03	**100**
		Norite	74	THED-01	
		Anorthosite	5	THED-02	
		Dolerite Dyke	1	THWD-01	
		Fe rich ultramafic pegmatoid (IRNP)	1	THFWD-04	
Comp 2	West Dump	Pyroxenite	19	THWD-03	**100**
		Norite	74	THWD-04	
		Anorthosite	5	THWD-02	
		Dolerite Dyke	1	THWD-01	
		Fe rich ultramafic pegmatoid (IRNP)	1	THFWD-04	
Comp 3	Far West Dump	Weathered Pyroxenite	19	THFWD-01	**100**
		Weathered Norite	74	THFWD-02	
		Anorthosite	5	THFWD-03	
		Dolerite Dyke	1	THWD-01	
		Fe rich ultramafic pegmatoid (IRNP)	1	THFWD-04	

Figure 8: Geochemical sampling locations at Tharisa Mine

The findings of the geochemical report are summarised in the sections below. The report is attached in Appendix N.

32.4.1 Minerology: X-Ray Diffraction

The mineralogy of Tharisa mine waste materials is listed in Table 37 below.

Table 37: Tharisa composite waste rock minerology

Mineral Name	Formulas	Composition (%)		
		East Dump	West Dump	Far West Dump
Quartz	SiO_2	1.3	1.9	0.2
Plagioclase	$(Na,Ca)(Si,Al)_4O_8$	61.4	74.3	58.3
Augite	$Ca(Fe,Mg)Si_2O_6$	3.4	5.3	5.4
Enstatite	$MgSiO_3$	29.9	17.7	35.0
Talc	$Mg_3(Si_2O_5)_2(OH)_2$	1.5	0	0
Muscovite	$KAl_2((OH)_2 Al Si_3 O_{10})$	2.46	0	0
Actinolite	$Ca_2(Mg,Fe)_5Si_8O_{22}(OH)$	0.1	0.5	0
Rutile	TiO_2	0	0.2	0
Chlorite	$(Mg,Fe)_5Al(AlSi_3O_{10})(OH)_8$	0	0	1.1

All the Tharisa mine WR materials are dominated by Plagioclase and Enstatite. Minor minerals include Muscovite, Augite and Quartz with Talc, Actinolite, Rutile and Chlorite present in trace amounts.

32.4.2 Synthetic Precipitation Leaching Procedure

Synthetic Precipitation Leaching Procedure (SPLP) concentrations for the Tharisa WR samples returned no constituents of concern (CoCs) except for a marginal exceedance of SANS 241: Operational for Al (East Dump and West Dump) and SANS 241: Aesthetic for Fe (Far West Dump; Table 38).

32.4.3 Tharisa mine waste materials waste assessment

32.4.3.1 Total and leachate concentrations

The waste assessment according to total and leachable concentrations for the Tharisa waste samples is presented Table 39 and Table 40. A summary of the waste type classification and barrier requirements is presented in Table 41. In accordance with GN R. 635 of 2013, for a waste to be **Type 3**, results must meet the following criteria:

- Leachable concentrations of all elements are below the LCT0, irrespective of the total concentrations of elements or chemical substances in the waste, provided that:
    - Concentration limits for organics and pesticides are low;
    - The inherent physical and chemical character of the waste is stable and will not change over time; and
    - The waste is deposed to landfill without any other waste.

Table 38: Tharisa Mine composite waste rock SPLP results

Analytes	Ag	Al*	As	Au	B	Ba	Be	Bi	Ca*	Cd	Ce	Co	Cr (total)	Cs	Cu	Dy	Er	Eu	Fe*	Ga
Unit	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*
1. DWAF TWQG		**5**	**1**		**5**				**1000**	**10**		**1**			**5**				**10**	
2. IFC: Mining effluent			**0.1**							**0.05**					**0.3**				**2.0**	
3. SANS 241: Operational		**0.3**																		
4. SANS 241: Aesthetic																			**0.3**	
5. SANS 241: Acute Health																				
6. SANS 241: Chronic Health			**0.01**		**2.4**	**0.7**				**0.003**		**0.5**	**0.05**		**2.0**				**2.0**	
Comp 1 East Dump	<0.010	0.553	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.185	<0.010
Comp 2 West Dump	<0.010	0.673	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	4	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.153	<0.010
Far West Dump	<0.010	0.257	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.323	<0.010

Analytes	Gd	Ge	Hf	Hg	Ho	In	Ir	K*	La	Li	Lu	Mg*	Mn*	Mo	Na*	Nb	Nd	Ni	Os	P
Unit	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*
1. DWAF TWQG				**1.0**								**500**	**10**	**0.01**	**2000**			**1**		
2. IFC: Mining effluent				**0.002**														**0.5**		
3. SANS 241: Operational																				
4. SANS 241: Aesthetic													**0.1**		**200**					
5. SANS 241: Acute Health																				
6. SANS 241: Chronic Health				**0.006**									**0.4**					**0.07**		
Comp 1 East Dump	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	1.439	<0.010	<0.010	<0.010	1	0.025	<0.010	<1	<0.010	<0.010	<0.010	<0.010	0.016
Comp 2 West Dump	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	1.842	<0.010	<0.010	<0.010	<1	0.025	<0.010	<1	<0.010	<0.010	<0.010	<0.010	0.037
Far West Dump	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.138	<0.010	<0.010	<0.010	<1	0.025	<0.010	<1	<0.010	<0.010	<0.010	<0.010	0.012

Analytes	Pb	Pd	Pr	Pt	Rb	Rh	Ru	Sb	Sc	Se	Si*	Sm	Sn	Sr	Ta	Tb	Te	Th	Ti	Tl
Unit	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*
1. DWAF TWQG	**0.5**									**50**										
2. IFC: Mining effluent	**0.2**																			
3. SANS 241: Operational																				
4. SANS 241: Aesthetic																				
5. SANS 241: Acute Health																				
6. SANS 241: Chronic Health	**0.01**							**0.02**		**0.04**										
Comp 1 East Dump	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	2.41	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Comp 2 West Dump	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	2.241	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Far West Dump	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	4.161	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

Analytes	Tm	U	V	W	Y	Yb	Zn	Zr	pH	EC	TDS	Tot Alk	Cl	SO4	NO3	NO2	F	Free NH3	Ortho-P
Unit	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*		*mS/m*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*
1. DWAF TWQG			**1**				**20**				**3000**		**3000**	**1000**	**100**	**10**	**6**		
2. IFC: Mining effluent							**0.5**		**6 - 9**										
3. SANS 241: Operational									**5 -9.7**										
4. SANS 241: Aesthetic							**5**			**170**	**1200**		**300**	**250**				**1.5**	
5. SANS 241: Acute Health														**500**	**11**	**0.9**			
6. SANS 241: Chronic Health		**0.03**	**0.2**														**1.5**		
Comp 1 East Dump	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8.1	4.2	50	20	<2	<2	0.1	<0.05	0.2	<0.1	<0.1
Comp 2 West Dump	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.21265	<0.010	8.1	4.3	64	16	<2	<2	0.3	<0.05	0.2	0.1	<0.1
Far West Dump	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6.7	1.8	38	8	<2	<2	<0.1	<0.05	0.2	<0.1	<0.1

Table 39: Tharisa Mine Waste Rock Total Concentration and Screening

Analyses	Units	TCT0	TCT1	TCT2	East Dump	West Dump	Far West Dump
As, Arsenic	mg/kg	5,8	500	2000	1,2	1,2	<0,400
B, Boron	mg/kg	150	15000	6000	<10	<10	<10
Ba, Barium	mg/kg	62,5	6250	25000	56,3	49,3	55,0
Cd, Cadmium	mg/kg	7,5	260	1040	<0,400	<0,400	<0,400
Co, Cobalt	mg/kg	50	5000	20000	40,9	24,5	52,5
CrTotal, Chromium Total	mg/kg	46000	800000	N/A	1518,7	798,7	1284,2
Cu, Copper	mg/kg	16	19500	78000	14,2	17,9	17,0
Hg, Mercury	mg/kg	0,93	160	640	<0,400	<0,400	<0,400
Mn, Manganese	mg/kg	1000	25000	100000	721,3	435,8	898,5
Mo, Molybdenum	mg/kg	40	1000	4000	<10	<10	<10
Ni, Nickel	mg/kg	91	10600	42400	245,4	157,8	339,6
Pb, Lead	mg/kg	20	1900	7600	1,4	1,5	1,0
Sb, Antimony	mg/kg	10	75	300	<0,400	<0,400	<0,400
Se, Selenium	mg/kg	10	50	200	<0,400	<0,400	<0,400
V, Vanadium	mg/kg	150	2680	10720	79,2	61,7	67,8
Zn, Zinc	mg/kg	240	160000	640000	48,1	32,4	52,8
Cr(VI), Chromium (VI)	mg/kg	6,5	500	2000	<2	<2	8,9[10]
Total Fluoride [o]	mg/kg	100	10000	40000	10,9	13,7	<0,5
Total Cyanide as CN [o]	mg/kg	14	10500	42000	<1,55	<1,55	<1,55

Table 40: Tharisa Mine Waste Rock leachable concentrations and screening

Analyses	Units	LCT0	LCT1	LCT2	LCT3	East Dump	West Dump	Far West Dump
As, Arsenic	mg/l	0,01	0,5	1	4	<0,001	<0,001	<0,001
B, Boron	mg/l	0,5	25	50	200	<0,025	<0,025	<0,025
Ba, Barium	mg/l	0,7	35	70	280	<0,025	<0,025	<0,025
Cd, Cadmium	mg/l	0,003	0,15	0,3	1,2	<0,001	<0,001	<0,001
Co, Cobalt	mg/l	0,5	25	50	200	<0,025	<0,025	<0,025

10 The total Cr(VI) concentration reported for the Far West WRD sample is anomalous due to the fact that Cr(VI) is mobile in groundwater but there is no detectable concentration of the parameter in the total leachate results for the same sample and long term site water quality monitoring data. Therefore, we suspect that this result could be due to an analytical error. This is reinforced by the lack of any detectable Cr(VI) in the extensive water quality monitoring data from the site.

Analyses	Units	LCT0	LCT1	LCT2	LCT3	East Dump	West Dump	Far West Dump
CrTotal, Chromium Total	mg/l	0,1	5	10	40	<0,025	<0,025	<0,025
Cr(VI), Chromium (VI)	mg/l	0,05	2,5	5	20	<0,010	<0,010	<0,010
Cu, Copper	mg/l	2	100	200	800	<0,010	<0,010	<0,010
Hg, Mercury	mg/l	0,006	0,3	0,6	2,4	<0,001	<0,001	<0,001
Mn, Manganese	mg/l	0,5	25	50	200	<0,025	<0,025	<0,025
Mo, Molybdenum	mg/l	0,07	3,5	7	28	<0,025	<0,025	<0,025
Ni, Nickel	mg/l	0,07	3,5	7	28	<0,025	<0,025	<0,025
Pb, Lead	mg/l	0,01	0,5	1	4	<0,001	<0,001	<0,001
Sb, Antimony	mg/l	0,02	1	2	8	<0,001	<0,001	<0,001
Se, Selenium	mg/l	0,01	0,5	1	4	0,002	0,001	<0,001
V, Vanadium	mg/l	0,2	10	20	80	<0,025	<0,025	<0,025
Zn, Zinc	mg/l	5	250	500	2000	<0,025	<0,025	<0,025
Total Dissolved Solids*	mg/l	1000	12 500	25 000	100 000	20	30	18
Chloride as Cl	mg/l	300	15 000	30 000	120 000	<2	<2	<2
Sulphate as SO4	mg/l	250	12 500	25 000	100 000	<2	<2	<2
Nitrate as N	mg/l	11	550	1100	4400	<0,1	0,2	<0,1
Fluoride as F	mg/l	1,5	75	150	600	0,2	0,2	0,2
Total Cyanide as CN [o]	mg/l	0,07	3,5	7	28	<0,07	<0,07	<0,07
pH	mg/l					8,1	8	7,5
Paste pH	mg/l					9,5	9,5	9,3
Moisture %	mg/l					---	---	---

Based on the results, the WR composite samples are classified as a Type 3 criteria in terms of total and leachable concentrations.

Table 41: Waste type determination for Tharisa waste samples

Sample Name	Waste Type	Reason for Classification	Landfill Class
East Dump composite	Type 3	All LC < LCT0; Ni > TCT0	Class C
West Dump Composite	Type 3	All LC < LCT0 Cu & Ni >TCT0	Class C
Far West Dump Composite	Type 3	All LC < LCT0 Co, Cu, Ni, Cr(VI) > TCT0	Class C

The DWS accepted a proposal by the Chamber of Mines of South Africa to follow a risk-based approach on a case-by-case basis to allow for representations on alternative barrier systems for Mine Residue Deposits and Stockpiles based on a risk assessment (29 June 2016). The risk assessment will enable an evaluation of the efficacy of the alternative barrier system to prevent pollution as required in terms of Section 19 (1) and (2) of the NEMA:WA (Singh, 2016). Since the purpose of the Norms and Standards is to protect water resources it may be appropriate to consider the potential water quality risk associated with existing facilities, rather than retroactively applying the legislated barrier requirements.

SLR recommends a risk-based approach for protection of water resources from the Tharisa WR materials rather than a formulaic application of the Norms and Standards. Therefore, it follows that the Tharisa WR can be classified as a Type 4 waste, requiring a Type D liner which is similar to the existing receiving storage facilities' base layer, due to the following reasons:

- All the leachable concentrations for the WR materials are below the LCT0 limit which indicates a low seepage risk.
- The acidic SPLP leach concentrations for the WR materials recorded only SANS 241: Operational and Aesthetic COCs for Al and Fe, respectively.
- A high failure probability of class C barriers exists for receiving WR materials.

32.4.4 Determining landfill class (barrier requirements)

The Tharisa mine WR materials has been classified using a risk-based approach as equivalent to a Type 4 waste and therefore disposal or incorporation into a storage facility will require a Class D barrier lining. Figure 9 depicts the prescribed barrier requirements for the waste type.

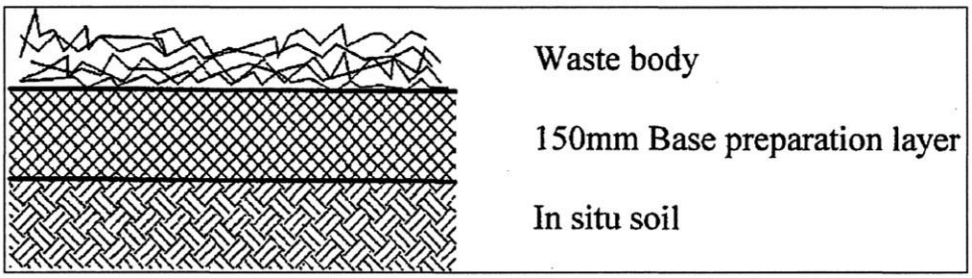

Figure 9: Class D landfill prescribed barrier

32.4.5 Geochemical source terms

The geochemical source terms modelled for the Tharisa waste samples are listed in Table 42 below. The input data was calibrated to the long-term water monitoring data equivalent to 457 samples over 7-8 years monitoring that increases the confidence of the modelled outputs.

Table 42: Tharisa Mine waste material geochemical source terms

Element	Units	SANS 241 / DWAF*	East Dump WR comp	West Dump WR comp	Far West Dump WR comp
Al	mg/L	5*	0,007	0,007	0,367
As	mg/L	1*	0,007	0,001	0,001
B	mg/L	2,4	0,007	0,001	0,007
Ba	mg/L	0,7	0,007	0,001	0,007
Alkalinity as HCO_3^-	mg/L		375,3	375,9	265,9
Ca	mg/L	1000*	72,0	71,9	21,4
Cd	mg/L	10*	0,007	0,001	0,001
Cl (-1)	mg/L	300	52,7	52,7	52,7
Co	mg/L	0,5	0,007	0,001	0,007
Cr	mg/L	0,05	0,003	0,003	0,003
Cu	mg/L	2	0,013	0,013	0,013
F	mg/L	1,5	0,300	0,300	0,300
Fe	mg/L	10*	0,264	0,219	0,007
Hg	mg/L	0,006	0,001	0,001	0,001
K	mg/L		2,056	2,632	0,197
Li	mg/L		0,007	0,007	0,007
Mg	mg/L	500*	108,1	107,7	118,6
Mn	mg/L	10*	0,036	0,001	0,036
Mo	mg/L	0,07*	0,001	0,007	0,007
N as NO_3^-	mg/L	22*	126,6	126,2	127,1
Na	mg/L	200	21,6	21,6	21,6
Ni	mg/L	0,07	0,007	0,063	0,006
P	mg/L		0,023	0,053	0,017
Pb	mg/L	0,1*	0,007	0,003	0,003
S as SO_4^{2-}	mg/L	500	111,2	111,2	111,1
Sb	mg/L	0,02	0,007	0,007	0,007
Se	mg/L	0,04	0,007	0,001	0,001
Si	mg/L		10,9	10,9	24,8
Sn	mg/L		0,007	0,007	0,007
Sr	mg/L		0,007	0,007	0,007
Ti	mg/L		0,007	0,007	0,007
U	mg/L	0,03	0,007	0,007	0,007
V	mg/L	1*	0,007	0,007	0,007

Element	Units	SANS 241 / DWAF*	East Dump WR comp	West Dump WR comp	Far West Dump WR comp
W	mg/L		0,007	0,007	0,007
Zn	mg/L	5	0,007	0,304	0,010
pH		5 - 9,7	8,7	8,8	8,5

The only CoC predicted for the Tharisa waste materials is the exceedance of DWAF livestock TWQG nitrate levels for all the waste streams. The increase in the modelled pH levels relative to the SPLP input concentrations is due to the dominant and intermediate reactive mineral Enstatite, which tends to uptake 2 H^+ ions in exchange for Mg^{2+} on the mineral surface, which ultimately results in an increase in leachate pH (Oelkers & Schott, 2001).

The nitrate mass build-up in the site leachate is as a direct result of the use of ammonium nitrate explosives in the mining process. The nitrate load will systematically decrease in the ground water via heterotrophic chemo-organotrophic denitrification which is a thermodynamically favoured reduction process:

$$\mathbf{5C_{org} + 4NO_3^- + 2H_2O \longrightarrow 2N_2 + 4HCO_3^- + CO_2} \quad \mathbf{(1)}$$

Nitrate is not sourced from the mined geochemistry but originates from operational blasting and decays with time. Based on the kinetics of the bacteria-controlled nitrate reduction, the half-life of nitrate is estimated to be between 500 – 1350 days (Eppinger and Walraevens, 1998) and proven to be between 108-162 days based on long-term site monitoring data.

32.4.6 Conclusion

Three (3) WR composite samples from the Tharisa PGM and Chromite mine were subjected to comprehensive geochemical investigation and waste assessment to predict the leachate quality from the waste storage facilities on site and if they pose any risk to surface or groundwater resources. The laboratory results (LCT and SPLP) are based on first flush static tests that often give conservative (elevated) concentrations whereas the modelled source terms are calibrated to long term water quality monitoring data that is subject to field scale conditions and are regarded as more accurate indicators of site leachate quality.

The XRD analysis confirmed the dominant minerals for all waste materials at Tharisa mine to be Enstatite and Plagioclase, with minor Muscovite, Augite and Quartz present. The SPLP results for Tharisa waste materials returned only SANS 241: Operational and Aesthetic exceedances for Al and Fe, respectively.

According to NEMWA GN R. 635 and 636 guidelines, all the waste rock samples can be classified as equivalent to a **Type 4** waste using a risk-based approach and will be required to be incorporated into a storage facility with a **Class D** barrier.

The geochemical source terms modelled for the Tharisa WR materials predicted the following CoCs for possible risk to water resources due to:

Exceedance of DWAF livestock TWQG nitrate levels for all the waste streams

However, nitrate is not sourced from the mined geochemistry but originates from operational blasting and decays with time. Based on the kinetics of the bacteria-controlled nitrate reduction, the half-life of nitrate is estimated to be between 500 – 1350 days (Eppinger and Walraevens, 1998) and proven to be between 108-162 days based on long-term site monitoring data.

The increase in the modelled pH levels relative to the SPLP input values is due to the dominant mineral Enstatite, which tends to uptake 2 H^+ ions in exchange for Mg^{2+} on the mineral surface, which ultimately results in an increase in modelled leachate pH (Oelkers & Schott, 2001).

32.4.6.1 Waste classification

In accordance with Regulation 3 of GN R. 632 of the NEM:WA, waste rock stockpiles need to be characterised and classified using a risk-based approach to determine the appropriate management measures. In the absence of a prescribed method on how to undertake a risk-based analysis, the characterisation and assessment of waste rock material at Tharisa was determined in accordance with the following associated National Norms and Standards:

- The National Norms and Standards for the assessment of waste for landfill disposal (GNR 635 of 2013); and
- The National Norms and Standards for disposal of waste to landfill (GNR 636 of 2013).

The waste classification and assessment in terms was undertaken by SLR in 2019 (SLR, 2019). The results from the assessment indicate that the waste rock is classified as a Type 3 waste in terms of the total concentration and a Type 4 waste in terms of the leachable concentrations. In terms of the risk-based waste assessment, it has been motivated that Class-D liner system is required for storage of the waste rock material, based on the following reasons:

- The leachable concentrations of all the constituents are below the threshold limit which indicates a lack of mobilised leachate and a low risk of seepage.
- The placed waste rock material will be dry and not contain water.
- The waste rock material is not acid generating.

32.5 ENGINEERING OR MINE DESIGN SOLUTIONS TO BE IMPLEMENTED TO AVOID OR REMEDY ACID MINE DRAINAGE

The proposed WRD designs is discussed in Section 3.2.4.

32.6 MEASURES THAT WILL BE PUT IN PLACE TO REMEDY ANY RESIDUAL OR CUMULATIVE IMPACT THAT MAY RESULT FROM ACID MINE DRAINAGE

Although the geochemical work undertaken for waste rock samples at Tharisa indicate that the waste rock is non-acid generating, based on leachate tests chemicals of concern that are likely to leach from the WRDs when compared to water quality standards include: Elevated concentrations of Al, Chromium (Cr), Iron (Fe), Manganese (Mn), Lead (Pb). Thus, the WRDs must be appropriately lined with a Class D liner to prevent pollution of groundwater.

Existing Tharisa mining infrastructure has already altered the natural drainage patterns by reducing the volume of run-off into the downstream catchments through existing stormwater management infrastructure on site. Rainfall and surface water run-off will be collected in a series of toe paddocks and secondary toe paddocks around the perimeter of the WRD's that will be designed to contain dirty water.

32.7 VOLUMES AND RATES OF WATER USE REQUIRED FOR THE MINING, TRENCHING OR BULK SAMPLING OPERATION

The mine water balance will be updated as part of a separate WULA.

32.8 HAS A WUL BEEN APPLIED FOR?

The proposed Project requires authorisation from the Department Water and Sanitation (DWS) for specific water uses listed under Section 21 of the NWA. This Report does not address the requirements of a water use licensing process. This will be handled as part of a separate process with the DWS.

32.9 IMPACTS TO BE MITIGATED IN THE RESPECTIVE PHASES

The mitigation measures to be implemented are summarised in the required DMRE format in Table 43.

Table 43: Impacts to be managed in their respective phases

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
Soils, Land Capability and Land Use					
Establishing waste rock over backfilled portions of the East (East OG WRD) Clearing of the footprint area associated for the proposed developments, Soil striping and Construction of WRDs	Construction	Approximately 72 ha	**Soil Erosion** • Temporary erosion control measures around the topsoil stockpile areas should be used to protect the disturbed soils during the rehabilitation until adequate vegetation has established. • Bare soils within the access roads can be regularly dampened with water to suppress dust during the construction phase, especially when strong wind conditions are predicted according to the local weather forecast. • The footprint of the proposed development and construction activities should be clearly demarcated to restrict vegetation clearing activities within the infrastructure footprint as far as practically possible. • All disturbed areas adjacent to the proposed development areas should be re-vegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission. **Soil Compaction**	MPRDA NEMA NEMBA	Mitigation measures are required to be implemented from the commencement of site preparation activities

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			• Compacted soils adjacent to the proposed developments during construction should be lightly ripped to at least 25 cm below ground surface to alleviate compaction. • Decommissioning activities should be scheduled to coincide with low rainfall conditions when soil moisture is anticipated to be relatively low, such that the soils are less prone to compaction. **Soil Contamination Management** • The construction of toe paddocks and secondary toe paddock cross walls around the perimeter of the WRDs should be installed to limit seepage. • WRDs should be lined in accordance with the proposed design features to limit possible seepage and the subsequent soil contamination. • Burying of any waste including rubble, domestic waste, empty containers on the site should be strictly prohibited and all construction rubble waste must be removed to an approved disposal site. • A spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans should also be compiled to guide the construction works. • An emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur, as well as preventative measures to prevent contamination.		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			Loss of Land Capability Management • Topsoil material should be stripped and stockpiled in areas demarcated as "No Go Areas". • A stripping depth of 500 mm has been recommended by the previous soil studies and this should be adhered to as far as possible. • Close supervision and monitoring of the stripping process is required to ensure that soils are stripped correctly. • Revegetate the disturbed soils with an indigenous grass mix, to re-establish a protective cover, in order to minimise soil erosion and dust emissions. • The footprint areas should be lightly ripped to alleviate compaction. **Stockpile Management** • Ensure all stockpiles (especially topsoil) are clearly and permanently demarcated and located in defined no-go areas. • Restrict the amount of mechanical handling, as each handling event increases that compaction level and the changes to the soil structure. Wherever possible, the 'cut and cover' technique (where the stripped soils is immediately placed in an area already prepared for rehabilitation, thus avoiding stockpiling) should be used. • Stockpile height should be restricted to that which can deposited without additional traversing by machinery. Stockpiles should be treated with		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			temporary soil stabilisation methods, such as the application of organic matter to promote soil aggregate formation, leading to increased infiltration rate, thereby reducing soil erosion. Also, the use of lime to stabilise soil pH levels. • Soil erosion should be controlled on stockpiles by having control measures to reduce erosion risk such as erosion control blankets, soil binders, revegetation, contours, diversion banks and spillways. • Stockpiled soils should be stored for a maximum of 3-5 years to ensure that the soil quality does not deteriorate. In addition, concurrent rehabilitation must strongly be considered to reduce the duration of stockpile storage to ensure that the quality of stored soil material does not deteriorate excessively, especially with regard to leaching and acidification. • The topsoil stockpile should be vegetated and while vegetating, measures will be needed to contain erosion of the stockpile during rain events. • Temporary berms can be installed, around stockpile areas whilst vegetation cover has not established to avoid soil loss through erosion.		
Operation of the WRDs and related activities.	Operational	Approximately 72 ha	**Soil Erosion** • Temporary erosion control measures around the topsoil stockpile areas should be used to protect the disturbed soils during the rehabilitation until adequate vegetation has established.	MPRDA NEMA NEMBA	Mitigation measures are required to be implemented from the commencement of site preparation activities throughout operations

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			• All disturbed areas adjacent to the proposed development areas should be re-vegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission. • Burying of any waste including rubble, domestic waste, empty containers on the site should be strictly prohibited and all construction rubble waste must be removed to an approved disposal site. • A spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans should also be compiled to guide the construction works. • An emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur, as well as preventative measures to prevent contamination.		
Cessation of WRD activities Capping and revegetation of WRDs	Closure	Approximately 72 ha	**Soil Compaction** • Compacted soils adjacent to the proposed developments during construction should be lightly ripped to at least 25 cm below ground surface to alleviate compaction. **Stockpile Management** The recovered soils should be re-used to rehabilitate the mine footprint following mine closure.	MPRDA NEMA NEMBA	Mitigation measures are required to be implemented during closure and rehabilitation activities
Air Quality					

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
Grading of new roads; Vehicle (trucks) on newly graded unpaved roads; and Land clearing for new WRD sections.	Construction	Approximately 72 ha	• Air quality impacts during construction would be reduced through basic control measures such as limiting the speed of haul trucks; limit unnecessary travelling of vehicles on unpaved roads; and to apply water sprays on regularly travelled, unpaved sections. • When haul trucks need to use public roads, the vehicles need to be cleaned of all mud and the material transported must be covered to minimise windblown dust. • The access roads to the processing plants needs to be kept clean to minimise carry-through of mud on to public roads.	NEM:AQA Dust Control Regulation GNR 827 of 2013 Ambient Air Quality Standards	Throughout construction
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Operational	Approximately 72 ha	• Regular water sprays on in-pit unpaved roads to ensure at least 75% control efficiency. Literature indicates an application rate >2 litre/m²/hour should achieve this. • Regular apply chemical suppressants on all regularly used surface haul roads to ensure a control efficiency of 90%. • Monthly physical inspection of road surface, daily visual observation of entrained dust emissions from unpaved road surfaces. • Controlled blasting techniques to be used to ensure minimal dust generation. • Blasting only to be conducted on cloudless days, if possible.	NEM:AQA Dust Control Regulation GNR 827 of 2013 Ambient Air Quality Standards	On-going and during future Project operational phase

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			• Addition of chemical surfactants to water sprays to lower water surface tension and increase binding properties. • Drill rigs to be fitted with dust suppression to achieve 97% control efficiency. • Drop height from excavator into haul trucks to be kept at a minimum for ore and waste rock. • Tipping onto ROM storage piles to be controlled through water sprays, should visible amounts of dust be generated. This should result in a 50% control efficiency. • Keep material handled by dozers moist to achieve a control efficiency of 50%, especially during dry periods. • Regular clean-up at loading areas. • Water sprays at primary and secondary crushers to achieve at least 50% control efficiency. • Enclosure with extraction systems would ensure better control efficiency. According to literature hooding with cyclones would achieve 65% CE, whereas scrubbers will achieve 75% and fabric filters would result in 83% CE. • Water sprays at ROM stockpiles can achieve 50% control efficiency. Increase in moisture content provides higher threshold friction velocity and ensures that particulates are not as easily entrained due to high surface winds. • Keep active areas on WRDs small and use water sprays to reduce the potential for wind erosion.		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			• Reshape all disturbed areas to their natural contours. • Cover disturbed areas with previously collected topsoil and replant native species. • Rock cladding with larger pieces of waste rock is recommended to reduce wind erosion.		
Noise					
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	All phase	Approximately 72 ha	**General Management Measures** Good engineering and operational practices will reduce levels of annoyance. For general activities, the following good engineering practice **should** be applied to **all project phases**: • All diesel-powered equipment and plant vehicles should be kept at a high level of maintenance. This should particularly include the regular inspection and, if necessary, replacement of intake and exhaust silencers. Any change in the noise emission characteristics of equipment should serve as trigger for withdrawing it for maintenance. • In managing noise specifically related to vehicle traffic, efforts should be directed at: • Minimising individual vehicle engine, transmission, and body noise/vibration. This is achieved through the implementation of an equipment maintenance program. • Maintain road surfaces regularly to repair potholes etc.	SANS Environmental Noise Standards IFC Performance Standard	Implementation from construction to closure

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			• Keep all roads well maintained and avoid steep inclines or declines to reduce acceleration/brake noise. • Avoid unnecessary equipment idling at all times. • Minimising the need for trucks/equipment to reverse. This will reduce the frequency at which disturbing but necessary reverse warnings will occur. Alternatives to the traditional reverse 'beeper' alarm such as a 'self-adjusting' or 'smart' alarm could be considered. These alarms include a mechanism to detect the local noise level and automatically adjust the output of the alarm is so that it is 5 to 10 dB above the noise level near the moving equipment. The promotional material for some smart alarms does state that the ability to adjust the level of the alarm is of advantage to those sites 'with low ambient noise level'. Also, when reversing, vehicles should travel in a direction away from NSR's if possible. • A noise complaints register must be kept. **Specifications and Equipment Design** As the site or activity is in close proximity to NSRs, equipment and methods to be employed should be reviewed to ensure the quietest available technology is used. Equipment with lower sound power levels must be selected in such instances and vendors/contractors should be required to guarantee optimised equipment design noise levels.		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			Controlling the Spread of Noise Naturally, if noise activities can be minimised or avoided, the amount of noise reaching NSRs will be reduced. Alternatively, the distance between source and receiver must be increased, or noise reduction screens, barriers, or berms must be installed. **Distance** To increase the distance between source and receiver is often the most effective method of controlling noise since, for a typical point source at ground level, a 6 dB decrease can be achieved with every doubling in distance. It is however conceded that it might not always be possible. **Screening** If noise control at the source and the use of distance between source and receiver is not possible, screening methods may be considered. The effectiveness of a noise barrier is dependent on its length, effective height, and position relative to the source and receiver as well as material of construction. To optimize the effect of screening, screens should be located close to either the source of the noise, or the receiver. The careful placement of barriers such as screens or berms can significantly reduce noise impacts but may result in additional visual impacts. Although vegetation		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			such as shrubs or trees may improve the visual impact of construction sites, it will not significantly reduce noise impacts and should not be considered as a control measure. Earth berms can be built to provide screening for large scale earth moving operations and can be landscaped to become permanent features once construction is completed. Care should be taken when constructing earth berms since it may become a significant source of dust. Further attenuation measures that will need to be implemented including operating the proposed WRDs during day-time hours only (with a 5m noise berm along the perimeter of the West OG WRD) or relocating the nearest NSRs (i.e., Mmaditlhokwa Community (directly east of West OG WRD), NSR1 (farmstead ~650 m south of West OG WRD), NSR3 (Wolvaardt residence ~400 m south of West OG WRD) and NSR4 (van der Hoven residence ~470 m south of west OG WRD)).		
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Construction	Approximately 72 ha	To reduce the nuisance effects of the proposed construction on the community, the following mitigation actions are to be applied: • Routine monitoring of ambient noise and to comply with the relevant estimated background noise levels as provided. • Construction staff need to be trained on noise control plan during health & safety briefings.	SANS Environmental Noise Standards IFC Performance Standard	Implementation throughout construction

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			• 'Low noise' equipment, or methods of work is to be selected. • Avoid clustering of mobile plant near receptors and enforce rest periods for unavoidable maximum noise events. • Investigate use of alternatives to audible reversing alarms (such as broadband noise emitting models) or configure to maximise forward movements of mobile plant. • Regular inspection and maintenance of all equipment is to be established. • Avoid unnecessary equipment idling. • Where possible, limit activities to day-time working hours (6am – 6pm). • Establish community engagement and ensure all affected persons have been consulted with prior to the commencement of and during activities.		
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Operational	Approximately 72 ha	To reduce the nuisance effects of the proposed operation on the community, the following mitigation actions are to be applied: • Train operational staff on noise control plan during health & safety briefings. • Investigate use of alternatives to audible reversing alarms (such as broadband noise emitting models) or configure to maximise forward movements of mobile plant. • Avoid clustering of mobile plant near receptors and enforce rest periods for unavoidable maximum noise events.	SANS Environmental Noise Standards IFC Performance Standard	Implementation throughout operations

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			• Ensure periods of respite are provided in the case of unavoidable maximum noise level events. • Regular inspection and maintenance of all equipment. • Maintain haul road surfaces regularly to avoid corrugations, potholes etc. • Keep all roads well maintained and avoid steep inclines. • Using rubber linings in for instance dump trucks to reduce impact noise of dropped material. • Naturally, if noise activities can be minimised or avoided, the amount of noise reaching NSRs will be reduced. • Noise reduction berms along the perimeter of the proposed West OG WRD. • A noise complaints register must be kept. • If complaints are received, noise sampling should be undertaken at the NSRs and source of noise should be investigated. • Noise monitoring locations (as surveyed in 2021 and 2022) should be incorporated into the annual noise sampling network for Tharisa Mine. • Monitored ambient noise levels should comply with the relevant estimated background noise levels as provided. The significance can be further reduced to low by: • Limiting operations to day-time hours only (with noise berm in place at West OG WRD), or		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			• Relocating close NSRs (i.e., Mmaditlhokwa Community (directly east of West OG WRD), NSR1 (farmstead ~650 m south of West OG WRD), NSR3 (Wolvaardt residence ~400 m south of West OG WRD) and NSR4 (van der Hoven residence ~470 m south of west OG WRD)).		
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Closure	Approximately 72 ha	• Routine monitoring of ambient noise and to comply with the relevant estimated background noise levels as provided. • Closure staff need to be trained on noise control plan during health & safety briefings. • 'Low noise' equipment, or methods of work is to be selected. • Avoid clustering of mobile plant near receptors and enforce rest periods for unavoidable maximum noise events. • Investigate use of alternatives to audible reversing alarms (such as broadband noise emitting models) or configure to maximise forward movements of mobile plant. • Regular inspection and maintenance of all equipment is to be established. • Avoid unnecessary equipment idling. • Where possible, limit activities to day-time working hours (6 am – 6 pm). • Establish community engagement and ensure all affected persons have been consulted with prior to the commencement of and during activities.	SANS Environmental Noise Standards IFC Performance Standard	Implementation throughout Closure and rehabilitation
Visual					

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Construction	Approximately 72 ha	• Good housekeeping to reduce dust from the mine, WRDs and in all working areas and access/haul roads associated with the project to an absolute minimum. • The minimum amount of existing vegetation and topsoil should be removed in preparing areas where development will take place. • Topsoil that occurs within the proposed footprint of an activity must be removed and stockpiled for later use. The construction contract must include the stripping and stockpiling of topsoil for use during the rehabilitation phase. • Specifications with regards to the placement of construction camps, as well as a site plan of the construction camp, indicating waste areas, storage areas, and placement of ablution facilities should be included in the EMPr. These areas should either be screened or positioned in areas where they would be less visible from human settlements and main roads. • Ensure that the mine's design uses natural features and includes engineered barriers (trees, earth berms, etc.) for visual screening of operations and infrastructure. • Before commencing operations, develop a post-closure rehabilitation plan to acceptable topographic and ecological conditions.	NEMA MPRDA	Implementation throughout construction
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	All phases	Approximately 72 ha	• Earthworks should be executed so that only the footprint and a small 'construction buffer zone' around the proposed activities are exposed. The naturally occurring vegetation should be retained in	NEMA MPRDA	Implementation throughout all project phases

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			all other areas, especially along the periphery of the Project's sites (relates to west OG WRD). • The soil must be exposed for the minimum time possible once cleared of vegetation to avoid prolonged exposure to wind and water erosion and to minimise dust generation. • At closure, all remaining exposed terraced areas should be contoured and revegetated to appear natural and blend with the surrounding topographic features. • Where new vegetation is proposed to be introduced to the site, an ecological approach to rehabilitation, as opposed to a horticultural approach, should be adopted. For example, communities of indigenous plants will enhance biodiversity, a desirable outcome for the area. This approach can significantly reduce long-term costs as less maintenance would be required over conventional landscaping methods as well as the introduced landscape is more sustainable. • The following measures are proposed to minimize light pollution beyond the perimeter of the project and should be considered in the lighting design of the Project: • Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the WRDs, i.e. lights (spotlights) are pointed away from sensitive viewing		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			areas (Mmaditihokwa, Lapologang and homesteads south of the W OG WRD). • Avoid high pole top security lighting along the site's periphery and use only lights activated on illegal entry to the site. • Minimise the number of light fixtures to the bare minimum, including security lighting.		
Biodiversity					
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Construction and Operational Phase	Approximately 72 ha	**Development footprint** • The footprint and daily operation of all mining surface infrastructure areas must be strictly monitored to ensure that edge effects from the operational facilities do not affect the surrounding faunal habitat beyond the allowed footprint. • The footprint areas of all proposed surface infrastructure must be minimised to what is essential and within a designated and approved boundary. It should be ensured that no mining related activities take place outside of this demarcated footprint. • Faunal habitat beyond the demarcated area should not be altered or disturbed, therefore vegetation outside of the footprints is not to be cleared. • Where topsoil is excavated, it must be stored with associated native vegetation debris for subsequent rehabilitation use. • No dumping of waste on site should take place. As such it is advised that waste disposal containers and	MPRDA NEMA NEMWA NEMBA	Implementation throughout construction and operational phases

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			bins be provided during the construction phase for all dilapidates, rubble and general waste. • Active dust suppression must be undertaken. • The future WRDs must be planned in such a way as to help maximise rehabilitation and habitat restoration post mining. Suitable designing and dumping of waste rock during the operational phase will help limit post closure costs and time as the WRD will not have to be significantly reshaped. • The base of the WRDs should be revegetated and monitored. This will help trap sediment runoff, promote natural vegetation re-establishment, provide a vegetated buffer between the WRD and the surrounding natural areas and help limit alien plant proliferation in these areas. • If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder faunal 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 practised preventing the ingress of hydrocarbons into the topsoil. • No hunting/trapping or collecting of faunal species is allowed. • No informal fires by construction personnel are allowed. • Smaller species of invertebrates and reptiles are likely to be less mobile during the colder period, as		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			such should any be observed in the footprint areas during clearing and operational activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Operational personnel are to be educated about these species and the need for their conservation. Harmless reptiles should be carefully relocated by a suitably nominated construction person or nominated mine official. For larger venomous snakes, a suitably trained mine official should be contacted to affect the relocation of the species, should it not move off on its own. **Fauna SCC** • No collection of faunal SCCs may be allowed by mining personnel; and • In the unlikely event that a faunal SCC be found, and should it not relocate outside of the disturbance area itself, it should be relocated by a suitably qualified specialist once the appropriate permits have been obtained.		
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Decommissioning and Closure	Approximately 72 ha	**Development footprint** • No additional habitat is to be disturbed during the Decommissioning & Rehabilitation Phase. • No vehicles are allowed to indiscriminately drive through undisturbed habitat and natural areas. • No dumping of litter must be allowed on-site; and • Edge effects must be continually monitored and controlled, notably erosion and alien plant proliferation.	MPRDA NEMA NEMWA NEMBA	Implementation throughout decommissioning and closure

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			Rehabilitation • All mining footprints that will be decommissioned should be concurrently rehabilitated in accordance with a rehabilitation plan compiled by a suitable specialist. • Where needed, the WRDs should be re-sloped and profiled in order to give them a more natural profile that not only fits in with the landscape, but which also allows for the establishment of a diversity of plants and faunal species. In the regard, the WRD should be designed to have terraces and troughs so as to create areas of unique plant growth and faunal habitat. • Stormwater must be suitably managed so that surface water runoff is captured on the WRD and not simply discharged down the slope. • All soils compacted because of construction activities falling outside of the project area should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas. • Any natural areas beyond the direct footprint, which have been affected by the mining activities, must be rehabilitated using indigenous species. • 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 as per the post-closure land-use objective.		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			• 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. **<u>Alien Vegetation</u>** • Edge effects, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. • Ongoing alien and invasive plant monitoring and clearing/control should take place throughout the Decommissioning & Rehabilitation 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; and • Floral monitoring should be done annually during rehabilitation activities.		
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Construction and Operational Phase	Approximately 72 ha	**<u>Development footprint</u>** • Minimise loss of vegetation where possible through adequate planning and, where necessary, by incorporating the sensitivity of the biodiversity report as well as any other specialist studies. • The construction footprint must be kept as small as possible in order to minimise impact on the	MPRDA NEMA NEMWA NEMBA	Implementation throughout construction and operational phases

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			surrounding environment (edge effect management). • Removal of vegetation must be restricted to the approved development footprint. • Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the mining activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal. • No collection of indigenous floral species must be allowed by construction personnel. • Care should be taken during the construction of the proposed infrastructure development to limit edge effects to surrounding natural habitat. This can be achieved by: • Ensuring continued demarcation all footprint areas during mining activities. • No construction rubble or cleared AIP species are to be disposed of outside of demarcated areas and should be taken to a registered waste disposal facility or low sensitivity areas allocated specifically for waste dumping. • All soils compacted as a result of mining activities should be ripped and profiled and reseeded once these areas become available for rehabilitation. • Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas (especially nearby freshwater features). Specific		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			mention in this regard is made to Category 1b species identified within the development footprint areas (refer to section 3.4 of this report. • No dumping of litter, rubble or cleared vegetation on site should be allowed. Infrastructure and rubble removed because of mining activities should be disposed of at an appropriate registered dump site away from the development footprint. No temporary dump sites should be allowed in areas with natural vegetation. Waste disposal containers and bins should be provided during the construction and maintenance phase for all construction rubble and general waste. Vegetation cuttings must be carefully collected and disposed of at a separate waste facility or demarcated low sensitivity site. • 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 practised, preventing the ingress of hydrocarbons into the topsoil. • Suppress dust to mitigate the impact of dust on flora within a close proximity of construction activities (Sett 2017) – any chemicals used for this purpose must not be permitted to enter the Freshwater habitats.		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			• Upon completion of mining activities, it must be ensured that no bare areas remain, and that indigenous species be used to revegetate the disturbed area. • Ensure sound geotechnical design and carefully plan future WRD utilization and closure. • Slope monitoring should be carried out regularly to manage the slope angle and height with variation in material properties. • Ensure that the slope ratio is not excessively steep which may induce slope failure or implement mechanisms to improve slope stability where necessary. • Ensure that where berms and/or cut of 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 drains and associated clean and dirty water separation structures must be maintained in good working order. • Regular monitoring should be undertaken to assess the footprint area of the WRD and to measure the degree of sedimentation and soil disturbance in order to allow for adaptive management. • Where high levels of sediment are collecting at the base of the various WRDs, these areas should be revegetated to stabilise these sections to minimise		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			further dispersion of sediment into the surrounding soils during high rainfall events. Should this not be feasible, this material should be collected, transported, and stored in a suitable waste facility where it cannot be transported further through erosive agents. The remaining bare soil areas are then to be revegetated accordingly. • Any areas where there is increased risk that water runoff and sediment will enter into any freshwater systems, appropriate drainage infrastructure must be developed to minimise this risk; and • An alien plant control plan must be implemented, and all alien plants controlled, with focus on the bases of the WRDs within 50 m of the toe of each WRD. All alien plants in the freshwater systems must be controlled in line with relevant legislation to minimise further dispersal of alien plant propagules. **<u>Alien Vegetation</u>** Prior to the commencement of the proposed mining activities, the current AIP Management/Control Plan should be updated by a qualified specialist and subsequently implemented: • Removal of AIPs should occur regularly throughout the mining phase and continue throughout the i) Mining Phase, and ii) the Decommissioning & Rehabilitation Phase. • The existing AIP Management/Control Plan should be regularly updated (and implemented) by a		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			qualified professional. No use of uncertified chemicals may be used for chemical control of AIPs. Only trained personnel are to use chemical and mechanical control methods of AIPs. Chemical control may not be used near freshwater features (e.g., within the surrounding areas of the mining area). • Edge effects arising from the proposed mining activities, such as erosion and AIP proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2020) (section 3.4 of this report). Ongoing monitoring and clearing/control should take place throughout the i) Mining and ii) Decommissioning & Rehabilitation Phases of the proposed mining activities; and • 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 or an area demarcated specifically for cleared vegetation and waste. **Fire** No illicit fires must be allowed during the construction of the proposed development.		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
Freshwater ecosystems					
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Construction	Approximately 72 ha	• Encroachment into the wetlands is highly unlikely since these are located outside of the existing boundary fence (albeit partially within the MRA). No encroachment within the riparian zone of the Sterkstroom River is deemed likely, due to the distance of the river from the proposed WRD. Therefore, no contractor laydown areas, material storage facilities or vehicle refuelling is likely to be placed within or occur within the boundaries or 32 m NEMA zone of regulation around these watercourses, however it must be ensured that no activities occur within the wetlands, riparian zone or the associated NEMA regulated zone. • Additional stormwater management and clean and dirty water systems are to be developed first prior to any other major earthworks to reduce risk of erosion and sedimentation. • The majority of the WRD footprints are planned within existing opencast mining and disturbed areas. Where there is marginal encroachment into areas not already cleared (1 ha of the West Above Ground WRD), then clearing must be limited to the approved footprint, and as much indigenous vegetation as possible retained. • It should be feasible to utilise existing roads to gain access to the sites and crossing the river in areas where no existing crossing is apparent should be unnecessary. Should new crossings be required for	IWWMP MPRDA NEMA NEMBA NWA	Implementation throughout construction

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			any reason, the necessary authorisations must be obtained in advance. • The proposed 4 m waste rock road around the perimeter of each WRD must take into consideration the delineations of the watercourses and be planned to avoid these, as much as feasible. • The watercourse areas beyond the proposed footprint of development and the NEMA zone of regulation (32m) should be clearly demarcated with danger tape except where located outside the existing boundary fence of the mine, and areas in which no activities are proposed should be marked as a no-go areas. • Topsoil stockpiling must be undertaken in accordance with the mine's existing topsoil conservation guide. Any soil stockpiles may not exceed the height recommended by the topsoil conservation guide.		
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Operational	Approximately 72 ha	• The structures must be stabilised to prevent failure and must be regularly inspected to proactively manage any perceived risk of failure. • Should failure occur, and the CVB wetland in particular become blocked as a result, the waste rock must be removed immediately and stockpiled in another appropriate WRD to ensure continued hydraulic connectivity of the channel. • Due to the distance between the East Above Ground WRD and the Sterkstroom River, the risk posed to the river is considered negligible.	IWWMP MPRDA NEMA NEMBA NWA	Implementation throughout operations

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			• Additional water inputs to watercourse via groundwater are anticipated to be unlikely due to distance of the WRDs from the respective watercourses. • Notwithstanding the above, monitoring of seepage water contained in the perimeter toe paddocks and of boreholes around the perimeter of each WRD must be undertaken to allow for proactive management. • Although the geochemical work undertaken for waste rock samples at Tharisa indicate that the waste rock is non-acid generating, based on leachate tests chemicals of concern that are likely to leach from the WRDs when compared to water quality standards include: Elevated concentrations of Al, Chromium (Cr), Iron (Fe), Manganese (Mn), Lead (Pb). Thus, the WRDs must be appropriately lined with a Class D liner to prevent pollution of groundwater. • Regular monitoring of groundwater quality must be undertaken in accordance with existing recommendations by the groundwater specialist or if such recommendations have not been provided, a monitoring plan must be developed by a suitably qualified specialist.		
Groundwater					
Establishing waste rock over backfilled portions of	Construction	Approximately 72 ha	• Road compaction and service facilities for mine vehicles with spillage sump.	MPRDA and NEMA principles	Implementation throughout construction

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
the East Pit (East OG WRD and West OG WRD).			• Monitoring systems to detect leaking and as well as visual observations of facilities conditions. • Best practise storage facilities and spill kits.	Water management measures in compliance with NWA and IWUL IWWMP NWA NEMA	
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Operational	Approximately 72 ha	• The monitoring network needs to be reviewed and a formal monitoring protocol developed. A parameter optimisation study should be conducted to only analyse for the critical control parameters (CCP) as there are only ± 5 important chemical parameters. This would save on lab analysis costs. Additional downstream monitoring locations for both surface water and groundwater are required. Monitoring data should be archived on a digital data base that should serve as a future reference. Monitoring reports should be issued on a quarterly (summary) and annual (detailed) basis. Management and mitigation measures should be adapted based on the monitoring results to effectively mitigate the impacts. • A hydrocensus should be conducted on an annual basis to evaluate the status of the potential surface water and groundwater receptors surrounding the site and proposed facilities. • The recommended Sustainable Multiple-Capturing-Barrier-System and sustainable groundwater	MPRDA and NEMA principles Water management measures in compliance with NWA and IWUL IWWMP NWA NEMA	Implementation throughout operations

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			management and mitigation plan should be included in the EMPR and IWWMP. • More detailed site characterization and modelling for implementation level accuracy to verify subsurface flow zones and hydraulic parameters with specific reference to: • Clay layer thickness and continuity. • Geophysical surveys to verify existence of dyke, dyke-contacts and fault/fracture zones and the thickness of the weathered zone. • Drilling of site characterization holes (4 - 6 holes, 45 m to 70 m deep, 0.165 m diameter) and subject to aquifer tests to verify hydraulic parameters. • Downhole geophysical surveys and lugeon tests on selected holes to verify depth permeability relationships. • Sampling for chemical and isotope analysis. • Update and recalibration of flow and mass transport model for implementation level accuracy. • Sterkstroom wet and dry season flow data and based on hydrological, aquatic ecological and water use impact modelling. • The additional monitoring boreholes should be optimized during the pre- and operational phase site characterization (geophysics, drilling and aquifer testing) phases. • Options to use the fully backfilled open pits as water resources and enhance recharge yield by diverting surface water into them during flood conditions		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			should be considered and evaluated via further modelling and studies. • The mine dewatering and mass transport model should be reviewed and updated every two years and/or once the KMLCS pit dewatering modelling are completed as the open pits form important sinks in the mass transport model (for dewatering planning purposes). • Biomonitoring should be included in the water monitoring protocol, up and downstream of Tharisa to determine the cumulative impact of the nitrate build-up on the downstream ecosystem		
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Operational	Approximately 72 ha	• Monitor upstream and downstream Strekstroom flows, and specific boreholes located adjacent to the stream for early detection; Diversion of non-contact runoff to the Sterkstroom. Verification of mine dewatering impacts on the Sterkstroom based on specialist surface water studies and monitoring. • If impacts are significant piping or discharge of dewatered volumes in the Sterkstroom to a downstream point after mining activities during low flow months. • Develop and implement a dewatering strategy and design that includes sumps, pumps and associated infra-structure. • The mine dewatering modelling accounted for the Samancor flooded underground. The transient dewatered volumes should be included in an updated transient mine water balance to ensure	MPRDA and NEMA principles Water management measures in compliance with NWA and IWUL IWWMP NWA NEMA	Implementation throughout operations

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			reuse and sufficient storage capacity during extreme wet events. • Develop and integrated, transient mine water and chemical mass load balance and align with the Integrated water and waste management plan & EIA; If excess water is clean (below SANS 241 standards), it could potentially be discharged into Sterkstroom downstream. • A multiple barrier and sustainable management plan approach should be followed to ensure any potential seepage is mitigated: • The main nitrate seepage vector due to dewatering, is captured to the open pits during the operational phase. During the post-operational phase, the nitrate source would stop, and it would decay within 5 - 10 years. The resultant water quality would be close to drinking water standards. • A shallow Perimeter Solution Trench (± 2.5 m deep) should be included at selected zones of WRD toe to capture shallow toe and diffuse seepage. • Several monitoring boreholes (± 8) to be drilled 35 - 40 m deep to fully penetrate the discrete shallow weathered fracture zones (based on high resolution geophysical survey results) and subjected to aquifer tests. Pending regular monitoring results, boreholes could be equipped with submersible pumps to keep the groundwater head ± 15 m below the initial water levels.		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			• A green band of trees (Searsia lancea or equivalent) should be concurrently planted at selected areas as a biological nitrate sink which also controls shallow fugitive seepage if it emanates at the toe. • Post Closure rehabilitation and revegetation of the WRDs to limit rainfall recharge and therefore seepage. • Shaping of the backfilled open pits in a concave shape to limit infiltration and direct runoff towards seepage capture canals/trenches. • Time - Nitrate degrades due to natural denitrification processes and was proven to decay with a half-life of ± 110 - 160 days. It is therefore only an operational concern and would decay to drinking water standards within 5 - 10 years after operations end. • Monitoring with feedback, active intervention, and control is important for the operational phase impact verification. • After 5 - 10 years post operation the water from the mitigation boreholes and open pit decant volumes can be converted to sustainable drinking water to the community.		
Safety					
Hazardous excavations	All phases	Approximately 72 ha	• Each hazardous excavation will have a barrier around it to prevent access by people and animals. The barrier may be in the form of fences, walls or berms. In addition, the barriers must have warning signs at appropriate intervals. These warning signs	MPRDA Occupational Health and Safety Act (OHSA) National Road Traffic	Implementation throughout the project

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			must be in picture format and/or written in English, Afrikaans and Tswana. • Any hazardous structure or excavations will be designed and constructed in a manner to ensure that stability and safety risks to third parties and animals are addressed. These issues will be monitored according to a schedule that is deemed relevant to the type of facility. • Tharisa will update its surface use area map on a routine basis to ensure that the position and extent of all potentially hazardous excavations, infrastructure is known. • If people or animals fall off or into hazardous excavations or infrastructure causing injury, the Tharisa emergency response procedure will be initiated. • Any hazardous structure or excavations will be closed in a manner to ensure that stability and safety risks to third parties and animals are addressed. These issues will be monitored according to a schedule that is deemed relevant to the type of facility. • Where Tharisa has caused injury to third parties and/or animals, appropriate compensation will be provided. • If people or animals fall off or into hazardous excavations or infrastructure causing injury, the Tharisa emergency response procedure will be initiated.		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
Socio-economic					
Continuation of mining activities	Operations and Closure	Approximately 72 ha	• The mine will continue to implement the commitments in its social and labour plan in accordance with the employment, procurement and social investment principles of the Mining Charter. • The administration/human resource manager is responsible for implementing these actions during all mine phases. • Land within affected mining zones should be purchased by the mine as and when necessary. Land outside these zones should not be significantly affected. Taking the various mitigated impact types into account the approximate guideline is 500m. • Requirement and procurement of local services as far as reasonability possible. • Work with existing structures and organisations to establish and maintain a good working relationship with surrounding communities, local authorities and landowners in order to limit the impacts associated with inward migration. • Any complaint from the public during the construction and operation of this project must be attended to by the person involved as soon as possible to the satisfaction of the parties concerned. A complaint register must be kept up to date and shall be produced upon request. • The applicant must be responsible for compliance with the provisions for duty of care and remediation of environmental damage in accordance with	SLP	Implementation throughout the project

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			Section 28 of National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.		
Heritage					
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Operations and Closure	Approximately 72 ha	• If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Elijah Katsetse/Phillip Hine 021 462 4502) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule; • If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Ngqalabutho Madida 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule; 38(4)d – See section 51(1) of the NHRA; • The following conditions apply with regards to the appointment of specialists: • If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the	NHRA SAHR	Implementation throughout the project

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA. • 38(4)a – The SAHRA Archaeology, Palaeontology and Meteorites (APM) Unit has no objections to the proposed development; • 38(4)b – The recommendations of the specialists are supported and must be adhered to. No further additional specific conditions are provided for the development; • 38(4)c(i) – If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Elijah Katsetse/Phillip Hine 021 462 4502) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule; • 38(4)c(ii) – If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Ngqalabutho Madida 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offense in terms		

Activities	Phase	Size and Scale Of Disturbance	Mitigation Measures	Compliance With Standard	Time Period For Implementation
			ofsection 51(1)e of the NHRA and item 5 of the Schedule; • 38(4)d – See section 51(1) of the NHRA; • 38(4)e – The following conditions apply with regards to the appointment of specialists, If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.		

33. IMPACT MANAGEMENT OUTCOMES

Table 26 1 below provides a description of the outcomes and identifies the standard of impact management required in order to manage, remedy, control or modify potential impacts. The management actions identified to achieve these outcomes and objectives are described in Section 20.

Table 44: Description of impact management outcomes

Activity	Potential Impact	Affected Aspect	Phase	Management actions Type	Standard to be Achieved (Impact management objectives)
All activities	Loss of soil resources and land capability due to contamination	Soil and land capability	Construction Operational Decommissioning Closure	Limit project footprint Control through waste management practices Control through appropriate design (incl. access roads) Closure planning and rehabilitation Remedy through emergency response procedures	To rehabilitate disturbed areas in line with the management plans.
All activities	General disturbance of biodiversity	Biodiversity	Construction Operational Decommissioning Closure	Implement biodiversity action plan Limit project footprint Monitoring Rehabilitation	To prevent the unacceptable disturbance and loss of biodiversity and related ecosystem functionality through physical destruction and general disturbance.
All activities	Contamination of surface water	Surface water	Construction Operational Decommissioning Closure	Management through appropriate design Implementation of Storm water Management Plan Management through waste management practises Surface water monitoring Compensation Remedy through emergency response procedures	To prevent unacceptable alteration of drainage patterns and related reduction of downstream surface water flow and to prevent pollution of surface water resources.
Stormwater management Non-mineralised waste management	Groundwater contamination	Groundwater	Construction Operational Decommissioning Closure	Groundwater monitoring Implementation of Storm Water Management Plan Management through compensation Management through appropriate design	To prevent pollution of groundwater resources and related harm to water users and

Activity	Potential Impact	Affected Aspect	Phase	Management actions Type	Standard to be Achieved (Impact management objectives)
Storage and maintenance services/ facilities Site management Rehabilitation				Remedy through emergency response procedures	to prevent losses to third party water users.
Earthworks Transport systems Site management Rehabilitation	Change in ambient air concentrations	Air quality	Construction Operational	Management through appropriate design Air quality monitoring Complaints register	To prevent air pollution health impacts.
Earthworks Transport systems Site management Rehabilitation	Increase in ambient noise levels	Noise	Construction Operational	Manage through noise controls Conduct noise monitoring	To prevent public exposure to disturbing noise.
Earthworks Transport systems Site management Rehabilitation	Change in landscapes and related visual aspects	Visual	Construction Operational Decommissioning Closure	Limit project footprint Manage through visual controls Rehabilitation	To limit negative visual impacts.
All activities	Economic impact	Socio-economic	Construction Operational Decommissioning	Control through the monitoring of socio-economic conditions Remedy through emergency response procedures	To enhance the positive economic impacts and limit the negative economic impacts. To enhance the sustainability of the project into the future by building capacity.
All activities	Inward migration		Construction Operational Decommissioning Closure	Control through good communication, recruitment and procurement processes Co-operation with government health and safety structures to address the spread of disease, HIV/AIDS Communication with local police force to combat crime	
Transport systems Site management	Road disturbance	Traffic	Construction Operational	Remedy through emergency response procedures	To prevent mine-related road disturbance.

Activity	Potential Impact	Affected Aspect	Phase	Management actions Type	Standard to be Achieved (Impact management objectives)
	and traffic safety				
All activities	Land use impacts	Land use	Construction Operational Decommissioning Closure	Mitigate all environmental and social impacts	To prevent unacceptable impacts on surrounding land uses and their economic activity.

34. IMPACT MANAGEMENT ACTIONS

The impact management actions are summarised in the required DMR format in Table 45.

Table 45: Impact Management Actions

Activity	Potential Impact	Management actions	Time Period for Implementation	Compliance with Standards
SOCIO-ECONOMIC				
All activities involving employment and procurement of goods and services	Local employment Local economic development	Enhance through implementation of the SLP	Mitigation measures are required to be implemented from the commencement of site preparation activities throughout the LOM	SLP Mining Charter MPRDA IFC Performance Standards
All related activities	Mine health and safety	Control through planning design and operational controls	As above	Mine Health and Safety Act, 1996 MPRDA
	Security risk			SLP IFC Performance Standards
	Contribution of royalties, rates and taxes	No mitigation identified	As above	SLP Mining Charter MPRDA IFC Performance Standards
	Community health and safety	Control through planning design and operational controls	As above	National Road Traffic Act SLP Mining Charter MPRDA IFC Performance Standards

	Mine closure and associated effects on the local economy	Control through planning and implementation of the SLP	As above	SLP Mining Charter MPRDA IFC Performance Standards
GROUNDWATER				
All related activities	Contamination of groundwater in private boreholes, making the groundwater unfit for use	• Control through design and operational controls • Monitor through groundwater monitoring programme	As above	MPRDA and NEMA principles Water management measures in compliance with NWA and IWUL NWA NEMA
AIR QUALITY				
Materials Handling, Transport of Man and Machinery	Elevated PM10 and PM2.5 Concentrations	Control through design and operational controls	As above	NEM:AQA Dust Control Regulation GN R. 827 of 2013 Ambient Air Quality Standards
Materials Handling, Transport of Man and Machinery	Elevated dust fall levels			
NOISE				
All related activities	Noise impacts generated may impact on the social environment.	Minimise through design and operational controls	As above	SANS Environmental Noise Standards IFC Performance Standards
CULTURAL HERITAGE				
Excavation	Disturbance/Loss of Significant Archaeological or Cultural Heritage Sites/Remains	Maintain / monitor through implementation of chance-find procedure	As above	SAHRA

35. FINANCIAL PROVISION

The financial closure liability costs for the proposed Project were as per the *Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine* as published by the Department of Mineral Resources and Energy (DMRE) (previously known as the Department of Minerals and Energy [DME]), dated January 2005.

35.1 DETERMINATION OF THE AMOUNT OF THE FINANCIAL PROVISION

The closure liability estimate took account of infrastructure and closure activities associated with the proposed Project, namely:

- Rehabilitation of the overburden and spoils associated to the two waste rock dumps, described above;
- Engineering and Management of such activities during the closure process; and,
- Care and Maintenance for two to three years following the closure of the two waste rock storage facilities; and,
- General site rehabilitation and maintenance, upon Life of Mine.

35.1.1 Closure objectives description and the alignment with the baseline environment

The closure objective will be to return the land to pre-mining potential or as agreed with the land owners and the relevant authorities. A summary of the conceptual closure planning is provided below. At a conceptual level, decommissioning is a reverse of the construction phase with infrastructure and activities very similar to those described for the construction phase. The conceptual decommissioning plan is as follows:

- Surface infrastructure will be demolished and removed, with the exception of the mineralised waste facilities which will remain in perpetuity. These will be rehabilitated as described in the sections below.
- All waste and contaminated soil and water will be removed from the project area and disposed of appropriately.
- A soil specialist will be consulted to test the stockpiled soil and advise if any amelioration is required prior to using it for rehabilitation.
- Areas where infrastructure has been removed will be levelled and topsoil restored to depths advised by the soil specialist.
- A vegetation specialist will be consulted to determine if active seeding is required and what species should be seeded that are suited to the relevant soil type. Vegetation selected will be a combination of indigenous trees, shrubs, grasses and aloe species etc. to mimic the vegetation cover of natural topographical features in the area.

35.1.2 Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties

All aspects of the conceptual closure planning undertaken to date, including the applicable specialist studies and the closure plan itself is made available for review and comment as part of the public participation process described in the EIR.

35.1.3 Rehabilitation and closure plan

Once the Additional WRD's have been constructed, it is recommended that an updated closure plan be developed that includes a decommissioning strategy and decommissioning plan.

The decommissioning strategy should consider at least:

- Optimal approaches for rehabilitation;
- Options for extending the WRD Facility's life; and
- Any other options that optimise the decommissioning spend, whilst still remaining legal and compliant.

35.1.4 Compatibility of the rehabilitation plan with the closure objectives

The closure liability estimate took account of infrastructure and closure activities associated with the proposed Project, namely:

- Rehabilitation of the overburden and spoils associated to the two waste rock dumps.
- Engineering and Management of such activities during the closure process.
- Care and Maintenance for two to three years following the closure of the two waste rock storage facilities.
- General site rehabilitation and maintenance, upon Life of Mine.

35.1.5 Calculate and state the quantum of the financial provision

The current financial closure liability associated with the proposed additional Waste Rock Storage facilities (as of July/August 2022) is R 61 452 044.40 (including VAT). This amount has been calculated at Current Value (CV) as of 13 October 2022 and presented in Table 46.

The calculated financial liability is considered to be Class 1 estimate (with an accuracy between +25% and -15%) based on the overall generic approach as stipulated by the DMRE Guideline Document.

Table 46: Closure Liability Calculation

CALCULATION OF THE QUANTUM								
Area	*Anglo American Mogalakwena Mine - Nugen Project (Calculated as of August 2022)*							
No.	Description:	Unit:	Operational Area	A Quantity	B Master rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
				Step 4.5	Step 4.3	Step 4.3	Step 4.4	
1	Dismantling of processing plant & related	m^3	n/a	0	R 17.93	1	1.1	R 0.00
2 (A)	Demolition of steel buildings & structures	m^2	n/a	0	R 249.77	1	1.1	R 0.00
2 (B)	Demolition of reinforced concrete buildings & structures	m^2	n/a	0	R 368.08	1	1.1	R 0.00
		m^2	n/a	0	R 368.08	1	1.1	R 0.00
3	Rehabilitation of access roads	m^2	n/a	0	R 44.70	1	1.1	R 0.00
4 (A)	Demolition & rehabilitation of electrified railway lines	m	n/a	0	R 433.81	1	1.1	R 0.00
4 (B)	Demolition & rehabilitation of non electrified railway lines	m	n/a	0	R 236.62	1	1.1	R 0.00
5	Demolition of housing &/or administration facilities	m^2	n/a	0	R 499.53	1	1.1	R 0.00
		m^2	n/a	0	R 499.53	1	1.1	R 0.00
6	Opencast rehabilitation including final voids & ramps	ha	n/a	0	R 254 236.43	0.52	1.1	R 0.00
7	Sealing of shafts, adits & inclines	m^3	n/a	0	R 134.09	1	1.1	R 0.00
8 (A)	Rehabilitation of overburden & spoils	ha	Waste Rock Dump West	109	R 174 573.93	1	1.1	R 20 931 414.01
			Waste Rock Dump East	72	R 174 573.93	1	1.1	R 13 826 255.12
8 (B)	Rehabilitation of processing waste deposits	ha	n/a	0	R 217 428.67	1	1.1	R 0.00
8 (C)	Rehabilitation of processing waste deposits	ha	n/a	0	R 631 515.93	0.66	1.1	R 0.00
9	Rehabilitation of subsided areas	ha	n/a	0	R 146 179.37	1	1.1	R 0.00
10	General surface rehabilitation	ha	n/a	0	R 138 292.00	1	1.1	R 0.00
11	River diversions (to be decommissioned)	ha	n/a	0	R 138 292.00	1	1.1	R 0.00
12	Fencing	m	n/a	0	R 157.75	1	1.1	R 0.00
13	Water management	ha	n/a	0	R 52 582.51	0.25	1.1	R 0.00
14	2 to 3 years of maintenance & aftercare	ha	Additional Areas	181.000	R 18 403.88	1	1.1	R 3 664 212.11
15 (A)	Specialist Studies/Allowances	SUM	Closure - Engineering & Management	1	R 1 260 380.00	1	1	R 1 260 380.00
		SUM	Hydrogeological Assessment	1	R 4 190 120.00	1	1	R 4 190 120.00
							Sub Total 1 (Sum of items 1 to 15 Above)	R 43 872 381.24
17	Multiply Subtotal 1 by Weighting Factor 2 (step 4.4)				5.0% of Subtotal 1			R 2 193 619.06
							Subtotal 2 (Subtotal 1 plus Weighting Factor 2 value)	R 46 066 000.30
18	Preliminary and General (P&G's)				6.0% of Subtotal 2			R 2 763 960.02
							Subtotal 3 (Subtotal 2 plus P&G's value)	R 48 829 960.32
19	Contingency				10.0% of Subtotal 2			R 4 606 600.03
							Subtotal 4 (Subtotal 3 plus Contingency value)	R 53 436 560.35
20	VAT				15.0% of Subtotal 3			R 8 015 484.05
							GRAND TOTAL (Subtotal 4 plus VAT)	R 61 452 044.40

35.1.6 Confirmation that the financial provision will be provided

In compiling and submitting their Mine Work Programme, the Applicant has confirmed that the required amount for financial provision for rehabilitation and closure can be derived from operating expenditure over the LOM.

36. MECHANISMS FOR MONITORING COMPLIANCE AND PERFORMANCE AGAINST THE EMPR

This section provides the monitoring programme identified for the proposed Project.

Tharisa will ensure that the monitoring programmes comprise the following:

- A formal procedure.
- Appropriately calibrated equipment.
- Where sample require analysis they will be preserved according to laboratory specifications;
- An accredited, independent, commercial laboratory will undertake sample analyses.
- Parameters to be monitored will be identified in consultation with a specialist in the field and/or the relevant authority.
- If necessary, following the initial monitoring results, certain parameters may be removed from the monitoring programme in consultation with a specialist and/or the relevant authority.
- Monitoring data will be stored in a structured database.
- Data will be interpreted and reports on trends in the data will be compiled by an appropriately qualified person on a quarterly basis.
- Both the data and the reports will be kept on record for the life of mine.

36.1 FREQUENCY OF PERFORMANCE ASSESSMENT REPORT

The frequency of mine performance assessment reporting shall be at least annually or as otherwise determined by legislation, the EA and the approved EMPrs.

36.2 CLOSURE COST REPORTING

The frequency of closure cost reporting shall be undertaken annually as determined by legislation, the EA and the approved EMPrs.

Table 47: Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements For Monitoring	Roles And Responsibilities	Monitoring And Reporting Frequency and Time Periods For Implementing Impact Management Actions
All construction - Phase activities which generate particulate emissions Excavations, Site Clearance and Transportation All operational – phase activities which generate particulate emissions	Elevated dust fallout levels Elevated PM10 and PM2.5 emission	It is recommended that the current fall out dust monitoring network be maintained and the monthly fall out dust results used as indicators to tract the effectiveness of the applied mitigation measures. fall out dust collection should follow the ASTM method as per the NDCRs. The ASTM method covers the procedure of collection of fall out dust and its measurement and employs a simple device consisting of a cylindrical container exposed for one calendar month (30 ±2 days). The method provides for a dry bucket, which is advisable in the dry environment.	ECO / Mine Manager	Periodic inspections and external audits are essential for progress measurement, evaluation and reporting purposes. It is recommended that site inspections and progress reporting be undertaken at regular intervals (at least quarterly), with annual environmental audits being conducted. Annual environmental audits should be continued at least until closure. Results from site inspections and monitoring efforts should be combined to determine progress against source- and receptor-based performance indicators. Progress should be reported to all interested and affected parties (I&APs), including authorities and persons affected by pollution.

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements For Monitoring	Roles And Responsibilities	Monitoring And Reporting Frequency and Time Periods For Implementing Impact Management Actions
		It is recommended that PM10 sampling be conducted at Maditlokwa since PM10 concentrations were predicted to be non-compliant with the NAAQS, even with mitigation measures in place. A suitable location should be around dustfall unit TM D12 - Maditlokwa1 (S25.72764; E27.48858). It is proposed that particulate air concentration monitoring include the thoracic dust fraction which is typically denoted by the fraction with aerodynamic diameters less than 10 µm (or PM10). It is proposed that the sampling be done using one standalone sampler that can sample continuously with a datalogger, modem, solar power system and local WiFi access for viewing data. Data should be downloaded weekly and analysed on a monthly basis. Stakeholder forums provide possibly the most effective mechanisms for information dissemination and consultation. Management plans should stipulate specific intervals at which forums will be held and provide information on how people will be notified of such meetings.		The criteria to be taken into account in the inspections and audits must be made transparent by way of minimum requirement checklists included in the management plan. Corrective action or the implementation of contingency measures must be proposed to the stakeholder forum in the event that progress towards targets is indicated by the quarterly/annual reviews to be unsatisfactory. Given the proximity of the study site to the nearby communities and farmsteads, it is recommended that such meetings be scheduled and held at least on an annual basis. A complaints register must be kept at all times. The financial plan should be audited by an independent consultant, with reviews conducted on an annual basis.

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements For Monitoring	Roles And Responsibilities	Monitoring And Reporting Frequency and Time Periods For Implementing Impact Management Actions
		The budget should provide a clear indication of the capital and annual maintenance costs associated with dust control measures and dust monitoring plans.		
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Noise emissions	The following procedure should be adopted for all noise surveys: Any surveys should be designed and conducted by a **trained specialist**. Sampling should be carried out using a **Type 1** Sound Level Meter (SLM) that meets all appropriate IEC standards and is subject to **annual calibration** by an accredited laboratory. The **acoustic sensitivity of the SLM should be tested** with a portable acoustic calibrator before and after each sampling session. Samples sufficient for statistical analysis should be taken with the use of portable SLM's capable of logging data continuously over the time period. Samples representative of the day- and night-time acoustic environment should be taken.	ECO / Mine Manager	Noise monitoring at sites where noise is an issue or may become an issue is essential. Annual noise sampling for day- and night-time at NSRs surrounding the project will be incorporated in an annual environmental noise monitoring programme. Noise monitoring should be undertaken at sampling sites as surveyed in 2021 and 2022. An additional sampling site at NSR2 is recommended to be included in the survey points. Also, in the event that noise related complaints are received short term ambient noise measurements should be conducted as part of investigating the complaints. The results of the measurements should be used to inform any follow up interventions. The investigation of complaints should include an investigation into equipment or machinery that likely result or resulted in noise levels annoying to the community. This could be achieved with source noise measurements.

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements For Monitoring	Roles And Responsibilities	Monitoring And Reporting Frequency and Time Periods For Implementing Impact Management Actions
		The following acoustic indices should be recoded and reported: L_{Aeq} (T), statistical noise level L_{A90}, L_{AFmin} and L_{AFmax}, octave band or 3rd octave band frequency spectra. The SLM should be located approximately 1.5 m above the ground and no closer than 3 m to any reflecting surface. Efforts should be made to ensure that measurements are not affected by the residual noise and extraneous influences, e.g., wind, electrical interference and any other non-acoustic interference, and that the instrument is operated under the conditions specified by the manufacturer. It is good practice to avoid conducting measurements when the wind speed is more than 5 m/s, while it is raining or when the ground is wet. A detailed log and record should be kept. Records should include site details, weather conditions during sampling and observations made regarding the acoustic environment of each site		
Establishing waste rock over backfilled portions of the East Pit (East OG WRD and West OG WRD).	Visual Impacts	Physical Inspection	ECO / Mine Manager	Monitoring or reporting of adherence to the proposed management measures should be conducted by the Mine's Environmental Officer on a regular monthly basis, specifically as it relates to the negative effects of night lighting.

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements For Monitoring	Roles And Responsibilities	Monitoring And Reporting Frequency and Time Periods For Implementing Impact Management Actions
				Monitoring or reporting of adherence to the proposed management measures should be conducted by the Environmental Control Officer (ECO) on a regular monthly basis to ensure effective rehabilitation in the long term.
Surface Water	Water Quality	Surface water sampling campaign	ECO / Mine Manager	Monitoring of seepage water contained in the perimeter toe paddocks and of boreholes around the perimeter of each WRD must be undertaken to allow for proactive management. Monitoring data obtained during the operational phase must inform monitoring requirements during closure and post-closure Monthly and quarterly as per requirements of water license
Soils	Soil compaction and contamination	Close supervision and monitoring of the stripping process is required to ensure that soils are stripped correctly.	ECO / Mine Manager / Contractor	Regular monitoring should be undertaken to assess the footprint area of the WRD and to measure the degree of sedimentation and soil disturbance in order to allow for adaptive management. Close supervision and monitoring of the stripping process is required to ensure that soils are stripped correctly.

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements For Monitoring	Roles And Responsibilities	Monitoring And Reporting Frequency and Time Periods For Implementing Impact Management Actions
Biodiversity	Fauna	Visual inspection	ECO / Mine Manager	The footprint and daily operation of all mining surface infrastructure areas must be strictly monitored to ensure that edge effects from the operational facilities do not affect the surrounding faunal habitat beyond the allowed footprint
Groundwater	Water quality and availability	Groundwater water sampling campaign	ECO / Mine Manager	The monitoring network needs to be reviewed and a formal monitoring protocol developed. A parameter optimisation study should be conducted to only analyse for the critical control parameters (CCP) as there are only ± 5 important chemical parameters. Additional downstream monitoring locations for both surface water and groundwater are required. Monitoring data should be archived on a digital data base that should serve as a future reference. Monitoring reports should be issued on a quarterly (summary) and annual (detailed) basis. Management and mitigation measures should be adapted based on the monitoring results to effectively mitigate the impacts. The additional monitoring boreholes should be optimized during the pre- and operational phase site characterization (geophysics, drilling and aquifer testing) phases.

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements For Monitoring	Roles And Responsibilities	Monitoring And Reporting Frequency and Time Periods For Implementing Impact Management Actions
				Biomonitoring should be included in the water monitoring protocol, up and downstream of Tharisa to determine the cumulative impact of the nitrate build-up on the downstream ecosystem

37. ENVIRONMENTAL AWARENESS PLAN

This section describes the environmental awareness plan for Tharisa.

37.1 MANNER IN WHICH APPLICANT INTENDS TO INFORM EMPLOYEES OF THE ENVIRONMENTAL RISKS

The purpose of the environmental awareness plan is to ensure that all personnel and management understand the general environmental requirements of the site. In addition, greater environmental awareness must be communicated to personnel involved in specific activities which can have a significant impact on the environment and ensure that they are competent to carry out their tasks on the basis of appropriate education, training and/or experience. The environmental awareness plan should enable the mine to achieve the objectives of the environmental policy.

37.2 ENVIRONMENTAL POLICY

The Tharisa Mine Environmental Policy has been included as Appendix D.

37.3 STEPS TO ACHIEVE THE ENVIRONMENTAL POLICY OBJECTIVES

The mine's environmental policy will be realised by setting specific and measurable objectives. It is proposed that new objectives are set throughout the life of mine, but initial objectives are as follows:

- Management of environmental responsibilities:
    - The mine will establish and appoint an Environmental/SHE Manager at senior mine management level, who will be provided with all necessary resources to carry out the management of all environmental aspects of the site as a primary function, for example:
        - compliance with environmental legislation and EMP commitments;
        - implementing and maintaining an environmental management system;
        - developing environmental emergency response procedures and coordinating personnel during incidents;
        - manage routine environmental monitoring and data interpretation;
        - environmental trouble shooting and implementation of remediation strategies; and
        - closure planning.
- Communication of environmental issues and information:
    - Meetings, consultations and progress reviews will be carried out, and specifically the mine will:
        - set the discussion of environmental issues and feedback on environmental projects as an agenda item at all company board meetings;
        - provide progress reports on the achievement of policy objectives and level of compliance with the approved EIA and EMPr to the DMRE;
        - ensure environmental issues are raised at monthly mine management executive committee meetings and all relevant mine wide meetings at all levels; and
        - ensure environmental issues are discussed at all general liaison meetings with local communities and other interested and affected parties.
- Environmental awareness training:
    - The mine will provide environmental awareness training to individuals at a level of detail specific to the requirements of their job, but will generally comprise:

  - basic awareness training for all prior to granting access to site (e.g. short video presentation requiring registration once completed). Employees and contractors who have not attended the training will not be allowed on site;
  - general environmental awareness training will be given to all employees and contractors as part of the Safety, Health and Environment induction programme. All non-mine personnel who will be on site for more than five days must undergo the environmental induction training; and
  - specific environmental awareness training will be provided to personnel whose work activities can have a significant impact on the environment (e.g. workshops, waste handling and disposal, sanitation, etc).
- Review and update the environmental topics identified in the EMPr.
- All mine projects will be designed to minimise impact on the environment and to accomplish closure/rehabilitation objectives.
- Tharisa will maintain records of all environmental training, monitoring, incidents, corrective actions and reports.
- Contractors and employees will be contractually bound to participate in the achievement of environmental policy objectives and compliance with the EIA and EMPr.

37.3.1 Training objectives of the environmental awareness plan

The environmental awareness plan ensures that training needs are identified, and that appropriate training is provided. The environmental awareness plan should communicate:

- The importance of conformance with the environmental policy, procedures and other requirements of good environmental management.
- The significant environmental impacts and risks of individuals work activities and explain the environmental benefits of improved performance.
- Individuals' roles and responsibilities in achieving the aims and objectives of the environmental policy.
- The potential consequences of not complying with environmental procedures.

37.3.1.1 General contents of the environmental awareness plan

To achieve the objectives of the environmental awareness plan the general contents of the training plans are as follows:

- Module 1 – Basic training plan applicable to all personnel entering the site:
  - short (15 minute) presentation to indicate the site layout and activities at specific business units together with their environmental aspects and potential impacts.
  - individuals to sign off with site security on completion in order to gain access to the site.
- Module 2 – General training plan applicable to all personnel at the site for longer than 5 days:
  - general understanding of the environmental setting of the mine (e.g. local communities and industries and proximity to natural resources such as rivers).
  - understanding the environmental impact of individuals activities on site (e.g. excessive production of waste, poor housekeeping, energy consumption, water use, etc).
  - indicate potential site-specific environmental aspects and their impacts;
  - Tharisa's environmental management strategy;
  - identifying poor environmental management and stopping work which presents significant risks;
  - reporting incidents;
  - examples of poor environmental management and environmental incidents; and
  - procedures for emergency response and cleaning up minor leaks and spills.
- Module 3 – Specific training plan:

- environmental setting of the workplace (for example, proximity of watercourses, vulnerability of groundwater, proximity of local communities and industries, etc);
- specific environmental aspects, for example spillage of hydrocarbons at workshops;
- impact of environmental aspects, for example hydrocarbon contamination of local watercourses resulting in loss of resource to downstream users;
- Tharisa's duty of care (specifically with respect to waste management); and
- purpose and function of Tharisa's environmental management system.

Individuals required to complete Module 3 (specific training module) will need to complete Modules 1 and 2 first. On completion of the Module 3, individuals will be subject to a short test (written or verbal) to ensure the level of competence has been achieved. Individuals who fail the test will be allowed to re-sit the test after further training by the training department.

The actual contents of the training modules will be developed based on a training needs analysis.

Key personnel will be required to undergo formal, external environmental management training (e.g., how to operate the environmental management system, waste management and legal compliance).

In addition to the above Tharisa will:

- Conduct refresher training/presentations on environmental issues for mine employees (permanent and contractors) at regular intervals.
- Promote environmental awareness using relevant environmental topic posters displayed at strategic locations on the mine. These topics will be changed monthly and will be reviewed annually by the environmental manager to ensure relevance.
- Participate and organise events which promote environmental awareness, some of which will be tied to national initiatives e.g., National arbor week, world environment day and national water week.

37.4 MANNER IN WHICH RISKS WILL BE DEALT WITH TO AVOID POLLUTION OR DEGRADATION

37.4.1 On-going monitoring and management actions

The monitoring programme as described in Section 36 will be undertaken to provide early warning systems necessary to avoid environmental emergencies associated with the proposed Project.

37.4.2 Procedures in case of environmental emergencies

Emergency procedures apply to incidents that are unexpected and that may be sudden, and which lead to serious danger to the public and/or potentially serious pollution of, or detriment to the environment (immediate and delayed). Procedures to be followed in case of environmental emergencies are described in Table 48 below.

37.4.3 General emergency procedure

The general procedure that should be followed in the event of all emergency situations is outlined below. During construction, the Construction Manager and ECO must be notified of an incident upon discovery.

- During operations, the incident must be reported immediately to Environmental Department for emergencies involving environmental impacts or to the Safety Department in the case of injury.
- Area to be cordoned off to prevent unauthorised access and tampering of evidence.

- If storm water controls are partially or totally failing and this cannot be prevented, the emergency siren is to be sounded (nearest one available). After hours the Plant Manager on shift must be notified.
- Take photographs and samples as necessary to assist in investigation.
- The Environmental Department must comply with Section 30 of the National Environmental Management Act (107 of 1998) such that:
    - The Environmental Department must immediately notify the Director-General (DMRE, DWS, and Inspectorate of Mines as appropriate), the South African Police Services and relevant fire prevention service, the provincial head or municipality, the head of the regional DWS office and any persons whose health may be affected, of:
        - the nature of the incident;
        - any risks posed to public health, safety and property;
        - the toxicity of the substances or by-products released by the incident; and
        - any steps taken to avoid or minimise the effects of the incident on public health and the environment.
    - The Environmental Department must as soon as is practical after the incident:
        - take all reasonable measures to contain and minimise the effects of the incident including its effects on the environment and any risks posed by the incident to the health, safety and property of persons;
        - undertake clean up procedures;
        - remedy the effects of the incident; and
        - assess the immediate and long term effects of the incident (environment and public health).
    - Within 14 days the Environmental Department must report to the Director-General (DMR, DWS, as appropriate), the provincial head and the local municipality, the head of the regional DWS office such information as is available to enable an initial evaluation of the incident, including:
        - the nature of the incident;
        - the substances involved and an estimation of the quantity released;
        - the possible acute effects of the substances on the persons and the environment (including the data needed to assess these effects);
        - initial measures taken to minimise the impacts;
        - causes of the incident, whether direct or indirect, including equipment, technology, system or management failure; and
        - measures taken to avoid a recurrence of the incident.

37.4.3.1 Identification of emergency situations

Emergency situations that have been identified for the proposed Project together with specific emergency response procedures are outlined in Table 48. The procedures below have been taken from Tharisa's EMPr.

37.4.4 Technical, management and financial options

The technical, management and financial options that will be put into place to deal with the remediation of impacts in cases of environmental emergencies are described below.

- The applicant will appoint a competent management team with the appropriate skills to develop and manage a project of this scale and nature.
- To prevent the occurrence of emergency situations, the mine will implement as a minimum the plan and mitigation measures as included in this EIA and EMP report.
- On an annual basis, Tharisa will undertake a risk assessment as part of its auditing procedures to identify and check potential risks associated with its operations. The findings of the risk assessment will be reported to mine management to be actioned.

- As part of its annual budget, Tharisa will allow a contingency for handling of any risks identified and/or emergency situations.

Table 48: Emergency Response Procedures

No.	Emergency Situation	Response in Addition to General Procedures
1	Spillage of chemicals, engineering substances and waste	• Where there is a risk that contamination will contaminate the land (leading to a loss of resource), surface water and/or groundwater, the mine will: ○ notify residents/users downstream of the pollution incident; ○ identify and provide alternative resources should contamination impact adversely on the existing environment; ○ contain the spill (e.g. construct temporary earth bund around source such as road tanker); ○ pump excess hazardous liquids on the surface to temporary containers (e.g. 210 litre drums, mobile tanker, etc.) for appropriate disposal; and ○ remove hazardous substances from damaged infrastructure to an appropriate storage area before it is removed/repaired.
2	Discharge of dirty water to the environment	• Apply the principals listed for Item 1 above. • To stop spillage from the dirty water system the mine will: ○ redirect excess water to other dirty water facilities where possible; ○ pump dirty water to available containment in the clean water system, where there is no capacity in the dirty water system; and ○ carry out an emergency discharge of clean water and redirect the spillage to the emptied facility. • Apply for emergency discharge as a last resort.
3	Contamination of surface water	• Personnel discovering the incident must inform the Environmental Department of the location and contaminant source. • Apply the principals listed for Item 1 above. • Absorbent booms will be used to absorb surface plumes of hydrocarbon contaminants. • Contamination entering the surface water drainage system should be redirected into the dirty water system. • The Environmental Department will collect in-stream water samples downstream of the incident to assess the immediate risk posed by contamination.
4	Groundwater contamination	• Investigate the source of contamination and implement control/mitigation measures.
5	Veld fire	• Evacuate mine employees from areas at risk. • Notify downwind residents and industries of the danger. • Assist those in imminent danger/less able individuals to evacuate until danger has passed. • Provide emergency firefighting assistance with available trained mine personnel and equipment.

No.	Emergency Situation	Response in Addition to General Procedures
6	Road traffic accidents (on site)	• The individual discovering the accident (be it bystander or able casualty) must raise the alarm giving the location of the incident. Able personnel at the scene should shut down vehicles where it is safe to do so. • Access to the area should be restricted and access roads cleared for the emergency response team. • Vehicles must be made safe first by trained professionals (e.g., crushed or overturned vehicles). • Casualties will be moved to safety by trained professionals and provided with medical assistance. • Medical centres in the vicinity with appropriate medical capabilities will be notified if multiple seriously injured casualties are expected. • A nearby vet should be consulted in the case of animal injury.
7	Development of informal settlements	• The mine will inform the local authorities (municipality and police) that people are illegally occupying the land and ensure that action is taken within 24 hours.

38. SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

The following documents will be submitted to the DMRE from the start of construction until mine closure:

- As noted in Section 36, an environmental audit report in line with legislation relevant at the time, prepared by an independent person, will be submitted to the DMRE at intervals indicated in the environmental authorisation. The purpose of the environmental audit report is to ensure compliance with the conditions of the environmental authorisation and the EMPr.
- The financial provision will be updated in line with legislation relevant at the time on an annual basis and submitted to the DMRE.
- Comments from all relevant stakeholders are submitted to the Department with the EIA and EMPr. This includes but is not limited to the Provincial Heritage Resource Authority, Provincial Environmental Department, Department of Agriculture, Forestry and Fisheries (DAFF), Department of Water and Sanitation (DWS) and the local municipality. Proof of Correspondence with various stakeholder must be included in the EIAR. Should you be unable to obtain comment, proof of the attempts that were made to obtain comments should be submitted to the Department.
- In addition, the following amendments and additional information are required for the EIR:
    - A construction and operational phase EMP that include mitigation and monitoring measures; and
    - The EIA includes a A3 size locality map of the area ad illustrates the exact location of the proposed development.

39. UNDERTAKINGS

I, Chané Coetzee, the Environmental Assessment Practitioner responsible for compiling this report, undertake that:

- The information provided herein is correct.
- Comments and inputs from stakeholders and I&APs have been included and correctly recorded in this report.
- Inputs and recommendations from the specialist reports have been included where relevant.
- Any information provided to I&APs and any responses to comments or inputs made is correct or was correct at that time.

Chané Coetzee

Signature of EAP

01/02/2023

Date

Signature of commissioner of oath

01/02/2023

Date

COMMISSIONER OF OATHS
Oren Jan Van Vrede
Ex Officio – Professional Accountant (S.A.)
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I certify that the DEPONENT has acknowledged that he/she knows and understands the contents of this affidavit, that he/she does not have any objection to taking the oath, and that he/she considers it to be binding on his/her conscience, and which was sworn to and signed before me

at Fourways on this the 1st day of Feb 2023 and that the administering oath complied with the regulations contained in Government Gazette No. R1258 of 21 July 1972, as amended.

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Appendix A: EAP CVs and EAPASA Registration

Appendix B: Maps

Map 1: Regional Setting

Map 2: Local Setting

Map 3: Topography

Map 4: Site Layout

Map 5: Hydrology

Map 6: Location of the noise sampling sites

Map 7: Air Quality Sensitive Receptors

Map 8: Tharisa Mine ambient monitoring network locations

Map 9: Vegetation Types

Map 10: Regional Land Use

Map 11: Local Land Use

Map 12: Heritage Resources

Appendix C: Public Consultation

- DMRE pre-application meeting minutes.
- Copy of the correspondence with the Land Claims Commissioner.
- Copy of the BID in English, Afrikaans and Setswana and proof of distribution.
- Copies of the Scoping Report NTS.
- Site notice (English, Afrikaans, and Setswana) and photographic evidence of site notices.
- Advertisements placed in the Brits Pos and the Rustenburg Herald.
- Copy of flyers.
- Minutes of focussed and general public meetings held during the Scoping Phase.
- Copy of acknowledgement of receipt of the Environmental Authorisation Application.
- DMRE acceptance letter of the Scoping Report.
- Copies of the site notices placed during the EIA and EMPr Phase.
- Copies of the EIA and EMPr NTS – initial distribution.
- Copies of minutes of focussed meetings held during the EIA and EMPr Phase.

Appendix D: Environmental Policy

Appendix E: Detailed Assessment of Potential Impacts

Appendix F: Air Quality Assessment

Appendix G: Soils and Land Capability Assessment

Appendix H: Biodiversity Assessment

- Terrestrial Assessment
- Terrestrial Assessment - Fauna
- Terrestrial Assessment - Flora
- Freshwater Assessment

Appendix I: Groundwater Assessment

Appendix J: Noise Assessment

Appendix K: Visual Assessment

Appendix L: Heritage Assessment

Appendix M: Palaeontological Assessment

Appendix N: Geochemical Assessment

Appendix O: Closure Liability

Appendix P: Detailed design

RECORD OF REPORT DISTRIBUTION

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Report Number:	2
Client:	Tharisa Minerals (Pty) Ltd

Name	Entity	Copy No.	Date Issued	Issuer
Bokamosa Community	Madibeng Local Municipality	1	October 2022	CC
Tsumbebzo Nemafukani	DEDECT	1	October 2022	CC
Cornia Theunisse	DWS	1	October 2022	CC
Rabokale Mathope	Piet Retief Primary School	1	October 2022	CC
D.L Moleme	Mmadikhlokwa Community Hall	1	October 2022	CC
Linda Mbentana	Rustenburg Community Centre	1	October 2022	CC
Reuben Moatshe	Rustenburg Local Municipality	1	October 2022	CC

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