Assmang (Pty) Ltd: Khumani Iron Ore Mine

FINAL Environmental Scoping Report for various Capital Projects at Khumani Iron Ore Mine

Project 1: King Mine Optimisation

Project 2: King Mine KM02 Mine Residue Stockpile Rehabilitation

Project 3: New Bruce Block A & B Off-Grade ROM Stockpile

Project 4: Product Stockpile Formalisation

Project 5: Discard Low Grade Stockpile Design Change

Project 6: Khumani Photovoltaic Solar Plant

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Executive Summary

Introduction

Khumani is situated 15km south of Kathu, adjacent to the Kumba Iron Ore Mine and compromises of four (4) farms, namely Parson, King, Bruce and Mokaning.

The mine falls within two (2) Local and two District Municipalities. The farm Mokaning is situated within the Tsantsabane Local Municipality (NC085), which forms part of the ZF Mgcawu District Municipality (formerly known as the Siyanda District Municipality). The farms Parson, Bruce and King are situated within the Gamagara Local Municipality (NC01B1), which forms part of the John Taolo Gaetsewe District Municipality (formerly known as the Kgalagadi District Municipality). Neighbouring towns and villages include Olifantshoek, Beeshoek, Postmasburg and Dingleton. The main industries in the region include mining (mainly of manganese ore, iron ore and tiger's eye), agriculture (mainly cattle, sheep, goat and game farming) and tourism.

Project Description

Khumani has an approved Mining Right in terms of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA).

Regulation 23 of the MPRDA states in Section 1(a), that subject to subsection (4), the Minister must grant a mining right if the mineral can be mined optimally in accordance with the mining work programme. The mine has been awarded a Mining Right by the Department of Mineral Resources and Energy (DMRE) and therefore has an obligation to give effect to the following:

The ongoing development and improvement of the Mining Work Programme which details the planned mining activities to be followed in order to mine the mineral resource optimally; and

Optimal mining of minerals must be undertaken, as the Minerals and Petroleum Board may recommend to the Minister to direct the holder of a mining right to take corrective measures if the Board establishes that the minerals are not being mined optimally in accordance with the Mining Work Programme. The Minister may, on the recommendation of the Board, suspend or cancel a Mining Right if the Minister is convinced that any act or omission by the holder justifies the suspension or cancellation of the right.

The projects in question are required as a result of ongoing optimisation, improved product management and improvement of logistics on site. It is the intention of Khumani to initiate certain additional infrastructure and activities on site. These will include:

- Project 1: King Mine Optimisation
- Project 2: King Mine KM02 Mine Residue Stockpile Rehabilitation
- Project 3: New Bruce Block A & B Off-Grade ROM Stockpile
- Project 4: Product Stockpile Formalisation
- Project 5: Discard Low Grade Stockpile Design Change
- Project 6: Khumani Photovoltaic Solar Plant

Project 1 comprises the expansion of the King Opencast Pits as ongoing optimisation of the opencast practices. Project 1, further results in the need to increase the height of the approved King/Mokaning Low Grade ROM Stockpile to cater for the ongoing expansions of the opencast pits. Due to the ongoing rehabilitation practices such as backfilling being undertaken by the mine, the proposed height increase should be noted as a last resort, where pits are not available for backfilling. Due to the high iron ore grades at the King Pits specifically, care is taken in terms of backfilling to ensure that potential resources are not sterilised. Where backfilling is possible during the operational phase this is preferred to reduce waste deposition and financial provision for rehabilitation.

Project 2, on the other hand, caters for the formal rehabilitation of the approved KM02 Mine Residue Stockpile ([Waste Rock Dump [WRD]. Engineering designs for this activity have been finalised and will be submitted as part of the environmental authorisation application process.

Project 3 is applied for to improve logistics on site as the Bruce mining operations are moving towards the south, as per the approved Mining Work Programme. A new Block A & B Off-Grade ROM Stockpile is therefore proposed to be located closer to the current opencast pits. At the current Beneficiation Plant at Parsons, the mine experiences the haphazard stockpiling of product, which is a result of washing practices during plant shutdown and clean up.

In order to manage this area more effectively, it is recommended that this area be formalised as a product stockpile (Project 4) to avoid unnecessary contamination and subsequent loss of iron ore product.

Project 5 involves the reduction of the Discard Low Grade Stockpile (Discard Dump) design footprint as approved during 2016. This expansion has not been implemented as of yet and only requires the amendment of the approved designs as per the 2016 Environmental Authorisation. Dry pans (as presented in the 2011 National Freshwater Ecosystem Priority Areas (NFEPA) Database are located in the south and south-western corner of the facility. For this reason, the facility's design was reassessed to avoid the 500m Zone of Regulation in terms of GN509 of the National water Act (Act No. 36 of 1998) (NWA).

The final project, Project 6 involves a new Photovoltaic (PV) Solar Plant to the north of the existing Railway Loop.

The paragraphs which follow hereunder provide a brief summary of the proposed activities/ infrastructure associated with each Project –

Project 1a – King Mine Optimisation (KM01 Opencast Pit Expansion)

- Expansion of the existing King KM01 Opencast Pit by 87ha (to be known as KM016).
- The King Opencast Pits are projected to be mined up until 2039. KM015, the deepest of the King Opencast Pits, is projected to reach a maximum mining elevation of 930 mamsl, or approximately 280m below the pre-mining surface. The KM016 Opencast Pit will be to the same depth.
- Backfilling will be undertaken as part of the operational phase as and when opencast pits become available. Backfilling is an approved activity in terms of the 2009 Environmental Management Programme (EMPr) approval.

Project 1b – King Mine Optimisation (King/Mokaning Low Grade ROM Stockpile Height Increase)

- No footprint expansion is planned for the increase in height of the current King/Mokaning Low Grade ROM Stockpile. The height of this stockpile is to be increased from 70m to 90m, whilst the overall slope of 1:3 will be maintained. This will cater for the ongoing expansions of the opencast pits. Due to the ongoing rehabilitation practices, such as backfilling, being undertaken by the mine, the increase should be noted as a last resort, where opencast pits are not available for backfilling. Due to the high iron ore grades at the King Opencast Pits specifically, care is taken in terms of backfilling to ensure that potential resources are not sterilised.

Project 2: King Mine KM02 Mine Residue Stockpile Rehabilitation

The Licence Holder has an approved WRD, the KM02 Mine Residue Stockpile (WRD), located just southeast of the Paste Disposal Facility. This Mine Residue Stockpile is approved in terms of the Environment Conservation Act (Act No. 73 of 1989) (ECA) Environmental Authorisation, 2006, as well as the MPRDA EMPr and associated authorisation, 2006, and also the Water Use Licence (WUL), 2013 (which superseded the 2008 WUL):

- Permit 43/2006 for the development of an iron ore opencast mine with all associated infrastructure.
- MPRDA Record of Decision (ROD) 2007 for the new Mining Operation and associated Environmental Management Programme (EMP) dated February 2006.
- WUL: 10/D41J/BC1J/2122, dated 16 March 2013.

This Mine Residue Stockpile was established due to the opencast mining activities which gave rise to the KM02 Opencast Pit. This opencast pit is currently being backfilled as part of the Paste Disposal Facility development and no further mining of this pit is undertaken. The Mine Residue Stockpile is therefore dormant and has been identified as one of the key rehabilitation activities which the mine should focus on as part of the 2019 and 2020 Annual Rehabilitation Plans. The mine has therefore appointed engineers to design the final closure design for this facility. It is a requirement and commitment by the mine to rehabilitate the Mine Residue Deposits and therefore this project is a legal requirement to be implemented.

Based on the results from the 2018 waste characterisation, the Engineers, as well as Hydrogeologists are of the opinion that the mine residue material is relatively inert. Additionally, it would be prejudicial to the mine to classify the waste rock material as a Type 3 waste due to the slight exceedance of the Total Concentration Thresholds (TCT0) and Leachable Concentration Threshold (LCT0) values. A subsequent study was conducted by Pro Earth Solutions (PES) during 2022. The outcomes of the study stated: "It must be noted that the total concentrations of the elements mentioned above barely exceeded the TCT0 limits and were far below the TCT1 limits. In addition, all of leachable concentrations with the exception of the two Bruce Facility samples were under the LCT0 limit. And the leachable concentrations of the two Bruce Facility samples were far below the LCT1 limit. It is the opinion of PES that it would be unfair to the mine to classify the waste as a Type 3 based on these results for the following two reasons. Firstly, the limits prescribed in the legislation is not scientifically based and secondly the elements that do exceed the TCT0 limits and LCT0 limits are common across all of the samples, and this could be due to these elements naturally being present in higher concentration in the mineral composition of soils present on this mine. Therefore, stating the natural soils on this mine would have to disposed of in a Waste Facility with a Class C barrier would not be the Best Practical Environmental Option (BPEO). PES would recommend that a Type 4 waste classification is considered for the management of these waste streams. However, this will have to be confirmed with the relevant authorities."

The mine likewise has permission to use this same material for backfilling of the mine voids in terms of the EMPr, and also in terms of the submitted Integrated Water and Waste Management Plans (IWWMPs). With this in mind, and the fact that the EMPr requires only a topsoil capping for the waste facility, the Engineering specialists recommended that a Class D landfill is applied to the Mine Residue Deposit together with a 150mm layer of topsoil, as per the EMPr.

The following key considerations must be noted as part of this project:

- The total final rehabilitated footprint will be 903,171 m^2. This side slope will be cut back at the time of rehabilitation to provide a more stable side slope of 1:3. The discard facility will have a maximum average height of approximately 30m.
- The Mine Residue is regarded as inert.
- Surface water management around the facility will be managed using channels and a paddock system which will be unlined.
- One of the paddocks will be lined and will serve as a water storage pond.

Project 3: New Bruce Block A & B Off-Grade ROM Stockpile

This project will involve the development of a new Off-Grade ROM Stockpile on the farm Bruce. The current Low Grade ROM Stockpile is located towards the northern-most portion of the farm property and requires extensive travelling distances relating to the BB and BC Opencast Pits, with the BA Opencast Pit furthest to the north. The mine has therefore identified an additional area located in close proximity to the current opencast pits for the construction of the new Bruce Block A & B Off-Grade ROM Stockpile. The proposed facility will be about 55ha in size and will be associated with berms and paddocks to manage clean and dirty water systems. It is not foreseen that additional roads will be required as access roads to this area are already in place.

Project 4: Product Stockpile Formalisation

- The mine experiences the haphazard stockpiling of product at the current Beneficiation Plant at Parsons, which is a result of washing practices during plant shutdown and clean up.
- In order to manage this area for effectively, it is recommended that this area of about 5ha be formalised as a product stockpile to avoid unnecessary contamination and subsequent loss of iron ore product.

Project 5: Discard Low Grade Stockpile Design Change

- The Discard Low Grade Stockpile (Discard Dump) has an approved footprint of 387ha. The new design will result in a reduction in size to 258ha.

- The current approved Discard Low Grade Stockpile is developed as a dry stockpile and at capacity will have a maximum vertical height of approximately 30m (approved legal limit). The proposed design will result in a smaller footprint as was initially planned.
- The general infrastructure associated with the Discard Low Grade Stockpile will include:
    - Two access ramps (east and west) and a conveyor ramp will provide access to the top surface of the Discard Low Grade Stockpile.
    - The ring road (unpaved gravel road) will provide access to the access ramps, as well as the toe line of the Discard Low Grade Stockpile.
    - Approved catchment paddocks located along the final toe line of the Discard Low Grade Stockpile will collect silt and run-off from its side slopes. The runoff will be allowed to evaporate and infiltrate from the paddocks. The side slope geometry for the dump can be summarised as follows:
        - Temporary side slope angle (angle of repose) = approximately 1(v):1.4(h)
        - Recommended final side slope angle = 1(v):3(h)
        - The final top surface elevations for the dump will be:
            - 1 230 mamsl (minimum) & 1 233 mamsl (maximum)
            - Conveyor platform = 1 232.75 mamsl
            - The discard material is currently stockpiled with a conveyor on the existing Discard Low Grade Stockpile. The discard material is then distributed and placed with haulage trucks in designated areas. Various parts of the dump are subsequently compacted to varying amounts by the trafficking of earthmoving vehicles including trucks and bulldozers.

<u>Project 6: Khumani Photovoltaic Solar Plant</u>

The project will involve the following:

- 40MW PV Solar Plant;
- Storage facility (dangerous goods) in excess of 80m^3, but less than 500m^3;
- Electricity distribution (22kV line);
- The required area for the PV Solar Plant is between 60 to 90ha with all ancillary infrastructure resulting in an area of all inclusive with the Solar plant not exceeding 100ha (depending on the outcomes of the specialist studies);
- Water will be required about four (4) times a year for cleaning (water from the existing approved boreholes at Parson will supply this water and no additional water is required). This water will likely be stored in JoJo tanks or steel Braithwaite tanks;
- The option for the possible location of the PV Solar Plant currently most preferred in terms of various environmental considerations, is Option A, the area where current borrow pits are located.

The area where the Explosives Silos (Parson) are located will be decommissioned in terms of the 2018 Environmental Authorisation, and this area may be utilised as a potential laydown area, thereby avoiding further vegetation clearance.

Listed Activities

In terms of the National Environmental Management Act, 1998 (NEMA), there are three (3) listing notices which should be considered for this application. These listing notices were amended during April 2017. Listing Notice 1 (Regulation 983) activities require a Basic Assessment Process, whereas Listing Notice 2 (Regulation 984) activities require a full Environmental Impact Assessment (EIA) Process. Listing Notice 3 (Regulation 985) activities require a Basic Assessment Process if the area falls within certain geographic zones. Listing Notice 3 is now applicable to Khumani, but only on the western portion of the mine, where protected areas have been proclaimed within 5km from this area.

The following table details the listed activities relevant to this project:

Table i: Listed Activities being considered

Name of Activity	Extent (Ha)	Listed Activity (Y or N)	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations	Is a WML Required?	Applicable Listing Notice 921	Is a WUL Required?
General: Consolidation of existing Environmental Authorisations as well as the amendment of administrative conditions (such as the streamlining of internal and external audits for the various Environmental Authorisations and Environmental Management Programmes [EMPr's])	-	-	A Consolidated and Integrated Environmental Authorisation and Waste Management Licence (WML) in terms of Regulations 29 and 31 of the EIA Regulations, Section 24 of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and Section 45 of the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEMWA.	N	-	N
Project 1a: King Mine Optimisation: KM01 Opencast Expansion • Expansion of the existing King KM01 Opencast Pit by 87ha (to be known as KM016). • Topsoil will be stored on the existing topsoil stockpiles on King. • The King Opencast Pits are projected to be mined up until 2039. KM015, the deepest of the King Opencast Pits, is projected to reach a maximum mining elevation of 930 mamsl or approximately 280m below the pre-mining surface. The KM016 pit will be to the same depth. • Backfilling with material from the opencast pit expansions will be undertaken as part of the operational phase as and when opencast pits become available. Backfilling is an approved activity in terms of the 2009 Environmental Management Programme (EMPr) approval.	87ha	Y	**Listing Notice 1**, Activity 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse. (This will be dependent on the outcomes of the Freshwater Ecosystem Study, whether pans exist in this area). **Listing Notice 1**, Activity 48: The expansion of infrastructure where the physical footprint is expanded by 100m^2 or more, where such expansion occurs within a watercourse. (This will be dependent on the outcomes of the Freshwater Ecosystem Study that will determine whether pans exist in this area). **Listing Notice 2**, Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— the undertaking of a linear activity.	N – Backfilling is an approved activity.	-	To be determined – backfilling is currently being applied for as part of the 2022 Technical WUL Amendment. Should wetlands be identified in this area, the required Section 21(c) & (i) water uses will be applied for.

Name of Activity	Extent (Ha)	Listed Activity (Y or N)	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations	Is a WML Required?	Applicable Listing Notice 921	Is a WUL Required?
Project 1b: King Mine Optimisation: King/Mokaning Low Grade Stockpile Height Increase • No footprint expansion is planned for the increase in height of the current King/Mokaning Low Grade ROM Stockpile. The height of this stockpile is to be increased from 70m to 90m, whilst the overall slope of 1:3 will be maintained. This will cater for the ongoing expansions of the opencast pits. It should be noted that this project will be implemented only where backfilling is not possible. Due to the high iron ore grades at the King Opencast Pits specifically, care is taken in terms of backfilling to ensure that potential resources are not sterilised.	No increase in footprint, increase in height from 70m to 90m (20m increase)	Y	**Listing Notice 1,** Activity 34: The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution. *Note – the above activity is included pre-empting the promulgation of the NEMWA based on the National Environmental Management Laws Amendment Act (Act No. 02 of 2022) (NEMLAA). Note that it is acknowledged that Mine Residue Deposits are proposed to be removed from the NEMWA based on the 2022 NEMLA which was published in Government Gazette 46602, 24 June 2022. As the NEMWA Regulations have not been published caution is taken by including this project as a NEMWA listed activity.* **Listing Notice 2**, Activity 6: The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent.	Y	No increase in footprint – only height increase; a 1:3 slope will be maintained. **Category A**: Activity 13 – The expansion of a waste management activity listed in Category A or B of this Schedule which does not trigger an additional waste management activity in terms of the Schedule. *Note that it is acknowledged that Mine Residue is proposed to be removed from the NEMWA based on the National Environmental Management Laws Amendment Act (Act No. 02 of 2022) (NEMLAA) which was published in Government Gazette 46602, 24 June 2022. As these NEMWA Regulations have not been published caution is taken by including this project as a NEMWA listed activity. However, should the NEMLAA be published, this activity will not be relevant under the NEMWA and will be managed in terms of the required regulations as guided by the Competent Authority.*	Y – S21(g)
Project 2: King Mine KM02 Mine Residue Stockpile Rehabilitation • Rehabilitation of the King KM02 Mine Residue Stockpile	87ha	N	-	Y	**Category A**, Activity 14: The decommissioning of a facility for a waste management activity listed in Category A or B of this Schedule. *Note that it is acknowledged that Mine Residue is proposed to be removed from the NEMWA based on the 2022 NEMLA which was published in Government Gazette 46602, 24 June 2022. As the NEMWA Regulations have not been published with incorporating the NEMLA caution is taken by including this project as a NEMWA listed activity. However, should the NEMWA be published, this activity*	A WUL is not required, however the closure design of this Mine Residue Deposits must be approved by the Department of Water and Sanitation (DWS).

Name of Activity	Extent (Ha)	Listed Activity (Y or N)	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations	Is a WML Required?	Applicable Listing Notice 921	Is a WUL Required?
					will not be relevant under the NEMWA and will be managed in terms of the required regulations as guided by the Competent Authority.	
Project 3: New Bruce Block A & B Off-Grade ROM Stockpile . This facility is the proposed run of mine to supply the Beneficiation Plant and will have a footprint of about 55ha. This activity may require the expansion of existing roads or the construction of new roads.	55ha	Y	**Listing Notice 1**, Activity 24: The development of a road—with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road—which is 1 kilometre or shorter. **Listing Notice 1,** Activity 34: The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution. **Listing Notice 1,** Activity 56: The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre—where the existing reserve is wider than 13,5 meters; or where no reserve exists, where the existing road is wider than 8 metres. **Listing Notice 2**, Activity 6: The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent. **Listing Notice 2**, Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—the undertaking of a linear activity.	-	As this is a ROM Stockpile, it is not considered a Mine Residue Deposit.	Y Section 21(g)

Name of Activity	Extent (Ha)	Listed Activity (Y or N)	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations	Is a WML Required?	Applicable Listing Notice 921	Is a WUL Required?
Project 4: Product Stockpile Formalisation • At the current Beneficiation Plant at Parson, the mine experiences the haphazard stockpiling of product, which is a result of washing practices during plant shutdown and clean up. • In order to manage this area, it is recommended that this area of about 5ha be formalised as a product stockpile to avoid unnecessary contamination and subsequent loss of iron ore product.	5ha (no clearance required)	Y	**Listing Notice 1**, Activity 34: The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution, or effluent.	N	-	Y Section 21(g)
Project 5: Discard Low Grade Stockpile (Discard Dump) Design Change • The Discard Low Grade Stockpile has an approved footprint of 387ha. The new design will result in a reduction in footprint area to 258ha. • The Discard Low Grade Stockpile is being developed as a dry stockpile. The Discard Low Grade Stockpile will have a maximum vertical height of approximately 30m (approved legal limit).	Reduction in footprint – new design	NEMA	NEMA Part 1, Regulation 29: "An environmental authorisation may be amended by following the process prescribed in this Part if the amendment; Will not change the scope of a valid environmental authorisation nor increase the level or nature of the impact, which impact was initially assessed and considered when the application was made for an environmental authorisation; or Relates to the change of ownership or transfer of rights and obligations". *Note – This project is already approved in 2016 EA for the expansion of activities which requires a WUL (Activity 5 of GN R545, 18 June 2010). Due to this authorisation, and this project only requiring the reduction of footprint Activity 34 under Listing Notice 1 is not regarded as applicable, as no expansion is proposed.*	N	-	Y Section 21(g)
Project 6: Khumani Photovoltaic (PV) Solar Plant • 36.8MW(AC)-44.21MW (DC) Solar Farm; • Storage facility (dangerous goods) in excess of 80m^3;	60-100ha	Y	**Listing Notice 1,** Activity 11: The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.	N	Old batteries will be stored on site, for removal by licensed waste removal companies.	Y Section 21(b) for storage of clean water, Section 21(c) & (i) depending on

Name of Activity	Extent (Ha)	Listed Activity (Y or N)	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations	Is a WML Required?	Applicable Listing Notice 921	Is a WUL Required?
• Electricity distribution (22&44kV lines); • Area for the PV Solar Plant between 60-100ha (depending on the outcomes of the specialist studies); • ≤1ha area for site office and Operations and Maintenance (O&M) buildings; • Area occupied by on-site substation (existing – 7 551m^2); • Heigh of on-site substation complex infrastructure: To be determined; • Type of batteries: Lithium-ion; • Battery Storage Facility: 38MW(AC)-33.546MWh(DC), Containers not stacked and will cover an area less than 1ha; • Generation capacity of the facility: Maximum installed capacity of 44.21MW of DC which would produce approximately 36.8MW of Alternating Current (AC); • Proximity to grid connection: 2.5km; • Height of grid connection: To be determined; • Portable sanitation facilities during construction and operation; • Road: ○ Option 1: Access utilising existing Silo Access road with expansion requirements (overall road length: 2.2km at 8m width);			**Listing Notice 1**, Activity 12: The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse (depending on the outcomes of the specialist studies). **Listing Notice 1,** Activity 14: The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. **Listing Notice 1,** Activity 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse (depending on the outcomes of the specialist studies). **Listing Notice 1,** Activity 24: The development of a road— with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road—which is 1 kilometre or shorter. **Listing Notice 1**, Activity 56: The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre— (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres.			outcomes of specialist studies

Name of Activity	Extent (Ha)	Listed Activity (Y or N)	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations	Is a WML Required?	Applicable Listing Notice 921	Is a WUL Required?
○ Option 2: Access utilising existing farm road (overall length: 2.6km at 8m width); ○ Service road along power lines: approximately 2km in power line servitude); • Temporary construction areas with a combined maximum size of approximately 4ha, including: ○ a concrete batching facility; ○ temporary offices; ○ a construction yard; and ○ a laydown area.			**Listing Notice 2,** Activity 1: The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more. **Listing Notice 2**, Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— the undertaking of a linear activity. According to the South African Protected Areas Database SAPAD (2022) the Bredenkamp Nature Reserve is located approximately 2.8km west of the project area and the Brooks Nature Reserve is located approximately 6km to the west of the project area. Both these areas were proclaimed in 2018. The South African Conservation Areas Database (SACAD) (2022) and National Protected Areas Expansion Strategy (NPAES) database (2018) do not indicate any other conservation areas or NPAES Focus Areas within a 10km radius. **Listing Notice 3**, Activity 4 states: The development of a road wider than 4 metres with a reserve less than 13,5 metres. (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA [National Environmental Management: Protected Area Act, Act No 57 of 2003] or from the core areas of a biosphere reserve, excluding disturbed areas. **Listing Notice 3**, Activity 10 states: The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a			

Name of Activity	Extent (Ha)	Listed Activity (Y or N)	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations	Is a WML Required?	Applicable Listing Notice 921	Is a WUL Required?
			biosphere reserve – this activity is unlikely based on the following: Furthermore, as confirmed by the "Guideline to EIA Regulations, 10 October 2012" unit of the Department of Environmental Affairs, the identified activities relating to storage of dangerous goods, will not be triggered by the proposed Battery Energy Storage System (BESS) installation, due to the following: • A battery is not deemed to be a container; and • The function of these batteries is deemed to be similar to transformers within substations: converting high voltage electricity to lower voltage electricity for further distribution. The function of the battery is not for "storage" or "storage and handling" of a dangerous good. The guideline document states that the storage of transformer oil in containers meeting the threshold will trigger this activity, however a transformer itself cannot be defined as a container or a storage facility and for this reason neither a transformer or a battery triggers a listed activity. It is requested that the DMRE provide guidance on this matter. **Listing Notice 3**, Activity 18 states: The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre outside urban areas and should consider (gg) (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.			

Note: All listed activities presented in italic are included as the specific requirement for these have not been finalised. These will be determined once the final layouts and specialists studies are available.

Aim and Motivation of the Project

Projects 1 to 5 are considered as improvement project to optimise the mining process, as well as to improve and meet Environmental Management Principles and Environmental Management Programme Closure Objectives. These projects in itself will not create additional employment opportunities, but will result in improved mining and environmental management principles. By not undertaking Projects 1 to 5, the mine will lose the opportunity to improve and optimally mine on site.

Specifically considering not implementing Project 2 (KM02 Mine Residue Stockpile Rehabilitation), will result in not meeting the objectives of the approved EMPr, 2009. It is a requirement and commitment by the mine to rehabilitate the Mine Residue Deposits and therefore this project is a legal requirement to be implemented.

Project 6 is the most greenfields project associated with this overall Environmental Authorisation Application. This project is considered a R1.25 billion rand capital investment. By not implementing this project, the mine loses the opportunity to fulfil and assist in the electricity needs, not only within the local setting but also in achieving the national grid objectives. The no-go alternative will not contribute to national renewable energy development targets and policy imperatives, as also stipulated in the Presidential Speech dated 25 July 2022. The implementation of Project 6 will contribute towards energy supply stability and security to the benefit of local residential electricity consumers as well as farmers and businesses, by reducing the mine's demand on the local electricity grid. In addition to this the project aims to employ approximately 200 employees during the Construction Phase at its peak, with 40 permanent employees during the Operational Phase.

Based on the evaluation of alternatives and specialists' assessment, it seems most likely that the overall positive impacts of the proposed activities would outweigh negative impacts if the proposed mitigation measures and management actions are implemented according to the specialist recommendations and EMPr, which will be developed for this project.

Environmental and Social risks and negative impacts would primarily arise at a local scale and site level and could be managed and controlled if the recommendations to be made in the EIA and EMPr are followed, as no fatal flaws have been identified at this phase of the investigations.

This project will further significantly reduce the Eskom Load Requirement from the mine. During the financial year 2021 and 2022 the mine used 200 799 039kWh. The mine had to work on a load reduction bases which required Black Rock Manganese Mine (also owned by Assmang) (Black Rock) to generate electricity through generators and supply to Eskom on behalf of the Assmang group. The electricity that Blackrock generated on behalf of Khumani was 6 965KWh (2.4mil liter diesel). The Solar Farm Project will therefore result in a significant positive contribution by reducing the need for electricity generation by means of generators and in so reduce the diesel usage requirements, a strong Carbon Footprint benefit.

Alternatives Considered

In terms of Projects 1 – 5, no alternatives are available as these project relate to existing projects and infrastructure. However some considerations for each of the projects have been made as part of this ESR. The key area for which alternatives and desirability are relevant is for Project 6 – PV Solar Plant.

For all the projects, the importance of mining in the economic setting of Local Municipalities must be considered with both the Gamagara and Tsantsabane Local Municipality IDPs stating that mining is one of the key contributors to the GDP of these municipalities.

<u>Project 1: King Mine Optimisation; Project 3: New Bruce Block A & B Off-Grade ROM Stockpile; and Project 4: Product Stockpile Formalisation</u>

An important consideration to keep in mind is the obligation of the mine to fulfil its Mining Works Programme. Section 23(1)(a) of the MPRDA states in Section 1(a), that subject to subsection (4), the Minister must grant a mining right if the mineral can be mined optimally in accordance with the mining work programme. The Mine has been awarded a Mining Right by the DMR (now DMRE) and therefore has an obligation to give effect to the following:

- The ongoing development and improvement of the Mining Work Programme which details the planned mining activities to be followed in order to mine the mineral resource optimally; and
- Optimal mining of minerals must be undertaken, as the Minerals and Petroleum Board may recommend to the Minister to direct the holder of a mining right to take corrective measures if the Board establishes

that the minerals are not being mined optimally in accordance with the Mining Work Programme. The Minister may, on the recommendation of the Board, suspend or cancel a mining right if the Minister is convinced that any act or omission by the holder justifies the suspension or cancellation of the right.

Projects 1, 3 and 4, together with the ongoing opencast mining operations, will give effect to the requirements of Section 23 of the MPRDA, as well as ensure the continuation of mining activities as an economic activity within the Local Municipalities.

Project 2: King Mine KM02 Mine Residue Stockpile Rehabilitation

The rehabilitation of the KM02 Mine Residue Stockpile gives effect to the approved Closure Objectives of the EMPr, as approved in 2009. The intent of the proposed rehabilitation is to ensure that the facility is stable and to ensure that the final land use objectives are achieved. The greater part of the mine will have the capability of at least grazing land, including the areas where grazing land currently exists, once closure is achieved. The rehabilitated Paste Disposal Facility and the deep unrehabilitated opencast voids will, however, not be used as grazing land due to the moderately steep side slopes where erosion could occur if grazed and due to safety factors, and for this reason is indicated as "restricted". It is a requirement and commitment by the mine to rehabilitate the Mine Residue Deposits and therefore this project is a legal requirement to be implemented.

Project 5: Discard Low Grade Stockpile Design Change

The current approved footprint of the Discard Low Grade Stockpile encroaches over two (2) identified pans. The redesign of the facility will result in the protection of these two (2) systems.

Project 6: Khumani Photovoltaic Solar Plant

Need for alternative energy

Power generators input into the national Grid have been raised on a National Level. For the Gamagara Local Municipality in which the proposed PV Solar Farm is planned, the IDP (2020/2021) specifically states that the provision of infrastructure and basic services is one of the key performance areas and infrastructure remains a challenge.

Opportunity for Solar

According to the Global Solar Atlas, the area in which the PV Solar Plant is planned has a yearly total of between 1899 to 2045kW/h/kWp.

Locality for Solar Farm

An overall area of approximately 285ha is available on Portion RE of the farm Parson. This area is not planned for future mining and will therefore not result in the potential to sterilise reserves. Within this 285ha area, three (3) distinct blocks (A, B and C) for specialist investigation were identified to find the most suitable area for this facility. Within these blocks, the developer (NEC XON) has indicated the preferred site based on the location and placement of infrastructure (green block).

The site location has:

- Excellent Solar Energy Resource (see previous section);
- Low rainfall and a dry climate;
- Flat slope which is preferred for a PV installation;
- Sufficient availability of usable area to make provision for any constraints that may arise during the environmental authorisation process and to avoid such areas;
- In close proximity to the mine's substation;
- Surface land is owned by the mine;
- Access roads are available to the site;
- Not located in a CBA or specific sensitive areas; and

- Current land use is characterised by grazing and surrounding mining activities.

For each of these option blocks the following environmental aspects were considered:

- Soil Setting;
- Terrestrial Ecological Setting;
- Freshwater Ecosystem Setting;
- Hydrological Setting
- Visual Setting;
- Noise and Vibration Setting;
- Heritage and Paleontological Setting; and
- Social Setting (Residential).

Table ii: Listed Activities being considered

Environmental Consideration	Option A	Option B	Option C	Preferred Option by Developer	Key Concerns
Soil, Land Use and Land Capability	1	3	4	2	No to negligible concerns
Terrestrial Ecological Setting	2	1	3	4	Option A is associated with *Senegalia-Tarchonanthus* Bushveld, Non-watercourse habitat (within the Freshwater habitat), and Transformed Habitat. The Preferred PV Plant option is associated with habitats that provide favourable conditions for several SCC, *Senegalia-Tarchonanthus* Bushveld, Watercourse habitat (within the Freshwater habitat), and Transformed Habitat. The key concern is impacts on the watercourse.
Freshwater Ecosystems	1	3	2	4	Form a Freshwater Ecosystem Setting, no watercourses were identified directly within Options A, B or C, however, an episodic drainage line is partially located within the preferred option, and the associated riparian zone marginally encroaches into Site B. In addition an episodic drainage line is within 21m of the northern border of Site C.
Hydrological Considerations	1	2	4	3	A site selection process was undertaken to determine the solar site option that would have the least disturbance from a surface water perspective.
Visual Considerations	2	4	1	3	The most favourable site was selected based on the least visual receptors followed by the smallest visible area.
Vibration Considerations	2	3	4	1	The most favourable site was selection based on the distance of receptors from the PV Solar Plant.
Heritage Considerations	2	3	4	1	Consideration of the presence of heritage artefacts.
Other considerations					
River Crossings (power lines)	Y	N	N	Y	-
River Crossings (existing roads)	Y	Y	Y	Y	-
Total	**11**	19	22	18	Option A – preferred option from an environmental perspective. The key considerations are to avoid the freshwater ecosystems/watercourses and high significance heritage resources.

Based on the above, and with the opportunity to further avoid sensitive environments associated with the preferred site, Option A, the following is recommended:

- New power line river crossings are avoided;
- Existing farm road river crossings must be applied for, if owned by the mine;
- Avoidance of the 100m river buffer;
- Avoidance of heritage artefacts.

Initially an area of about 60-70 ha will be developed for the Solar Plant (Recommended Site), (detailed infrastructure layout will be available during the EIA reporting) whereafter in the near future the Solar Plant may be extended by a further 30ha, resulting in an area of about 90ha – this is into Block B, but will avoid the watercourses and heritage resources. To avoid a phased approach application, this EIA and Specialist studies, are considering both the recommended site, as well as the future expansion site for clearance. No designs or infrastructure layouts for this expansion will be available during the EIA Phase as yet. Should the design phases indicate that additional listed activities are triggered once the next phase becomes in place, the necessary amendments will be applied for. It is important to note that for the purposes of this study, the potential future powerline over the identified watercourse will be assumed to be undertaken not to impede or alter a watercourse (i.e. pylons outside of watercourses) – should this not be possible a water uses licence may be triggered for this activity specifically.

Infrastructure Alternatives

Two (2) alternative power line routes from the Solar Farm to the mine substation are proposed:

- Power line Option 1: 2 540m
- Power line Option 2: 3 420m

Both the power lines start and end at the same location; the final route will only be concluded upon the final design of the proposed PV Solar Plant, as it will depend on the requirements of the existing railway line loop and final outcomes of the specialist studies

Technological Alternatives

The two (2) photovoltaic (PV) technology alternatives considered by the mine are fixed mounting and tracking mounting structures. Typically, in a tracking system, the panels are mounted on a steel rack and a tracking motor is placed at the end of the array to control the tilt and movement of the panel as required to track the sun. The mounting structure influence the exposure of the PV panels to sunlight with single axis tracking systems, dual axis tracking systems, and fixed tilt mounting structure.

Battery Considerations

The project design team indicated that the lithium-ion batteries will be used. No other alternative was considered. The proposed lithium-ion technology was chosen due to the following reasons:

- Lithium – ion technology is very mature in the market with multiple global references
- There are multiple Tier 1 manufacturing and supply companies
- Availability to supply and support in a global market
- Lithium-ion provides great versatility (Power and Energy Applications)
- Energy density
- Charge rate
- 20 years of global market experience
- Minimised financial risk

Application and Consultation Process

The application for the Environmental Authorisation Process was submitted to the Department of Mineral Resources and Energy (DMRE) on 30 August 2022. A letter of acknowledgement from the DMR must be issued within 10 days from the submission of the application (Acknowledgement still to be received), at the time of

compiling this draft report the acknowledgement was not received, but proof of delivery is available. Once the application was submitted the stakeholder consultation process was initiated with the following steps:

- Identification of existing stakeholders on the existing database;
- In accordance with GNR 982 Section 41(2)(a-b) a site notice was developed and placed at six (6) locations, in order to inform surrounding communities and adjacent landowners of the proposed project, the site was placed on 31 August 2022 and at visible locations close to the site.
- Key stakeholders, who included the following sectors, were directly informed of the proposed development by e-mail and fax through the submission of the Background Information Document and Registration Sheet:
    - Authorities;
    - Municipalities;
    - Residential Associations;
    - Non-governmental organisations;
    - General Public;
    - Parastatals / Service providers, and
    - Adjacent Landowners.
- In accordance with GN. R 982 41(2)(c) of Chapter 6 an advert was placed in the Kathu Gazette on 31 August 2022.

The Draft ESR was made available to all registered stakeholders from 9 September 2022 to 10 October 2022. A period of 30 days was awarded for comments during the Scoping Phase. All comments received have been included into the final ESR, which is submitted to the Competent Authority, the DMRE, for consideration, prior to initiating the EIA process.

As part of the consultation process, all aspects relating to the Water Use Licence Application and any potential Heritage Resources Aspects in terms of the Heritage Resources Act will be considered.

The following comments have been received on the Environmental Scoping Report from registered Stakeholders:

No.	Theme: General Comments / Issues			
	Issue Raised	**Date and How Issue Was Raised**	**Commentator**	**Response**
1	Registration sheet included the following information and questions: • As farmer on property close to the mine any large project and the effect on the environment is of interest. • Environmental impact on areas around the mine • Information on listed projects	Registration sheet sent via email: dated 5 September 2022	Jaco Koorzen: Farmer	An e-mail response was sent on 5 September 2022 which read as follows: Thank you for the registration sheet. It was received. Additional information regarding the proposed projects will be provided as part of the draft Scoping Report which will be made available for a 30-day review period. You will be notified of the availability of the document.
2	Is this a Tender for Projects and Construction of a New Photovoltaic Solar Plant?? Are we Tendering?? Only Question I have.	E-mail sent: dated 5 September 2022	Tebogo Moemedi	The notification is for an Environmental Impact Assessment for Khumani Iron Ore Mine. An e-mail response was sent on 5 September 2022 which read as follows: ASSMANG (PTY) LTD: KHUMANI IRON ORE MINE: PROPOSED CAPITAL PROJECTS, NEAR KATHU, NORTHERN CAPE PROVINCE NOTICE OF AN ENVIRONMENTAL AUTHORISATION APPLICATION: PUBLIC PARTICIPATION PROCESS You are hereby notified of the commencement of the Environmental Impact Assessment Process and associated Public Participation Process for the proposed Khumani Iron Ore Mine: Capitals Project and proposed Photovoltaic Solar Plant. The proposed projects include the following: Project 1: King Mine Optimisation Project 2: King Mine KM02 Mine Residue Stockpile Rehabilitation Project 3: New Bruce Block A & B Off-Grade ROM Stockpile Project 4: Product Stockpile Formalisation Project 5: Discard Low Grade Stockpile Design Change Project 6: Khumani Photovoltaic Solar Plant Envirogistics (Pty) Ltd. has been appointed as the Environmental Assessment Practitioner to undertake the environmental authorisation process, and Batho Earth has been appointed to conduct the public participation process and stakeholder engagement. Find attached a Background Information Document (BID) and locality map with more detailed information. Please complete the included registration sheet and return to Batho Earth (ingrid@bathoearth.co.za and diana@bathoearth.co.za).

No.	Theme: General Comments / Issues			
	Issue Raised	**Date and How Issue Was Raised**	**Commentator**	**Response**
				Please also indicate any additional representatives of your organisation and/or Interested and Affected Parties that should become involved in the process. A Background Information Document was attached.
3	As landowner of farm Maxdale, I have the following concerns regarding the construction of the Project 6: Khumani Photovoltaic Solar Plant: Destruction of the current access road leading to homesteads on Maxdale and Fouriesville farms (specifically with regards to Option C) • Moving the access road will result in increased dust at homestead since current vegetated area serve as buffer. • Traffic levels have already increased since land adjacent to Maxdale is leased to tenants. • Increased traffic levels pose higher threat of livestock and associated theft.	Formal Letter send via e-mail on 10 October 2022.	Mr Attie Hoffman - Farm Maxdale	The comments have been forwarded to the project team for consideration. Note that the operation of the solar plant will not result in large increases in traffic on the road. Consideration of the access road will be given in the development of the project.
4	Destruction or partial destruction of vegetation buffer between Khumani mine and Maxdale • Increased vibrations from Khumani crushers. • Increased operational noise levels from Khumani Mine. • Increased visibility of mining and other infrastructure.	Formal Letter send via e-mail on 10 October 2022.	Mr Attie Hoffman - Farm Maxdale	This project will not result in any changes or increases in the existing plant area. The concerns regarding operational noise and visibility relating to this project have been forwarded to the relevant specialist for consideration.
5	Decline in natural wildlife • Pangolins, tortoises, nightjars, hedgehogs and snakes (Pofadders) frequent the area.	Formal Letter send via e-mail on 10 October 2022.	Mr Attie Hoffman - Farm Maxdale	A detailed ecological study will be undertaken as part of this project. The concerns have been forwarded to the appointed specialists.
6	Damage to river system • Hazardous spillages run-off will contaminate river system. • Increased alien species (Prosopis).	Formal Letter send via e-mail on 10 October 2022.	Mr Attie Hoffman - Farm Maxdale	No releases to watercourses are planned as part of the project. No activities relating to hazardous substances will be undertaken within the 1:100 year floodline of the Gamagara. A detailed ecological study will be undertaken as part of this project. The concerns have been forwarded to the appointed specialists.
7	I would like to lodge our concerns with regards to the construction of Project 6: Khumani Photovoltaic Solar Plant.	Formal Letter send via e-mail on 10 October 2022	Mr Jaap Hoffman - Farm Fouriesville	Comment Noted. The comments received from Mr J Hoffman – owner Farm Fouriesville on 10 October 2022 was included into the final Scoping report. The final scoping report will be submitted to the DMRE for review, including the concerns raised.
8	The construction of said solar plant will result in bush clearing of the current buffer zone between the homesteads on both Fouriesville and Maxdale, which will result in increased noise and dust levels from Khumani mine. Solar panels and associated infrastructure further negatively impact the visual aesthetic of an area, and the clearance of natural vegetation poses the threat of increased alien flora species such as Prosopis sp. already present upstream of said farms on Khumani landholding.	Formal Letter send via e-mail on 10 October 2022	Mr Jaap Hoffman - Farm Fouriesville	A detailed ecological study will be undertaken as part of this project. The concerns have been forwarded to the appointed specialists.
9	Option C slopes towards the river buffer area and sedimentation and/or other hazardous spillage (construction related hazardous substances and/or herbicides applied) run-off may detrimentally affect the river system. The perennial Gamagara river system currently contains standing water and several water-associated bird species have been observed breeding between the sedges. Herpetofauna species are also present.	Formal Letter send via e-mail on 10 October 2022	Mr Jaap Hoffman - Farm Fouriesville	No activities relating to hazardous substances will be undertaken within the 1:100 year floodline of the Gamagara.
10	Option C will further result in the demolition of the current access road to both Fouriesville and Maxdale and would require an alternative access road to be identified and constructed.	Formal Letter send via e-mail on 10 October 2022	Mr Jaap Hoffman - Farm Fouriesville	Consideration of the access road will be given in the development of the project. It is currently not foreseen that any demolition of access roads will be undertaken as part of this project.
11	Observances of Ground Pangolin (Smutsia temminckii) along the current access road towards these homesteads can be confirmed for 2022. Despite the destruction of their current home range, electric fencing usually associated with these developments threatens their survival. Secretary birds (Sagittarius serpentarius) have also been observed along the river edges and Puff adder (Bitis arietans) and Nightjars along the access route to homesteads in the past.	Formal Letter send via e-mail on 10 October 2022	Mr Jaap Hoffman - Farm Fouriesville	A detailed ecological study will be undertaken as part of this project. The concerns have been forwarded to the appointed specialists.

Key Potential impacts

Positive Impacts

The following key positive impacts are foreseen:

- The operation of the mine due to the lawful construction of the activities will allow the mine to operate within the legal realm of the Environmental Legislation;
- The construction of the various activities will ensure that the mining environment is safe and well designed to optimise the mining operations;
- The development of the new Bruce Block A & B Off-Grade ROM Stockpile will allow for improved logistics on site in terms of shorter travelling distance as the mine progresses to the south, as well as the opportunity for long-term ongoing mining and beneficiation activities;
- The expansion of the King KM01 Opencast Pit makes provision for the optimal mining of iron ore resources as part of the approved Mining Works Programme, with the King/Mokaning Low Grade ROM height increase in height allowing for improved logistics on site in terms of shorter travelling distance;
- The rehabilitation of the KM02 Mine Residue Stockpile gives effect to the Closure Commitment of the mine to ensure that facilities are rehabilitated. By rehabilitating the facility during the Operational Phase, operational costs can be utilised and thereby reducing the requirement for an increase in the financial provision for closure;
- The formalisation of the product area in the existing Beneficiation Plant area is undertaken to improve housekeeping in this area and also to improve general environmental management. The formalisation of this area will also improve the provision to reprocess the material more effectively;
- The Solar Farm Development not only will ensure sustainable electricity supply to the mine, but will also form part of the overall initiatives in South Africa to promote the use of renewable energies and thereby reduce the demand on the Eskom Grid. This may have far reaching possible impacts on the local municipality as well; and
- The activities mentioned above allow the mine to operate, invest in the local municipal setting, be a key employment supplier in the area, and participate as one of South Africa's chrome supply mines.

With any activity where invasive tasks will take place, such as site clearance and constructions, negative impacts may arise. As part of this project various initial or potential impacts have been identified in the four (4) tables before. Specialist studies are currently underway to assess each of the project areas in detail to determine the possible impacts and associated management measures required. For the purpose of the ESR, the current available information and the experience of the EAP were used to identify potential impacts and management measures.

Potential Negative Impacts

The key potential negative impacts which may/will arise and for which management measures have been recommended are, but still require confirmation by specialists are:

Geology

- No impacts have been identified.

Topography

- The increase in the Low-Grade ROM Stockpile and the development of a new facility will alter the topography of the area permanently.

Soils

- Vegetation clearing within the proposed areas as part of site preparation prior to commencement mining and related of activities, leading to soil disturbances and risk of erosion of exposed soils.
- Potential risk of soil erosion and disposal of waste on soil resources, leading to altered soil chemistry and quality.
- Contamination resulting from spillages of hydrocarbons and heavy metals.
- Movement of heavy machinery/ construction vehicles off existing/demarcated roads, leading to soil compaction.

Ecology

- Site clearing and construction activities will lead to habitat destruction within the footprint areas and will likely lead to the loss of floral and faunal species in the footprint areas, consequently impacting on the terrestrial biodiversity in the adjacent habitats.
- Vegetation clearance and constructions activities may result in the loss of faunal and floral SCC within the impacted areas.
- Potential indiscriminate fires by construction personnel may lead to uncontrolled/ run-away fires, impacting on floral and faunal communities.
- Construction and introduction of foreign material (e.g. soil) may lead to the further introduction of alien and invasive plant species, impacting on the floral characteristics within the natural areas remaining on the mine.
- Vehicles may impact upon the sensitive habitat during construction and operation, resulting in a loss of habitat. Vehicular movement and construction activities, could additionally cause increased erosion, leading to poor vegetation growth, consequently providing sub-optimal living conditions for faunal species.
- Dumping of construction and operational waste materials in the surrounding habitat will result in floral and faunal habitat changes, which is likely to push faunal species out of their current home ranges, resulting in an increased competition for space and resources in the areas surrounding the footprints.
- Earthworks may lead to increased runoff and erosion resulting in a further loss of faunal and floral habitat.
- Increased personnel on site may result in an increased risk of harvesting/overutilisation of medicinal and endangered floral species. Moreover, increased personnel inherently bring a higher risk of poaching activities, threatening the current faunal populations.

Freshwater Ecosystems

- Increased sedimentation and erosion of watercourses situated within 500m of the existing Discard Low Grade Stockpile.

Hydrology

- Erosion and consequent increase in Total Suspended Solids (TSS) in surrounding watercourses.

Hydrogeology

- No specific impact has been identified as a concern in terms of this project.

Air Quality

- Creation of a bare areas and the generation of dust.

Visual Impacts

- The presence of the new PV Solar Plant and the increase in the heights of the stockpiles, as well as the additional facility in the landscape, changing the topographic and visual characteristics of the area.
- Additional night lighting from the PV Solar Plant.
- Dust generation.

Heritage and Palaeontology

- Currently the projects will be developed in a manner not to impact on any Heritage Artefacts and environments.

Plan of Study for EIA

The Draft ESR was made available for comment to all registered stakeholders from 9 September 2022 to 10 October 2022. All comments received have been included into this final ESR. The draft EIA/EMPr will again be made available to all stakeholders and it is further proposed that a stakeholder meeting or focus meeting be held either in person or virtually to present the projects to registered stakeholders.

The aspects of the project that will be assessed in the EIA phase are those considered by the EAP as having the potential to result in environmental and social impacts. They include:

- Clearing of vegetation in an area regarded as sensitive;

- Proximity of activities to watercourses in the area;
- Removal of topsoil and the associated loss thereof in an area which has a negative topsoil balance;
- Impact on animals along the current open spaces;
- Visual impacts;
- Impacts on surrounding landowners, in terms of noise and vibration;
- Release of dust due to clearance activities; and
- Loss of heritage resources in an area not currently assess for this purpose.

The various projects which will therefore be considered will be the:

- Upgrades of roads;
- Expansion of KM01 Open Cast Pit;
- Increase in the height of the King/Mokaning Low Grade ROM Stockpile;
- Rehabilitation of the KM02 Mine Residue Stockpile;
- Construction of the proposed new Bruce Block A & B Off-Grade ROM Stockpile;
- Reduction in size of the Discard Low Grade Stockpile deign footprint (approved activity, only design change to avoid pans);
- Construction of the PV Solar Plant.

Specialist studies will be undertaken to determine the impact and potential flaws of the projects within the current environmental setting. Note that the specialist studies will also make recommendations to the amendment of activity layouts should these be required. The following specialist studies will be undertaken:

- Engineering designs for the Mine Residue Deposits;
- No waste classification will be undertaken as prior waste classifications have indicated all the waste at Khumani as Type 3 wastes, and with the Leachable Concentrations (LC) these can be motivated as Type 4;
- Soil, Land Use and Land Capability Study;
- Hydrogeological studies, including a numerical model;
- Hydrological study (including water balance and Stormwater Management Plan);
- Freshwater and Aquatic Assessment;
- Terrestrial Biodiversity (fauna and flora) Assessment ;
- Heritage and Palaeontological Assessment;
- Air Quality Assessment (including dispersion model);
- Noise and Vibration Assessment;
- Social Impact Assessment; and
- Visual Impact Assessment.

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mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

FINAL ENVIRONMENTAL SCOPING REPORT

FOR LISTED ACTIVITIES ASSOCIATED WITH MINING RIGHT AND/OR BULK SAMPLING ACTIVITIES INCLUDING TRENCHING IN CASES OF ALLUVIAL DIAMOND PROSPECTING.

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

NAME OF APPLICANT:	**Khumani Iron Ore Mine (Pty) Ltd**
TEL NO:	**+27 (0) 53 372 8000**
FAX NO:	**+27 (0) 53 723 8599**
POSTAL ADDRESS:	**PRIVATE BAG X 503, KATHU, NORTHERN CAPE**
PHYSICAL ADDRESS:	**Khumani Iron Ore Mine, Dingleton Road, Kathu**
FILE REFERENCE NUMBER SAMRAD:	**Mining Right Reference Number: NC30/5/1/2/3/2/1/070**

IMPORTANT NOTICE

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

Unless an Environmental Authorisation can be granted following the valuation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental management Act (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

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

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

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

OBJECTIVE OF THE SCOPING PROCESS

1) The objective of the scoping process is to, through a consultative process—

- identify the relevant policies and legislation relevant to the activity;
- motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;
- identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- identify the key issues to be addressed in the assessment phase;
- agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
- identify suitable measures to avoid, manage, or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

SCOPING REPORT

The application for the Environmental Authorisation Process was submitted to the Department of Mineral Resources and Energy (DMRE) on 30 August 2022. A letter of acknowledgement from the DMRE has not as yet been received from the DMRE, please refer to Annexure 1 for the proof of submission. In addition to this, an online submission on SAMRAD was also undertaken on 6 September 2022 with reference number NC-00233-MR/102 issued by the system. The Draft Environmental Scoping Report (ESR) was submitted to all Commenting Authorities, Stakeholders and the Competent Authority for a review period of 30 days, which commenced on 9 September 2022 and concluded on 10 October 2022. All comments received during the commenting period have been included into the Final ESR for submission to the DMRE.

Please refer to Appendix 1 for the submitted application form and proof of submission.

1 CONTACT PERSON AND CORRESPONDENCE ADDRESS

1.a Details

1.a.i Details of the Environmental Assessment Practitioner (EAP)

Table 1: Details of EAP

Name	Tanja Bekker
Designation	Environmental Assessment Practitioner
Postal Address	PO Box 22014, Helderkruin, 1733
Physical Address	21 Gladiolus Street, Roodekrans, 1724
Telephone Number	+27 (0) 82 412 1799
Cell Phone Number	+27 (0) 82 412 1799
Fax Number:	+ 27 (0) 86 551 5233
Email Address	tanja@envirogistics.co.za

1.a.ii Expertise of the EAP

The following table presents a summary of the Environmental Assessment Practitioner's (EAP) experience:

Table 2: Experience of EAP

Name	Position	Qualification	Professional Registrations	Experience
Tanja Bekker	Principal Environmental Assessment Practitioner	M.Sc. Environmental Management (RAU, now University)	Registered member of the Environmental Assessment Practitioners Association of South Africa (EAPASA; Reg No. 306/2019) Registered Professional Natural Scientist (Pr.Sci.Nat) with the South African Council of National Scientific Professions (SACNASP; Reg No. 400198/09) Member of International Association of Impact Assessors (IAIA) Member of the Environmental Law Association of South Africa	20 Years

Please refer to Appendix 2 for the EAP's Curriculum Vitae.

Education

M.Sc. Environmental Management - RAU (University of Johannesburg)
B.Sc. Geography Honours - RAU (University of Johannesburg)
B.Sc. Earth Sciences (Geography & Geology) – RAU (University of Johannesburg)

Career Enhancing Courses

ISO 14000 Lead Auditors Course (WTH Management)
Certificate in Project Management (Pretoria University)
Management Advance Programme (MAP 81) (Wits Business School)

Professional Affiliations

Certified member of Environmental Assessment Practitioners Association of South Africa
Certified ISO 14001 Environmental Management System Auditor
Registered as a Professional Natural Scientist,

Member of the South African affiliate of the International Association for Impact Assessment
Member of the Environmental Law Association of South Africa (ELA).

Summary of the EAP's past experience

Ms. Bekker is registered as a Professional Natural Scientist in the field of Environmental Science with the South African Council for Natural Scientific Professions (SACNASP) and is also a Registered Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioners Association of South Africa (EAPASA), a legal requirement stipulated by the National Environmental Management Act, 1998 (NEMA). She is further certified as an ISO 14001 Lead Auditor. Her qualifications include BSc. Earth Sciences (Geology and Geography), BSc. Hons. Geography, and MSc. Environmental Management. In addition to these tertiary qualifications, she obtained a Certificate in Project Management, and completed the Management Advancement Programme at Wits Business School.

With more than 20 years' working experience in environmental management and the consulting industry and managing various Large Account Clients, she understands the South African Regulatory System, and can advise clients with due diligence on their environmental regulatory requirements and offer a solution driven service to their project life cycle. She is equipped with exceptional project management and coordination skills, which especially enhances the service she offers clients within the environmental permitting system.

Her key focus is environmental management and compliance with extensive experience in the mining industry. Project Management and Coordination of projects form a critical component of her duties, which include project planning, initiation of projects, client, authority and stakeholder consultation, specialist coordination, budget control, process control, quality control and timeframe management. Her interest lies in a client advisory capacity, being involved during due diligence investigations, pre-project development and assisting the client and engineering team in adding value to develop the project in an environmentally sustainable manner, considering client costs and liabilities, as well as considering the implication of environmental authorisation conditions and requirements on project deliverables. Her involvement in projects has spanned over the project life cycle from Due Diligence Investigations, Pre-Feasibility Investigations, Prospecting Right Applications, Mining Right Applications, Environmental Reporting and implementation and auditing of Environmental Management Plans and Authorisations.

1.a.iii Details of the Applicant

Khumani Iron Ore Mine (hereafter referred to as "Khumani", or "the mine") is owned by Associated Manganese Mines of South Africa Limited (Assmang).

Khumani has an approved Mining Right, granted by the now Department of Mineral Resources and Energy (DMRE) in January 2007 for mining activities associated with iron ore. Khumani comprises of four (4) farms, namely Parson 564 (including Police Camp 693) (Portions RE, 2, 8 and 9), King 561 (Portions RE), Bruce 544 (Portion RE) and Mokaning 560 (Portions RE, 1, 2, 3, and 4), hereafter referred to as "Parson", "King", "Bruce" and "Mokaning" respectively.

The Mining Right is located over portions of the farms King, Bruce and Mokaning. The overall mining area, however, also includes the farm Parson, where the plant infrastructure, product- and low-grade stockpiles, explosives magazine and main offices are situated. The farm Parson does not form part of the Mining Right and therefore no mining activities are undertaken over this farm.

Construction activities at Khumani commenced during June 2006, with an environmental approval in terms of the Environment Conservation Act, 1989 (Act No. 73 of 1989) (ECA), while operational activities on the farm Bruce commenced during May 2007.

Khumani is an opencast Iron Ore Mine and is classified as a Primary Risk Class: A, which relates to the mining of base metals (including iron ore) for a Large Mining Operation, which includes a mine, mine waste, plant and plant waste.

The mining operations include opencast mining operations, within seven (7) opencast pits, from where the Run of Mine (ROM) is trucked to a primary crusher and is transported via conveyor to the secondary and tertiary crushers, with the latter located at the Beneficiation Plant on the farm Parson. Material is washed and screened in the Beneficiation Plant, where the final product is stockpiled for rail transport to either Saldanha for export (via the Ore Export [OREX] Line) or Gqeberha (previously Port Elizabeth) for local markets (via Transnet Fright Rail [TFR]). Low grade material, arising from the opencast operations are placed on Low-Grade ROM Stockpiles, and

earmarked for reprocessing in the future, depending on market requirements. The same is undertaken for discard material arising from the Beneficiation Plant.

Waste material from the beneficiation process is pumped through a series of thickeners to the Paste Disposal Facility located on the farm King. Additional ancillary mine infrastructure has been constructed, such as the main offices, access roads, haul roads, power lines, fences for security purposes, etc. The mine has, over the past number of years, invested in the delineation of its primary catchment areas for the purposes of designing a detailed clean and dirty water management system for the mine. One of the key purposes of this system is water conservation. The region in which the mine is located is characterised as a water negative environment, i.e. evaporation exceeds precipitation. The mine is committed to reuse as much water as possible, not only from an environmental and sustainability viewpoint, but also due to the fact that the mine is reliant on purchasing water from the Sedibeng Water Supply (Pipeline) Scheme, which is currently considered to be an unreliable source of water supply, having often resulted in the mine not having access to water. Water from the storm water system is utilised as a dust suppressant over roads, in combination with roads also being treated with an environmentally friendly dust suppressant.

The mining infrastructure associated with each farm of the Mining Right is detailed as follows:

Parson:

- Rapid Load Out Facility;
- Product Stockpile Area;
- ROM Stockpile Area;
- Discard Stockpile (to be known as the Low-Grade Stockpile);
- Plant Area (Original Beneficiation Plant and the Wet, High-Intensity Magnetic Separation [WHIMS] Plant);
- Plant Offices;
- Main Offices;
- Third Party Stockpile Area
- Workshop Areas;
- Explosive Magazine (operated by Sasol Nitro) – currently being decommissioned and relocated to the Bruce Mine under an approved Environmental Authorisation;
- Sewage Facilities (Packaging Plants);
- Conveyors;
- Storm Water Management Infrastructure (channels and dams);
- Borrow Pits; and
- Contractor Workshop Areas.

Bruce:

- Primary Crusher;
- Secondary Crusher;
- Mine Workshops;
- Offices;
- Overland Conveyors;
- Sewage Facilities (Packaging Plants);
- Contractor Workshop Areas;
- Opencast Operations (five main opencast pits – BA05, BB01, BC01, BC02, BC03);
- Topsoil Stockpile;
- Barrier Pillar Mining operations;
- Panhandle Dump;
- Explosives Magazine;
- ROM Stockpiles;
- Low-Grade ROM Stockpile; and
- Storm Water Management Infrastructure (channels and dam).

King/ Mokaning:

- Paste Disposal Facility;
- Topsoil Stockpile;

- Low Grade ROM Stockpiles – the King/Mokaning Low Grade ROM Stockpile is specifically to be increased in height as part of this project;
- Waste Rock Dump (WRD) – KM02 Mine Residue Stockpile is planned to be rehabilitated as part of this project;
- Contractor Workshop Areas;
- Opencast Pits (two main opencast pits – KM01, KM02) – expansion of KM01 Opencast Pit currently being planned as part of this project;
- Primary and Secondary Crusher;
- ROM Stockpiles
- Sewage Facilities (Packaging Plants);
- TFR Diversion has been completed and the decommissioned Port Elizabeth Railway Line is being dismantled;
- River Diversion associated with the TFR Diversion;
- Mine Workshops; and
- Offices.

Linear Activities Connecting the Farms Include:

- Pipelines;
- Conveyors;
- Roads; and
- Power lines.

Table 3: Details of Applicant

Project applicant:	Assmang (Pty) Limited		
Registration no (if any):	Assmang (Pty) Limited - Khumani Iron Ore Mine		
Trading name (if any):	1935/007343/06		
Responsible Person, (e.g. Director, CEO, etc.):	Dirk Coetzee		
Contact person:	Dirk Coetzee		
Physical address:	Khumani Iron Ore Mine, Dingleton Road, Kathu		
Postal address:	PRIVATE BAG X 503, KATHU, NORTHERN CAPE		
Postal code:	8446	Cell:	083 459 7580
Telephone:	053 372 8000	Fax:	053 723 8599
E-mail:	dirk.coetzee@assmang.co.za		

1.a.iv Environmental Authorisations

The mine is operating with all required environmental authorisations in terms of the following:

Table 4: List of Environmental Authorisations

#	Legislation	Licence	Reference	Date
1	Environmental Conservation Act, 1989 (ECA)	The development of an Iron Ore Opencast Mine with all associated infrastructure	43/2006	12 June 2006
2	Mineral and Petroleum Resources Development Act, 2002 (MPRDA)	Approval of proposed mining activities associated with the submitted Mining Right at the BKM Mine	NC30/5/1/2/3/2/1/070EM	25 January 2007
3	MPRDA	Environmental Authorisation for the mining of Barrier Pillars between Khumani and Sishen Iron Ore Mines	NC30/5/1/2/3/2/1/070EM	2008
4	NWA	Water Use Licence (replaced by the 2013 WUL)	719242	21 November 2008
5	National Environmental Management Act, 1998 (NEMA)	Proposed Expansion of capacity, railway line diversion and the establishment of a local railway siding	47/2009	29 July 2009
6	National Environmental Management: Waste Act, 2008 (NEMWA)	Hazardous Waste Storage and General Waste Disposal Facilities	12/9/11/L812/8	27 March 2010
7	MPRDA	Railway line diversion and the establishment of a local railway siding	NC30/5/1/2/3/2/1/070EM	17 February 2011

#	Legislation	Licence	Reference	Date
8	MPRDA	Amendment of the EMPr with Environmental Authorisations	NC30/5/1/2/3/2/1/070EM	14 May 2012
9	NEMA	Expansion of Diesel Storage and silo for Explosives, construction of a tar road, additional refuelling station, storm water dams and storage tanks.	37/2012	23 July 2012
10	National Water Act, 1998 (NWA)	Water Use Licence	10/D41J/BC1J/2122	16 March 2013
11	NEMA	Offgrade 2 Plant	56/2013	27 November 2013
12	NEMA	Acceptance of the new Process Water Storage Dam	25/4/2(02/03/2013)	28 March 2014
13	NEMA	Khumani, Parson and King Infrastructure Expansion Project, which includes the reworking activities around the Discard Dump, expansion of the Discard Dump, expansion of the Bruce and King/Mokaning Low Grade ROM Stockpiles, Construction of the WRD J.	21/2016	6 July 2016
14	NEMA	Activities relating to the new Low Grade ROM Sorter Plant and Silo Relocation	NC30/5/1/2/3/2/1/070EM	27 July 2018
15	NEMA	Project 1: New Return Water Dam 3, Project 2: New Infrastructure (New Water Containment Facility and Pipelines, Project 3: Water Use License (WUL) amendment	NC30/5/1/2/3/2/1/070EM	25 October 2019

Copies of the Environmental Authorisations are available in Appendix 3.

1.b Description of the Property Location and Ownership

Khumani is situated 15km south of Kathu, adjacent to the Kumba Iron Ore Mine and compromises of four (4) farms, namely Parson, King, Bruce and Mokaning (please refer to figures 1 and 2).

The mine falls within two (2) Local and two District Municipalities. The farm Mokaning is situated within the Tsantsabane Local Municipality (NC085), which forms part of the ZF Mgcawu District Municipality (formerly known as the Siyanda District Municipality). The farms Parson, Bruce and King are situated within the Gamagara Local Municipality (NC01B1), which forms part of the John Taolo Gaetsewe District Municipality (formerly known as the Kgalagadi District Municipality). Neighbouring towns and villages include Olifantshoek, Beeshoek, Postmasburg and Dingleton. The main industries in the region include mining (mainly of manganese ore, iron ore and tiger's eye), agriculture (mainly cattle, sheep, goat and game farming) and tourism.

Please refer to the following table for the registered name, administrative jurisdiction and summary of location of the land.

Table 5: Property Information

Farm Name	Portion	Registration Division (RD)	Size	Surface Owner and Title Deed	Mineral Rights Ownership
Bruce No. 544	RE	Kuruman RD	2346ha	Assmang Ltd T 349 of 1954	√
	3		11ha	Transnet Ltd T 790 of 1993	√
	4		5ha	Transnet Ltd T 790 of 1993	TBD (not impacted by this project)
	5		91ha	Sishen Iron Ore Company (Pty) Ltd T 3280 of 2001	√
King No. 561	RE	Kuruman RD	2320ha	Assmang Pty Ltd T 3565 of 2017	√
	1		17ha	Transnet Ltd T 1447 of 1993	√
Mokaning No. 560	RE	Kuruman RD	542ha	Assmang (Pty) Ltd T 3565 of 2017	√
	1		652ha	Assmang Ltd T 572 of 1968	√
	2		326ha	Assmang Ltd	√

Farm Name	Portion	Registration Division (RD)	Size	Surface Owner and Title Deed	Mineral Rights Ownership
				T 572 of 1968	
	3		558.7530ha	Assmang Ltd T 572 of 1968	√
	4		279ha	Assmang (Pty) Ltd T 3565 of 2017	√
	5		16.6819ha (19.4802M)	Transnet Ltd T 414 of 1968	√
	6		21.9ha	Transnet Ltd	-
	9		13.2ha	Assmang (decommissioned railway)	√
	10		202ha	Transnet Ltd	-
Parson No. 564	RE	Kuruman RD	1879ha	Assmang Ltd T 193 of 2006	√
	2		426ha	Assmang Ltd T 3907 of 2005	-
	6		1.4076ha	Transmet Ltd T 45 of 1993	-
	9		7.5ha	Assmang Ltd	√
Police Camp No. 693	-	Kuruman RD	10.6ha	Assmang Ltd	√

Note, the details in this table is captured via the Deeds website, site information and Planet GIS Cadastral Information (SA).

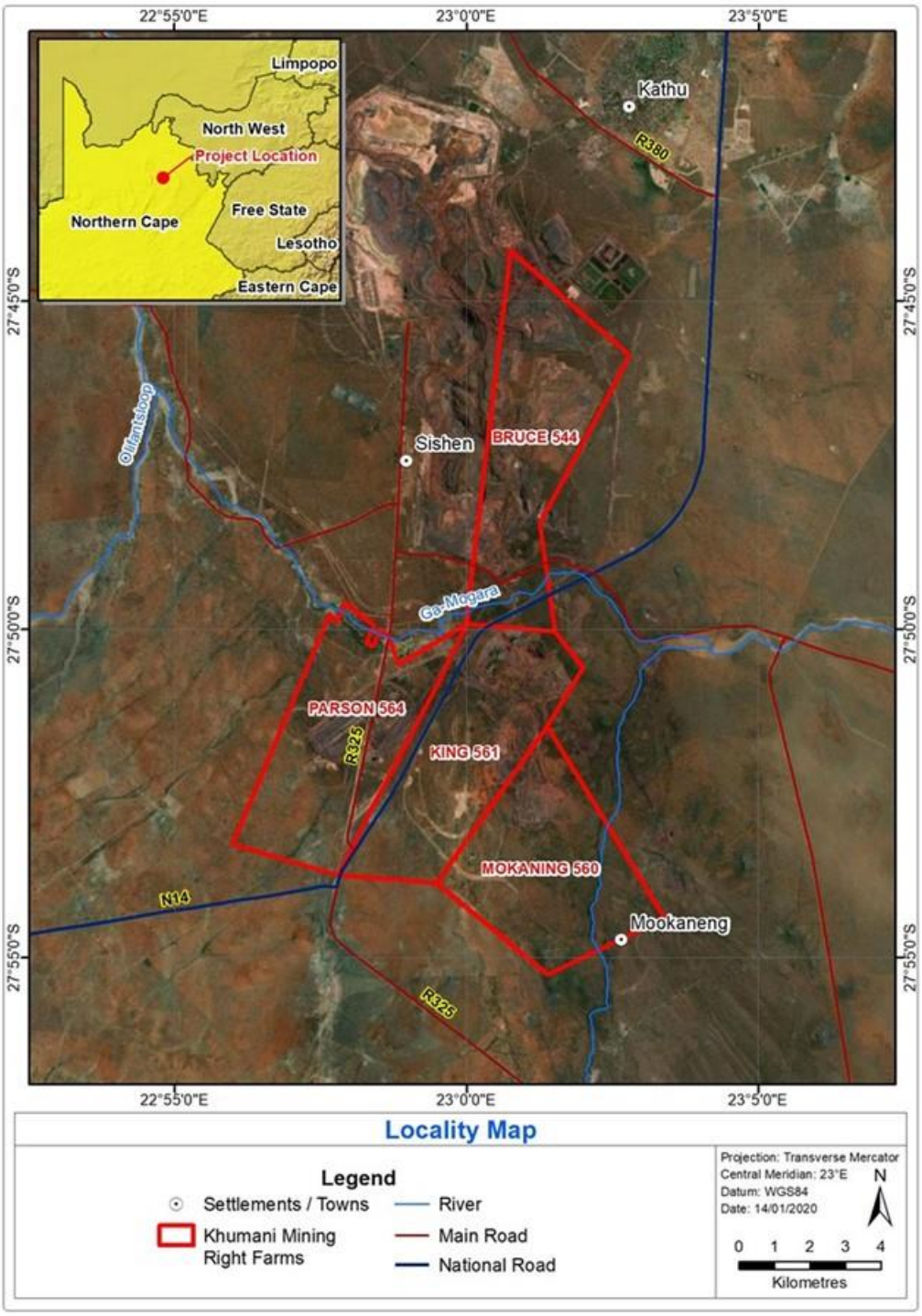


Figure 1: Project location

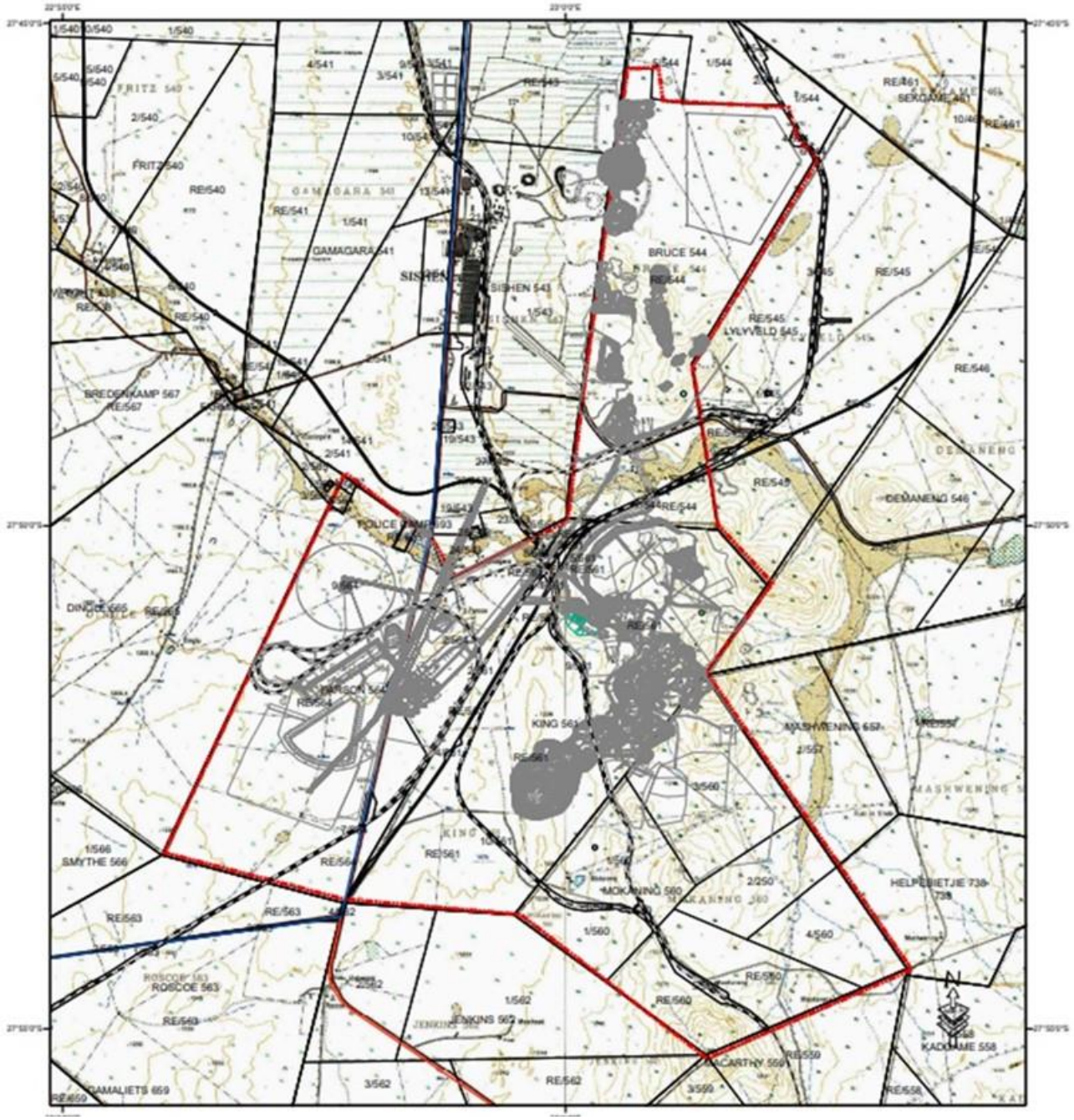


Figure 2: Cadastral Information

1.c Locality Map

The project in question comprises of six (6) stand-alone projects. These are discussed in more detail in the following section (Section 1.d). The table below introduces the location of each of the projects with a concise description of the area associated with each specific development. The location of each of the projects are presented in the figure hereafter.

Table 6: Location of Listed Activities

Farm Name:	**Farm Ownership:** - King 561, Portion RE - Mokaning 560, Portion RE - Mokaning 560, Portion 1 - Mokaning 560, Portion 2 - Mokaning 560, Portion 3 - Parson 564, Portion RE - Parson 564, Portion 2 - Parson 564, Portion 9 (new registration) - Bruce 544, Portion RE **Project 1: King Mine Optimisation** - **Project 1a**: KM01 Opencast Pit Expansion: King 561, Portion RE - **Project 1b**: King/Mokaning Low-Grade Run of Mine (ROM) Stockpile Height Increase: Mokaning 560, Portion 3 **Project 2: King Mine KM02 Mine Residue Stockpile Rehabilitation** - King 561, Portion RE **Project 3: New Bruce Block A & B Off-Grade ROM Stockpile** - Bruce 544, Portion RE **Project 4: Product Stockpile Formalisation** - Parson 564, Portion 2 **Project 5: Discard Low-Grade Stockpile Design Change** - Parson 564, Portion RE **Project 6: Khumani Photovoltaic Solar Plant** - Plant: Parson 564, Portion RE - Power line: Parson 564, Portion RE & 2 - Substation: Parson 564, Portion 2
Application area (Ha)	**Project 1a (King Mine Optimisation - KM01 Opencast Pit Expansion)** - Expansion of the existing King KM01 Opencast Pit by 87ha (to be known as KM016). - The King Opencast Pits are projected to be mined up until 2039. KM015, the deepest of the King Opencast Pits, is projected to reach a maximum mining elevation of 930 metres above mean sea level (mamsl) or approximately 280m below the pre-mining surface. The KM016 pit will be to the same depth. **Project 1b (King Mine Optimisation - King/Mokaning Low-Grade ROM Stockpile Height Increase)** - No footprint expansion planned. Height to be increased from 70m to 90m. - Overall slope of 1:3 will be maintained. **Project 2: King Mine KM02 Mine Residue Stockpile Rehabilitation** - Existing footprint of approximately 87ha – no further disturbance planned. Project comprises the rehabilitation of this facility (no vegetation clearance). **Project 3: New Bruce Block A & B Off-Grade ROM Stockpile** - New Off-Grade ROM Stockpile: about 55ha. **Project 4: Product Stockpile Formalisation** - Formalisation of Plant Product Stockpiles created during conveyor clean-up practices: 5ha (no vegetation clearance) **Project 5: Discard Low Grade Stockpile (Discard Dump) Design Change** - Approved footprint of 387ha. Reduction in size to 258ha, maximum vertical height of 30m. **Project 6: Khumani Photovoltaic (PV) Solar Plant** - Area for the PV Solar Plant between 60 and 100ha (dependent on the outcomes of the specialist reports).
Magisterial district:	Kuruman

Distance and direction from nearest town	The entrances of Bruce and Parson Mines are 16km and 23km south of Kathu, respectively, with the entrance to King Mine approximately 13km south of Kathu.

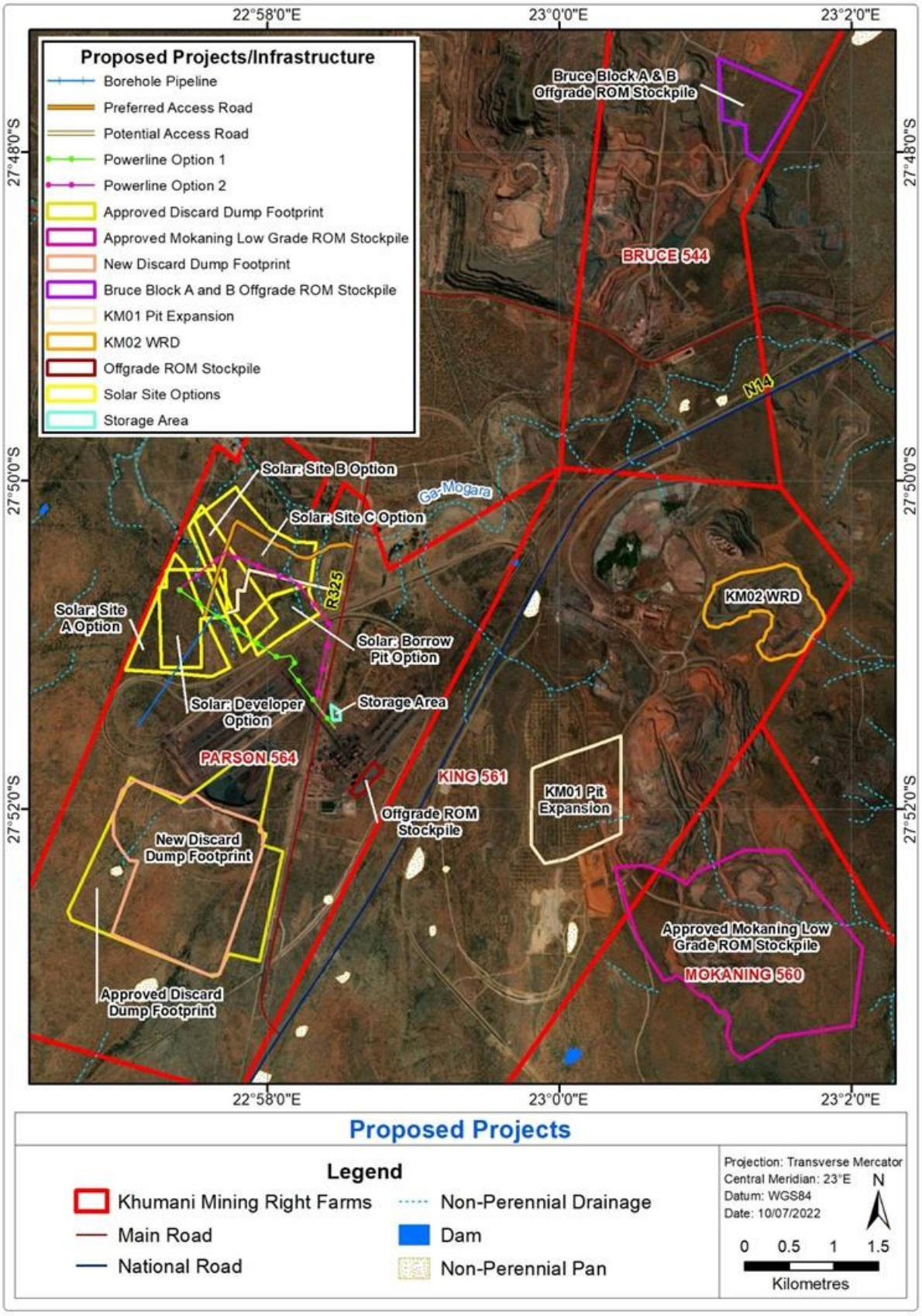


Figure 3: Location of Proposed Activities

1.d Description of the Scope of the Proposed Activity

It is the intention of Khumani to initiate certain additional infrastructure and activities on site. These will include:

- Project 1: King Mine Optimisation
- Project 2: King Mine KM02 Mine Residue Stockpile Rehabilitation
- Project 3: New Bruce Block A & B Off-Grade ROM Stockpile
- Project 4: Product Stockpile Formalisation
- Project 5: Discard Low Grade Stockpile Design Change
- Project 6: Khumani Photovoltaic Solar Plant

1.d.i Listed Activity Location and Size (also considering other Environmental Legislation)

1.d.i.1 National Environmental Management Act, 1998 (NEMA)

In terms of the National Environmental Management Act (Act No. 107 of 1998) NEMA, there are three (3) listing notices which should be considered for this application. These listing notices were amended during June 2021. Listing Notice 1 (Regulation 983) activities require a Basic Assessment Process, whereas Listing Notice 2 (Regulation 984) activities require a full Environmental Impact Assessment (EIA) Process. Listing Notice 3 (Regulation 985) activities require a Basic Assessment Process if the area falls within certain geographic zones. Listing Notice 3 is only applicable on the western portion of the mine, where protected areas are present within 5km from this area.

1.d.i.2 National Heritage Resources Act, 1999 (NHRA)

For this project, the National Heritage Resources Act (Act No. 25 of 1999) (NHRA) is of importance and the following sites and features are protected:

a) Archaeological artefacts, structures and sites older than 100 years;
b) Ethnographic art objects (e.g. prehistoric rock art) and ethnography;
c) Objects of decorative and visual arts;
d) Military objects, structures and sites older than 75 years;
e) Historical objects, structures and sites older than 60 years;
f) Proclaimed heritage sites;
g) Grave yards and graves older than 60 years;
h) Meteorites and fossils; and
i) Objects, structures and sites or scientific or technological value.

The national estate includes the following:

a) Places, buildings, structures and equipment of cultural significance;
b) Places to which oral traditions are attached or which are associated with living heritage;
c) Historical settlements and townscapes;
d) Landscapes and features of cultural significance;
e) Geological sites of scientific or cultural importance;
f) Archaeological and palaeontological importance;
g) Graves and burial grounds;
h) Sites of significance relating to the history of slavery; and
i) Movable objects (e.g. archaeological, palaeontological, meteorites, geological specimens, military, ethnographic, books, etc.).

Section 34 of the NHRA deals with structures that are older than 60 years. Section 35(4) of the NHRA deals with archaeology, palaeontology and meteorites. Section 36 of the NHRA, deal with human remains older than 60 years. Unidentified/unknown graves are also handled as older than 60 years until proven otherwise.

According to Regulation 38 of the NHRA, any development or other activity which will change the character of a site exceeding 5 000m^2 in extent requires notification to the South African Heritage Resources Agency (SAHRA).

1.d.i.3 National Environmental Management: Waste Act, 2008 (NEMWA)

Regulation 921 of National Environmental Management: Waste Act (Act No. 59 of 2008) (NEMWA), dated 29 November 2013 and as amended, makes provision for lists of waste management activities that have, or are likely to have a detrimental effect on the environment.

The establishment and expansion of a Mine Residue Deposit forms part of activities for which a Waste Management Licence (WML) is required.

Note that it is acknowledged that Mine Residue Deposits is proposed to be removed from the NEMWA based on the National Environmental Management Laws Amendment Act (Act No. 02 of 2022) (NEMLAA) which was published in Government Gazette 46602, 24 June 2022. As these Regulations have not been adopted into the NEMA and NEWA caution is taken by including this project as a NEMWA listed activity. .

1.d.i.4 National Water Act, 1998 (NWA)

Chapter 4 of the National Water Act (Act No. 36 of 1998) (NWA) specifically addresses the use of water and is a tool for an authority to ensure the implementation of the principle that National Government has overall responsibility over water resource management, including the equitable allocation and beneficial use of water in the public interest, including that a person can only be entitled to use water if the use is permissible under the Act. In general, a water use must be licensed unless it is listed in Schedule I, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a licence. Section 21 of the NWA identifies eleven (11) consumptive and non-consumptive water uses which must be authorised.

The activities associated with this project will trigger a Water Use Licence.

The activities in question and a brief location description are presented in the following table:

Table 7: Listed Activities

Name of Activity	Extent (Ha)	Listed Activity (Y or N)	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations	Is a WML Required?	Applicable Listing Notice 921	Is a WUL Required?
General: Consolidation of existing Environmental Authorisations as well as the amendment of administrative conditions (such as the streamlining of internal and external audits for the various Environmental Authorisations and Environmental Management Programmes [EMPr's])	-	-	A Consolidated and Integrated Environmental Authorisation and Waste Management Licence (WML) in terms of Regulations 29 and 31 of the EIA Regulations, Section 24 of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and Section 45 of the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEMWA.	N	-	N
Project 1a: King Mine Optimisation: KM01 Opencast Expansion • Expansion of the existing King KM01 Opencast Pit by 87ha (to be known as KM016). • Topsoil will be stored on the existing topsoil stockpiles on King. • The King Opencast Pits are projected to be mined up until 2039. KM015, the deepest of the King Opencast Pits, is projected to reach a maximum mining elevation of 930 mamsl or approximately 280m below the pre-mining surface. The KM016 pit will be to the same depth. • Backfilling with material from the opencast pit expansions will be undertaken as part of the operational phase as and when opencast pits become available. Backfilling is an approved activity in terms of the 2009 Environmental Management Programme (EMPr) approval.	87ha	Y	**Listing Notice 1**, Activity 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse. (This will be dependent on the outcomes of the Freshwater Ecosystem Study, whether pans exist in this area). **Listing Notice 1**, Activity 48: The expansion of infrastructure where the physical footprint is expanded by 100m^2 or more, where such expansion occurs within a watercourse. (This will be dependent on the outcomes of the Freshwater Ecosystem Study that will determine whether pans exist in this area). **Listing Notice 2**, Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— the undertaking of a linear activity.	N – Backfilling is an approved activity.	-	To be determined – backfilling is currently being applied for as part of the 2022 Technical WUL Amendment. Should wetlands be identified in this area, the required Section 21(c) & (i) water uses will be applied for.

Name of Activity	Extent (Ha)	Listed Activity (Y or N)	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations	Is a WML Required?	Applicable Listing Notice 921	Is a WUL Required?
Project 1b: King Mine Optimisation: King/Mokaning Low Grade Stockpile Height Increase • No footprint expansion is planned for the increase in height of the current King/Mokaning Low Grade ROM Stockpile. The height of this stockpile is to be increased from 70m to 90m, whilst the overall slope of 1:3 will be maintained. This will cater for the ongoing expansions of the opencast pits. It should be noted that this project will be implemented only where backfilling is not possible. Due to the high iron ore grades at the King Opencast Pits specifically, care is taken in terms of backfilling to ensure that potential resources are not sterilised.	No increase in footprint, increase in height from 70m to 90m (20m increase)	Y	**Listing Notice 1,** Activity 34: The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution. *Note – the above activity is included pre-empting the promulgation of the NEMWA based on the National Environmental Management Laws Amendment Act (Act No. 02 of 2022) (NEMLAA). Note that it is acknowledged that Mine Residue Deposits are proposed to be removed from the NEMWA based on the 2022 NEMLA which was published in Government Gazette 46602, 24 June 2022. As the NEMWA Regulations have not been published caution is taken by including this project as a NEMWA listed activity.* **Listing Notice 2**, Activity 6: The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent.	Y	No increase in footprint – only height increase; a 1:3 slope will be maintained. **Category A**: Activity 13 – The expansion of a waste management activity listed in Category A or B of this Schedule which does not trigger an additional waste management activity in terms of the Schedule. *Note that it is acknowledged that Mine Residue is proposed to be removed from the NEMWA based on the National Environmental Management Laws Amendment Act (Act No. 02 of 2022) (NEMLAA) which was published in Government Gazette 46602, 24 June 2022. As these NEMWA Regulations have not been published caution is taken by including this project as a NEMWA listed activity. However, should the NEMLAA be published, this activity will not be relevant under the NEMWA and will be managed in terms of the required regulations as guided by the Competent Authority.*	Y – S21(g)
Project 2: King Mine KM02 Mine Residue Stockpile Rehabilitation • Rehabilitation of the King KM02 Mine Residue Stockpile	87ha	N	-	Y	**Category A**, Activity 14: The decommissioning of a facility for a waste management activity listed in Category A or B of this Schedule. *Note that it is acknowledged that Mine Residue is proposed to be removed from the NEMWA based on the 2022 NEMLA which was published in Government Gazette 46602, 24 June 2022. As the NEMWA Regulations have not been published with incorporating the NEMLA caution is taken by including this project as a NEMWA listed activity. However, should the NEMWA be published, this activity will not be relevant under the NEMWA and will be managed in terms of the required*	A WUL is not required, however the closure design of this Mine Residue Deposits must be approved by the Department of Water and Sanitation (DWS).

Name of Activity	Extent (Ha)	Listed Activity (Y or N)	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations	Is a WML Required?	Applicable Listing Notice 921	Is a WUL Required?
					regulations as guided by the Competent Authority.	
Project 3: New Bruce Block A & B Off-Grade ROM Stockpile • . This facility is the proposed run of mine to supply the Beneficiation Plant and will have a footprint of about 55ha. • This activity may require the expansion of existing roads or the construction of new roads.	55ha	Y	**Listing Notice 1**, Activity 24: The development of a road—with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road—which is 1 kilometre or shorter. **Listing Notice 1,** Activity 34: The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution. **Listing Notice 1,** Activity 56: The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre—where the existing reserve is wider than 13,5 meters; or where no reserve exists, where the existing road is wider than 8 metres. **Listing Notice 2**, Activity 6: The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent. **Listing Notice 2**, Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—the undertaking of a linear activity.	-	As this is a ROM Stockpile, it is not considered a Mine Residue Deposit.	Y Section 21(g)
Project 4: Product Stockpile Formalisation • At the current Beneficiation Plant at Parson, the mine experiences the haphazard	5ha (no clearance required)	Y	**Listing Notice 1**, Activity 34: The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or	N	-	Y Section 21(g)

Name of Activity	Extent (Ha)	Listed Activity (Y or N)	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations	Is a WML Required?	Applicable Listing Notice 921	Is a WUL Required?
stockpiling of product, which is a result of washing practices during plant shutdown and clean up. • In order to manage this area, it is recommended that this area of about 5ha be formalised as a product stockpile to avoid unnecessary contamination and subsequent loss of iron ore product.			provincial legislation governing the release of emissions, effluent or pollution, or effluent.			
Project 5: Discard Low Grade Stockpile (Discard Dump) Design Change • The Discard Low Grade Stockpile has an approved footprint of 387ha. The new design will result in a reduction in footprint area to 258ha. • The Discard Low Grade Stockpile is being developed as a dry stockpile. The Discard Low Grade Stockpile will have a maximum vertical height of approximately 30m (approved legal limit).	Reduction in footprint – new design	NEMA	NEMA Part 1, Regulation 29: "An environmental authorisation may be amended by following the process prescribed in this Part if the amendment; Will not change the scope of a valid environmental authorisation nor increase the level or nature of the impact, which impact was initially assessed and considered when the application was made for an environmental authorisation; or Relates to the change of ownership or transfer of rights and obligations". *Note – This project is already approved in 2016 EA for the expansion of activities which requires a WUL (Activity 5 of GN R545, 18 June 2010). Due to this authorisation, and this project only requiring the reduction of footprint Activity 34 under Listing Notice 1 is not regarded as applicable, as no expansion is proposed.*	N	-	Y Section 21(g)
Project 6: Khumani Photovoltaic (PV) Solar Plant • 36.8MW(AC)-44.21MW (DC) Solar Farm; • Storage facility (dangerous goods) in excess of 80m^3; • Electricity distribution (22&44kV lines); • Area for the PV Solar Plant between 60-100ha (depending on the outcomes of the specialist studies);	60-100ha	Y	**Listing Notice 1,** Activity 11: The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts. **Listing Notice 1**, Activity 12: The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; or (c) if no development setback exists, within 32 metres of a watercourse, measured from	N	Old batteries will be stored on site, for removal by licensed waste removal companies.	Y Section 21(b) for storage of clean water, Section 21(c) & (i) depending on outcomes of specialist studies

Name of Activity	Extent (Ha)	Listed Activity (Y or N)	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations	Is a WML Required?	Applicable Listing Notice 921	Is a WUL Required?
≤1ha area for site office and Operations and Maintenance (O&M) buildings; Area occupied by on-site substation (existing – 7 551m^2); Heigh of on-site substation complex infrastructure: To be determined; Type of batteries: Lithium-ion; Battery Storage Facility: 38MW(AC)-33.546MWh(DC), Containers not stacked and will cover an area less than 1ha; Generation capacity of the facility: Maximum installed capacity of 44.21MW of DC which would produce approximately 36.8MW of Alternating Current (AC); Proximity to grid connection: 2.5km; Height of grid connection: To be determined; Portable sanitation facilities during construction and operation; Road: o Option 1: Access utilising existing Silo Access road with expansion requirements (overall road length: 2.2km at 8m width); o Option 2: Access utilising existing farm road (overall length: 2.6km at 8m width); o Service road along power lines: approximately 2km in power line servitude);			the edge of a watercourse (depending on the outcomes of the specialist studies). **Listing Notice 1,** Activity 14: The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. **Listing Notice 1**, Activity 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse (depending on the outcomes of the specialist studies). **Listing Notice 1,** Activity 24: The development of a road—with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road—which is 1 kilometre or shorter. **Listing Notice 1**, Activity 56: The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre— (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres. **Listing Notice 2,** Activity 1: The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more. **Listing Notice 2**, Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where			

Name of Activity	Extent (Ha)	Listed Activity (Y or N)	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations	Is a WML Required?	Applicable Listing Notice 921	Is a WUL Required?
• Temporary construction areas with a combined maximum size of approximately 4ha, including: o a concrete batching facility; o temporary offices; o a construction yard; and o a laydown area.			such clearance of indigenous vegetation is required for— the undertaking of a linear activity. According to the South African Protected Areas Database SAPAD (2022) the Bredenkamp Nature Reserve is located approximately 2.8km west of the project area and the Brooks Nature Reserve is located approximately 6km to the west of the project area. Both these areas were proclaimed in 2018. The South African Conservation Areas Database (SACAD) (2022) and National Protected Areas Expansion Strategy (NPAES) database (2018) do not indicate any other conservation areas or NPAES Focus Areas within a 10km radius. **Listing Notice 3**, Activity 4 states: The development of a road wider than 4 metres with a reserve less than 13,5 metres. (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA [National Environmental Management: Protected Area Act, Act No 57 of 2003] or from the core areas of a biosphere reserve, excluding disturbed areas. **Listing Notice 3**, Activity 10 states: The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve – this activity is unlikely based on the following: Furthermore, as confirmed by the "Guideline to EIA Regulations, 10 October 2012" unit of the Department of Environmental Affairs, the identified activities relating to storage of dangerous goods, will not be triggered by the proposed Battery Energy Storage System (BESS) installation, due to the following: • A battery is not deemed to be a container; and • The function of these batteries is deemed to be similar to transformers within substations:			

Name of Activity	Extent (Ha)	Listed Activity (Y or N)	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations	Is a WML Required?	Applicable Listing Notice 921	Is a WUL Required?
			converting high voltage electricity to lower voltage electricity for further distribution. The function of the battery is not for "storage" or "storage and handling" of a dangerous good. The guideline document states that the storage of transformer oil in containers meeting the threshold will trigger this activity, however a transformer itself cannot be defined as a container or a storage facility and for this reason neither a transformer or a battery triggers a listed activity. It is requested that the DMRE provide guidance on this matter. **Listing Notice 3**, Activity 18 states: The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre outside urban areas and should consider (gg) (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.			

Note: Listed activities presented will be confirmed based on the outcomes of the various specialist studies, the input clarifications requested by the DMRE and the Alternative Assessment.

1.d.ii Description of the Projects to be Undertaken

The proposed projects in question are required as a result of ongoing optimization, improved product management and improvement of logistics at Khumani.

The following section provides a brief summary of the proposed activities/ infrastructure associated with each Project.

1.d.ii.1 Project 1a – King Mine Optimisation (KM01 Opencast Pit Expansion):

Project 1 (King Mine Optimisation) includes the expansion of the KM01 Opencast Pit at King as ongoing optimisation of the opencast practices (referred to as Project 1a). The project includes the following:

- Expansion of the existing King KM01 Opencast Pit by 87ha (to be known as KM016). This pit is approved for an area of about 405ha, with the increase the pit will be about 500ha.
- Opencast mine with blasting practices. ROM is transported via trucks to the King Crusher from where it will follow the beneficiation route towards the Beneficiation Plant.
- The King Opencast Pits are currently projected to be mined up until 2039. KM015, the deepest of the King Opencast Pits, is projected to reach a maximum mining elevation of 930 mamsl or approximately 280m below the pre-mining surface. The KM016 Opencast Pit will be to the same depth.
- Backfilling will be undertaken as part of the operational phase as and when opencast pits become available. Backfilling is an approved activity in terms of the 2009 EMPr approval.

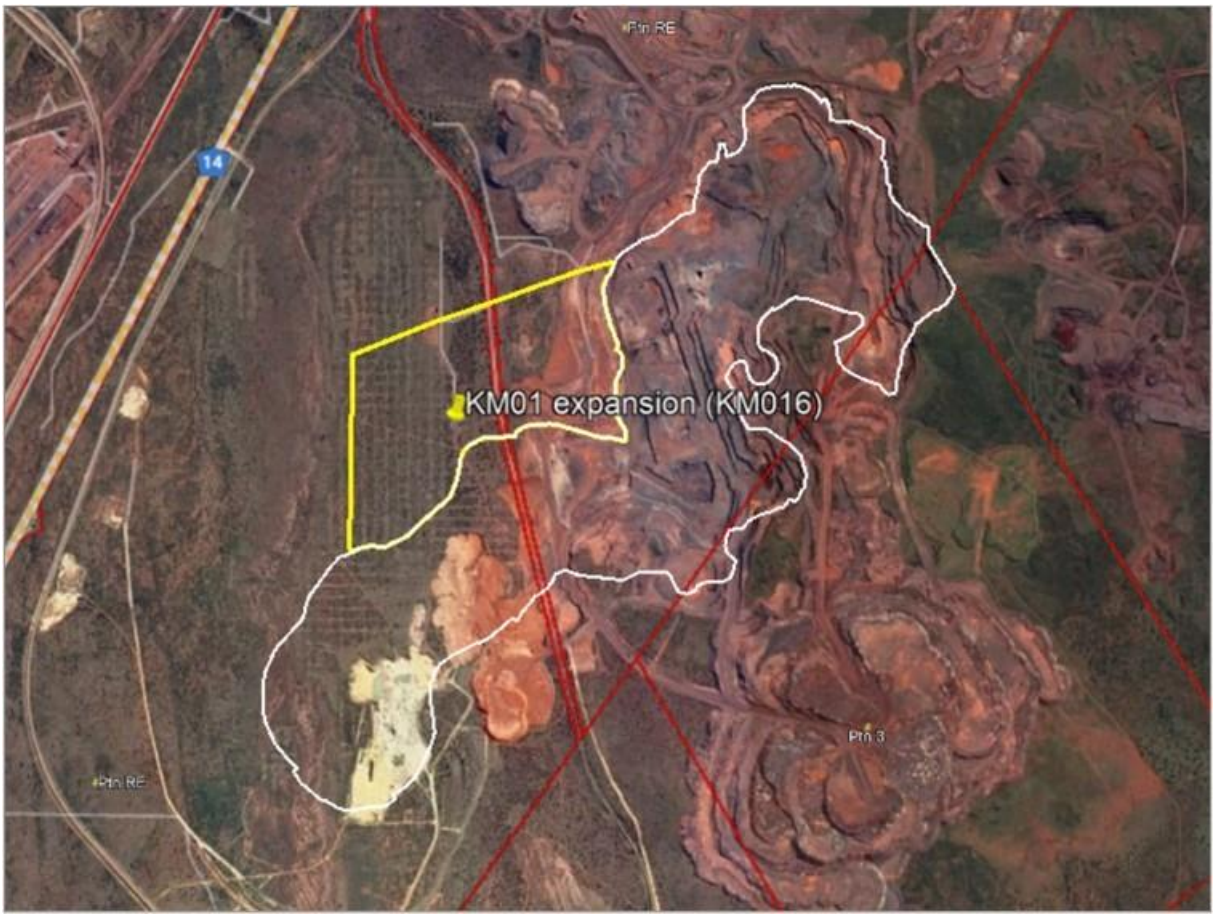


Figure 4: KM01 Opencast Pit Expansion

Table 8: KM01 Opencast Pit Expansion Project Summary

Name of Activity	Extent (Ha)	Dimensions	Coordinates	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulation – Listing Notice 3 is not applicable to this Project
Project 1a: King Mine Optimisation: Opencast Expansion • Expansion of the existing King KM01 Opencast Pit by 87ha (to be known as KM016). • Topsoil will be stored on the existing topsoil stockpiles on King. • The King Opencast Pits are projected to be mined up until 2039. KM015, the deepest of the King Pits, is projected to reach a maximum mining elevation of 930 mamsl or approximately 280m below the pre-mining surface. The KM016 pit will be to the same depth. • Backfilling with material from the opencast pit expansions will be undertaken as part of the operational phase as and when opencast pits become available. Backfilling is an approved activity in terms of the 2009 EMPr approval.	87ha	87ha 280m depth Backfilling to be undertaken as part of Operational Practices where possible.	27°51'55.79"S 23° 0'4.85"E	**Listing Notice 1**, Activity 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse. (This will be dependent on the outcomes of the Freshwater Ecosystem Study, whether pans exist in this area). **Listing Notice 1**, Activity 48: The expansion of infrastructure where the physical footprint is expanded by 100m² or more, where such expansion occurs within a watercourse. (This will be dependent on the outcomes of the Freshwater Ecosystem Study that will determine whether pans exist in this area). **Listing Notice 2**, Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— the undertaking of a linear activity. **NWA**: To be determined – backfilling is currently being applied for as part of the 2022 Technical WUL Amendment. Should wetlands be identified in this area, the required Section 21 (c) & (i) water uses will be applied for.

1.d.ii.2 Project 1b – King Mine Optimisation (King/Mokaning Low Grade ROM Stockpile Height Increase)

Khumani currently operates three (3) Mine Residue Deposits at the King Mining operations. These comprise of:

- WRD J;
- KM02 WRD (see Project 2); and
- King/Mokaning Low Grade ROM Stockpile.

The current mining operations, as well as the proposed expansion of the KM01 Opencast Pit will result in the need to increase the height of the approved King/Mokaning Low Grade ROM Stockpile. Due to the ongoing rehabilitation practices such as backfilling being undertaken by the mine, the proposed height increase should only be implemented as a last resort, where pits are not available for backfilling. Due to the high iron ore grades at the King Opencast Pits specifically, care is taken in terms of backfilling to ensure that potential resources are not sterilised. Where backfilling can be undertaken as part of the operational practices this is preferred to manage waste disposal on surface and in that instance also reducing the financial provision required for rehabilitation.

This project will not result in any footprint expansion. The height of this stockpile is to be increased from 70m to 90m, whilst the overall slope of 1:3 will be maintained.

Based on the latest Waste Type Assessment conducted by Pro Earth Solutions, 2022 for the mineral waste streams from the Bruce, Discard, King and Paste Disposal Facility, the following was concluded for the King sample: "The Total Concentration (TC) results for all of the elements were below the TCT0 limit, with the exception of Arsenic (As), Barium (Ba), Manganese (Mn), Lead (Pb), Antimony (Sb), and Selenium (Se). These elements were all below the TCT1 limit which technically classifies the waste as a Type 3 Waste. It must be noted that the elements exceeded the TCT0 limits by a small amount. Of more importance is the consideration of the leachable concentrations. All of the Leachable Concentration (LC) results were below the LCT0 limit, which technically classifies the waste as a Type 4 Waste."

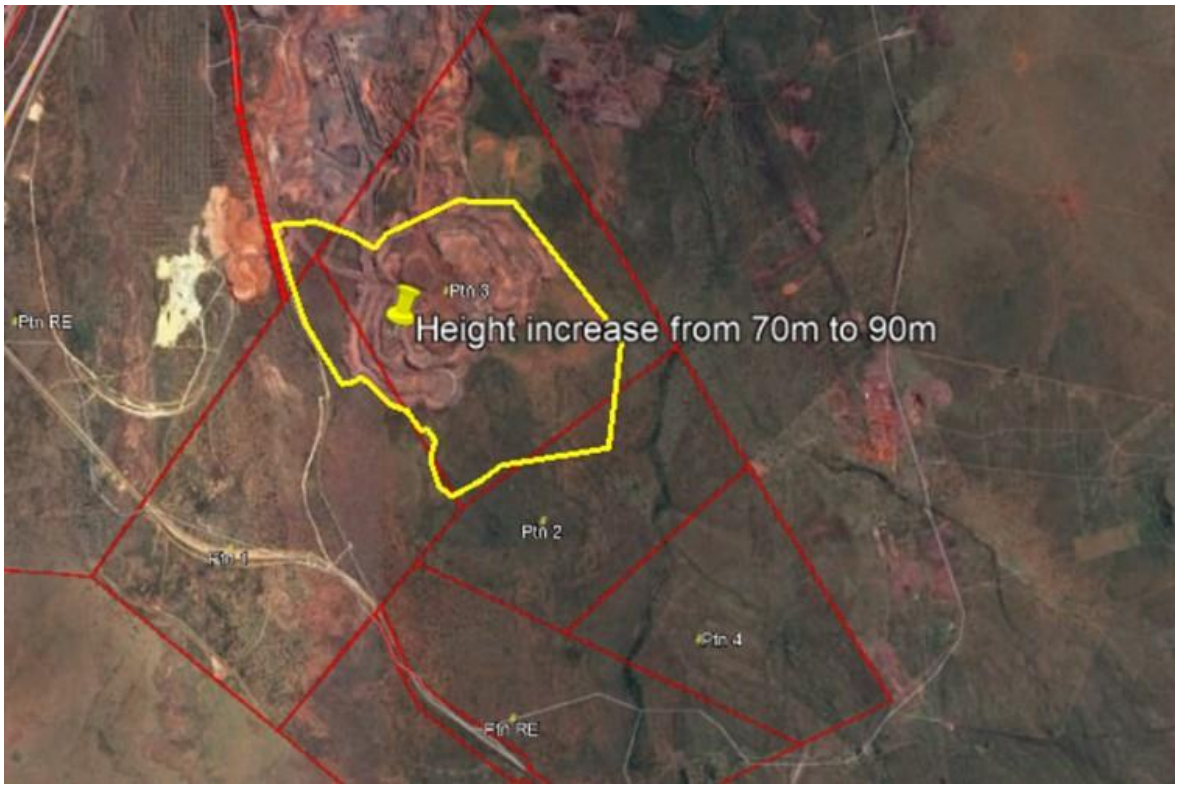


Figure 5: King/Mokaning Low Grade ROM Stockpile

Table 9: King/Mokaning Low Grade ROM Stockpile Project Summary

Name of Activity	Extent (Ha)	Dimensions	Coordinates	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations – Listing Notice 3 is not applicable to this Project
Project 1b: King Mine Optimisation: King/Mokaning Low Grade Stockpile Height Increase • No footprint expansion is planned for the increase in height of the current King/Mokaning Low Grade ROM Stockpile. The height of this stockpile is to be increased from 70m to 90m, whilst the overall slope of 1:3 will be maintained. This will cater for the ongoing expansions of the opencast pits. It should be noted that this project will be implemented only where backfilling is not possible. Due to the high iron ore grades at the King Opencast Pits specifically, care is taken in terms of backfilling to ensure	No increase in footprint, increase in height of 20m	Approved footprint of about 410ha. Approved height of 70m, to be increased by 20m to 90m. Recommended Type 4 facility.	27°52'50.59"S 23° 0'57.69"E	**Listing Notice 1,** Activity 34: The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution. *Note – the above activity is included pre-empting the promulgation of the NEMWA based on the National Environmental Management Laws Amendment Act (Act No. 02 of 2022) (NEMLAA). Note that it is acknowledged that Mine Residue Deposits are proposed to be removed from the NEMWA based on the 2022 NEMLA which was published in Government Gazette 46602, 24 June 2022. As the NEMWA Regulations have not been published caution is taken by including this project as a NEMWA listed activity.* **Listing Notice 2**, Activity 6: The development of facilities or infrastructure for any process or activity which requires a permit or licence or an

Name of Activity	Extent (Ha)	Dimensions	Coordinates	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations – Listing Notice 3 is not applicable to this Project
that potential resources are not sterilised.				amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent. No increase in footprint – only height increase; a 1:3 slope will be maintained. **Category A**: Activity 13 – The expansion of a waste management activity listed in Category A or B of this Schedule which does not trigger an additional waste management activity in terms of the Schedule. *Note that it is acknowledged that Mine Residue is proposed to be removed from the NEMWA based on the National Environmental Management Laws Amendment Act (Act No. 02 of 2022) (NEMLAA) which was published in Government Gazette 46602, 24 June 2022. As these NEMWA Regulations have not been published caution is taken by including this project as a NEMWA listed activity. However, should the NEMLAA be published, this activity will not be relevant under the NEMWA and will be managed in terms of the required regulations as guided by the Competent Authority.* S21(g) Water Use Activity

1.d.ii.3 Project 2: King Mine KM02 Mine Residue Stockpile Rehabilitation

Khumani has an approved WRD, namely the KM02 WRD, located just southeast of the Paste Disposal Facility. This WRD is approved in terms of the Environment Conservation Act (Act No. 73 of 1989) (ECA) Environmental Authorisation, 2006, as well as the MPRDA EMPr and associated authorisation, 2006, and also the Water Use Licence (WUL), 2013 (which supersedes the 2008 WUL):

- Permit 43/2006 for the development of an iron ore opencast mine with all associated infrastructure.
- MPRDA Record of Decision (ROD) 2007 for the new Mining Operation and associated Environmental Management Programme (EMP) dated February 2006.
- WUL: 10/D41J/BC1J/2122, dated 16 March 2013.

Figure 6: KM02 Mine Residue Stockpile Location

The KM02 Mine Residue Stockpile/ WRD was established due to the opencast mining activities which gave rise to the KM02 Opencast Pit. This opencast pit is currently being backfilled as part of the Paste Disposal Facility operation and no further mining of this pit is undertaken. This WRD is therefore dormant and has been identified as one of the key rehabilitation activities which the mine should focus on as part of the 2019 and 2020 Annual Rehabilitation Plans. The mine has therefore appointed engineers to design the final closure design for this facility.

Table 10: King Mine KM02 Mine Residue Stockpile Rehabilitation Project Summary

Name of Activity	Extent (Ha)	Dimensions	Coordinates	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations – Listing Notice 3 is not applicable to this Project
Project 2: King Mine KM02 Mine Residue Stockpile Rehabilitation Rehabilitation of the King KM02 Mine Residue Stockpile	85ha	85ha	27°50'40.02"S 23° 1'28.63"E	**Category A**, Activity 14: The decommissioning of a facility for a waste management activity listed in Category A or B of this Schedule. *Note that it is acknowledged that Mine Residue is proposed to be removed from the NEMWA based on the 2022 NEMLA which was published in Government Gazette 46602, 24 June 2022. As the NEMWA Regulations have not been published with incorporating the NEMLA caution is taken by including this project as a NEMWA listed activity. However, should the NEMWA be published, this activity will not be relevant under the NEMWA and will be managed in terms of the required*

Name of Activity	Extent (Ha)	Dimensions	Coordinates	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations – Listing Notice 3 is not applicable to this Project
				regulations as guided by the Competent Authority A WUL is not required, however the closure design of this Mine Residue Deposits must be approved by the Department of Water and Sanitation (DWS).

Based on the results from the 2018 waste characterisation, the engineers, as well has hydrogeologists are of the opinion that the discard material is relatively inert. Additionally, it would be prejudicial to the mine to classify the waste rock material as a Type 3 waste due to the slight exceedance of the Total Concentration Thresholds (TCT0) and Leachable Concentration Threshold (LCT0) values. A subsequent study was conducted by Pro Earth Solutions during 2022. The outcomes of the study stated: "It must be noted that the total concentrations of the elements mentioned above barely exceeded the TCT0 limits and were far below the TCT1 limits. In addition, all of leachable concentrations with the exception of the two Bruce Facility samples were under the LCT0 limit. And the leachable concentrations of the two Bruce Facility samples were far below the LCT1 limit. It is the opinion of Pro Earth Solutions that it would be unfair to the mine to classify the waste as a Type 3 based on these results for the following two reasons. Firstly, the limits prescribed in the legislation is not scientifically based and secondly the elements that do exceed the TCT0 limits and LCT0 limits are common across all of the samples, and this could be due to these elements naturally being present in higher concentration in the mineral composition of soils present on this mine. Therefore, stating the natural soils on this mine would have to disposed of in a Waste Facility with a Class C barrier would not be the Best Practical Environmental Option (BPEO). The design engineer recommended that a Type 4 waste classification is considered for the management of these waste streams. However, this will have to be confirmed with the relevant authorities."

Based on this latest Waste Type Assessment conducted by Pro Earth Solutions, 2022 for the mineral waste streams from the Bruce, Discard, King and Paste Disposal Facility, the following was concluded for the King sample: "The TC results for all of the elements were below the TCT0 limit, with the exception of Arsenic (As), Barium (Ba), Manganese (Mn), Lead (Pb), Antimony (Sb), and Selenium (Se). These elements were all below the TCT1 limit which technically classifies the waste as a Type 3 waste. It must be noted that the elements exceeded the TCT0 limits by a small amount . Of more importance is the consideration of the leachable concentrations. All of the Leachable Concentration (LC) results were below the LCT0 limit, which technically classifies the waste as a Type 4 waste.

The design of the KM02 Mine Residue Deposit was developed in line with the approved EMPr, 2006 objectives:

- The minimum objectives for the closure and rehabilitation of a dump must be to prevent air and water pollution in accordance with the requirements of the relevant regulations and with good international practice. The intended end use should take into consideration the prior land use and the location with respect to current and potential future socio-economic development.
- Final dumps will be sloped to 18 degrees and will be vegetated to ensure stability.
- The rehabilitated areas will be ameliorated and seeded with the recommended seed mix and the planted area will be watered thoroughly and regularly. Growth will be monitored on a quarterly basis.
- The area will be rehabilitated to be free draining by implementing storm water drainage systems, which will follow the natural drainage direction.
- Management measures will be implemented to prevent excessive run-off formation through the discard and surrounding areas into the open pits that could contribute to contamination in the form of suspended matter.
- Harsh, steep engineered slopes will be avoided if at all possible as these could impose an additional impact on the landscape by contrasting with existing topographic forms of the nearby hills and because it is difficult to sustain vegetation on steep slopes in the long term.
- Final shaping will be implemented such that the final profile of the rehabilitated overburden dumps is formed to emulate natural contours of the area i.e. a flat-topped profile is not desirable – rather a profile

that emulates the nearby hills is proposed. The dumps will remain after decommissioning, and it is imperative that a long-term view of its integration with the surrounding landscape be taken.

- Intermediate side slope angles of 1:1.5 (v:h) with 15m wide benches at 10m vertical intervals are proposed. This will result in an average overall slope angle of 1:3 (v:h). It is intended that the upper surface of the dumps will be shaped to retain surface run-off and thus to prevent the erosion of the outer slopes and the discharge of polluted solids to the natural streams. The outer slopes will be reshaped to ensure structural stability and to limit erosion damage.
- It is proposed that the dumps be covered with a 150mm thick layer of topsoil.
- A system of diversion canals to prevent storm water run-off from entering the dump areas will be included in the final closure plans. Surface water falling on the top surface of the dumps will be held on the dumps. The top surfaces will be divided into separate compartments. The run-off from the side slopes of the dumps will be controlled by the creation of engineered benches. Catchment paddocks and dams along the perimeter of the dumps will be the final control mechanism.
  The slopes will be vegetated.

The mine has permission to use this same material for backfilling of the mine voids in terms of the EMPr, and also in terms of the submitted Integrated Water and Waste Management Plans (IWWMPs). With this in mind, and the fact that the EMPr requires only a topsoil capping for the waste facility, the Engineering specialists recommended that a Class D liner is applied to the Mine Residue Deposit and a 150mm layer of topsoil, as per the EMPr.

The following key considerations must be noted as part of this project:

- The total final rehabilitated footprint will be 903,171m^2. This side slope will be cut back at the time of rehabilitation to provide a more stable side slope of 1:3. The discard facility will have a maximum average height of approximately 30m.
- The Mine Residue is regarded as inert.
- Surface water management around the facility will be managed using channels and a paddock system which will be unlined.
- One of the paddocks will be lined and will serve as a water storage pond.

Project 2 caters for the formal rehabilitation of the approved KM02 Mine Residue Stockpile. Engineering designs (Appendix 5) for this activity have been finalised and will be submitted as part of the environmental authorisation application process.

1.d.ii.4 Project 3: New Bruce Block A & B Off-Grade ROM Stockpile

Project 3 is applied for to improve logistics on site as the Bruce mining operations are moving towards the south, as per the approved Mining Works Programme. A new Off-Grade ROM Stockpile is therefore proposed to be located closer to the current opencast pits.

This project will involve the development of a new Off-Grade ROM Stockpile on the farm Bruce. This stockpile is earmarked for low grade material to be supplied to the Beneficiation Plant. The current Low-Grade ROM Stockpile is located towards the northern-most portion of the farm property and requires extensive travelling distances relating to the BB and BC Opencast Pits, with the BA Opencast Pit furthest to the north. The mine has therefore identified an additional area located in close proximity to the current opencast pits for the construction of the new Off-Grade ROM Stockpile. The proposed facility will be about 55ha in size and will be associated with berms and paddocks to manage clean and dirty water systems. It is not foreseen that additional roads will be required as access roads to this area are already in place.

Figure 7: Bruce Block A & B Off-Grade ROM Stockpile

Table 11: Bruce Block A & B Off-Grade ROM Stockpile Project Summary

Name of Activity	Extent (Ha)	Dimensions	Coordinates	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations – Listing Notice 3 is not applicable to this Project
Project 3: New Bruce Block A & B Off-Grade ROM Stockpile • This facility is the proposed run of mine to supply the Beneficiation Plant and will have a footprint of about 55ha. This activity may require the expansion of existing roads or the construction of new roads	55ha	55ha 1:3 slope Heigh unknown, subject to the pending designs.	27°47'42.69"S 23° 1'17.58"E	**Listing Notice 1**, Activity 24: The development of a road—with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road—which is 1 kilometre or shorter. **Listing Notice 1,** Activity 34: The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution. **Listing Notice 1,** Activity 56: The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre—where the existing reserve is wider than 13,5 meters; or where no reserve exists, where the existing road is wider than 8 metres.

Name of Activity	Extent (Ha)	Dimensions	Coordinates	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations – Listing Notice 3 is not applicable to this Project
				Listing Notice 2, Activity 6: The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent. **Listing Notice 2**, Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— the undertaking of a linear activity. **NWA**: Section 21(g)

1.d.ii.5 Project 4: Product Stockpile Formalisation

The mine experiences the informal stockpiling of product at the current Beneficiation Plant at Parson, which is a result of washing practices during plant shutdown and clean up. This material contains iron ore and is required to be processed through the Beneficiation Plant. In order to manage this area effectively, it is recommended that this area of about 5ha be formalised as a Product Stockpile to avoid unnecessary contamination and subsequent loss of iron ore product. The stockpiles are located within the existing storm water management system of the mine. The material will be uploaded either by front-end loaders or shovels, depending on the need.

Figure 8: Product Stockpile Formalisation

Table 12: Product Stockpile Formalisation Summary

Name of Activity	Extent (Ha)	Dimensions	Coordinates	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations – Listing Notice 3 is not applicable to this Project
Project 4: Product Stockpile Formalisation • At the current Beneficiation Plant at Parson, the mine experiences the haphazard stockpiling of product, which is a result of washing practices during plant shutdown and clean up. • In order to manage this area, it is recommended that this area of about 5ha be formalised as a product stockpile to avoid unnecessary contamination and subsequent loss of iron ore product.	5ha (no clearance required)	5ha Approximate height 5m Unlined	27°51'50.51"S 22°58'40.00"E	**Listing Notice 1**, Activity 34: The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution, or effluent. **NWA**: Section 21(g)

1.d.ii.6 Project 5: Discard Low Grade Stockpile Design Change

Project 5 involves the reduction of the Discard Low Grade Stockpile (Discard Dump) design footprint as approved during 2016.

The Discard Low Grade Stockpile is regarded as an asset to the mine, due to its potential future reworking opportunities. The discard is directly derived from the Beneficiation Plant at Parson. This material is a lower grade iron, which can be used for markets requiring lesser grade iron or to blend with the current iron ore should this be required.

During 2016 an Environmental Authorisation was issued for the future WHIMS Plant. This project involved the expansion of the Discard Low Grade Stockpile as the mine progresses, but also involved the inclusion of a conveyor and loading equipment. The conveyors would have conveyed this material to the Low Grade Reclaim Facility (still planned on site) from where the material will be conveyed to WHIMS 2 Plant, and from there be conveyed either to the Parson product stockpile yard or returned to the Discard Low Grade Stockpile for further stockpiling and possible processing.

This expansion of the Discard Low Grade Stockpile has not been implemented as of yet and only requires the amendment of the approved designs as per the 2016 Environmental Authorisation. This is the result of dry pans as presented in the 2011 National Freshwater Ecosystem Priority Areas [NFEPA] Database, indicated to the south and within the south-western corner of the facility (see Appendix 6). For this reason, the facility's design was reassessed to avoid the 1:100 year floodlines and 100m buffers as stipulated in the NWA (see Appendix 6).

The project involves the following (see Appendix 7):

- The Discard Low Grade Stockpile has an approved footprint of 387ha. The new design will result in a reduction in footprint area to 258ha.
- The Discard Low Grade Stockpile is developed as a dry stockpile and at capacity will have a maximum vertical height of approximately 30m (approved legal limit).
- The general infrastructure associated with the Discard Low Grade Stockpile will include:
    - Two access ramps (east and west) and a conveyor ramp that will provide access to the top surface of the stockpile.
    - A ring road (unpaved gravel road) will provide access to the access ramps, as well as the toe line of the stockpile.
    - Approved catchment paddocks located along the final toe line of the Discard Low Grade Stockpile will collect silt and run-off from its side slopes. The runoff will be allowed to evaporate and infiltrate from the paddocks. The side slope geometry for the stockpile can be summarised as follows:
        - Temporary side slope angle (angle of repose) = approximately 1(v):1.4(h)
        - Recommended final side slope angle = 1(v):3(h)
        - The final top surface elevations for the stockpile will be:

- 1 230 mamsl (minimum) & 1 233 mamsl (maximum);
- Conveyor platform = 1 232.75 mamsl;
- The discard material is currently stockpiled with a conveyor on the existing Discard Low Grade Stockpile. The discard material is then distributed and placed with haulage trucks in designated areas. Various parts of the stockpile are subsequently compacted to varying amounts by the trafficking of earthmoving vehicles including trucks and bulldozers.

Figure 9: Discard Low Grade Stockpile Design Change, with reduced footprint

Table 13: Discard Dump Reduced Footprint Summary

Name of Activity	Extent (Ha)	Dimensions	Coordinates	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations – Listing Notice 3 is not applicable to this Project
Project 5: Discard Low Grade Stockpile (Discard Dump) Design Change • The Discard Low Grade Stockpile has an approved footprint of 387ha. The new design will result in a reduction in footprint area to 258ha. • The Discard Low Grade Stockpile is being developed as a dry stockpile. The Discard Low Grade Stockpile will have a maximum vertical height of approximately 30m (approved legal limit).	Reduction in footprint – new design	Height: 30m Slope: 1:3 New, reduced footprint: 258ha	27°52'28.68"S 22°57'21.79"E	NEMA Part 1, Regulation 29: "An environmental authorisation may be amended by following the process prescribed in this Part if the amendment; Will not change the scope of a valid environmental authorisation nor increase the level or nature of the impact, which impact was initially assessed and considered when the application was made for an environmental authorisation; or Relates to the change of ownership or transfer of rights and obligations". *Note – This project is already approved in 2016 EA for the expansion of activities which requires a WUL (Activity 5 of GN R545, 18 June 2010). Due to this authorisation, and this project only requiring the reduction of footprint Activity 34 under Listing Notice 1 is not regarded as applicable, as no expansion is proposed.* **NWA**: Section 21(g)

1.d.ii.7 Project 6: Khumani Photovoltaic Solar Plant

Project 6 involves the establishment of a new Photovoltaic (PV) Solar Plant to the north of the existing Railway Loop. The purpose of this PV Solar Plant is to produce electricity for the mine's consumption and for this reason will tie into the mine's existing substation. The project has various benefits which include:

- Reduction of the Levelised Cost of Energy;
- Reduction of the mine's Carbon footprint;
- Increased energy security; and
- Provision of Energy Capabilities.

A PV Solar Plant uses solar radiation to produce electricity. Such a plant generally requires unrestricted access to the sun and large open areas for construction. The northern portion of the farm Parson (north of the railway link) is therefore the ideal location for such a project.

A 44,21MWp PV Solar Plant is planned for implementation and commissioned, on and area of between 60-90ha Plant, with associated infrastructure not exceeding 100ha. the site will be undertaken in phases (60-90ha facility). Initially an area of about 60-70 ha will be developed for the Solar Plant (Recommended Site), (detailed infrastructure layout will be available during the EIA reporting) whereafter in the near future the Solar Plant may be extended by a further 30ha, resulting in an area of about 90ha. To avoid a phased approach application, this EIA and Specialist studies, are considering both the recommended site, as well as the future expansion site for clearance. No designs or infrastructure layouts for this expansion will be available during the EIA Phase as yet. Should the design phases indicate that additional listed activities are triggered once the next phase becomes in place, the necessary amendments will be applied for. The following figure indicates the overall area, with the proposed future route locations of powerlines also indicated. It is important to note that for the purposes of this study, the potential future powerline over the identified watercourse will be assumed to be undertaken not to impede or alter a watercourse (i.e. pylons outside of watercourses) – should this not be possible a water uses licence may be triggered for this activity specifically.

The plant will comprise of the PV Solar Plant, Battery Energy Storage System (BESS) for the storage of backup electricity, inverters, transformers, a Medium Voltage Power Station (MVPS) containing the inverters, a Collector Substation and the required transmission (power) lines channeling to the mine's existing substation. The project will also require a battery storage area, site offices and the ancillary infrastructure. Please refer to the diagram below presenting a schematic illustration of the proposed layout.

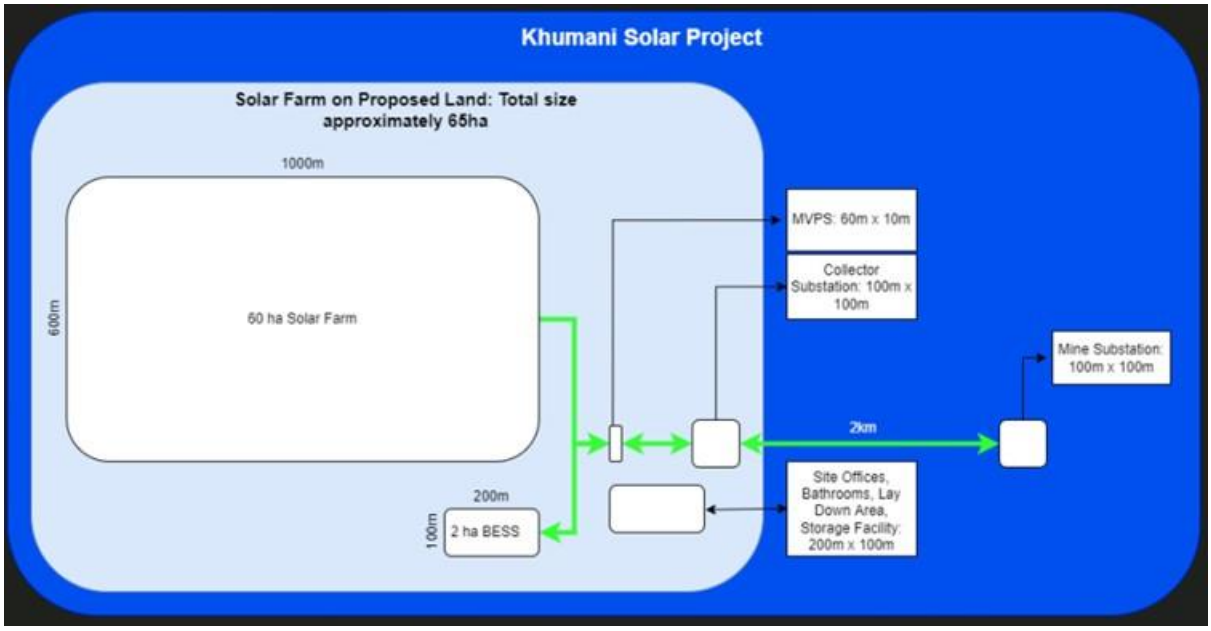


Figure 10: Typical Solar Project Layout

Laydown Area

A construction laydown area will be required during the construction phase. It is currently planned that this will

be located on the current Explosives Magazine footprint. The latter is currently being decommissioned and moved to the Bruce Mine. The benefit of utilising this area for the purpose of a PV Solar Plant is that no additional clearance will be required, and that access roads, levelled areas for storage of equipment, and sanitary facilities are already available.

Solar Cells

To produce the planned amount of energy, the PV Solar Plant will require approximately 82 860 solar panels. The solar panels comprise of several solar cells containing of negative and positive charge, which are connected to a model and grouped together to form an array of solar panels. The solar cells are interconnected and encapsulated between a transparent front (usually glass) and a backing material to form a solar panel (Figure 11). When exposed to solar radiation the photovoltaic material in the solar cells produce direct current electric power. When considering other PV Solar Projects, the typical photovoltaic material is crystalline silicon, but new tandem solar cell technology may offer other viable options such as cadmium telluride and copper indium gallium selenide. The final technology will be determined during the detailed Design Studies, which will commence after receipt of an Environmental Authorisation from the Competent Authority.

The PV Solar Plant will be constructed from a Single Axis Tracking System, which will track the movement of the sun to increase energy production. Typically, in this tracking system, the panels are mounted on a steel rack and a tracking motor is placed at the end of the array to control the tilt and movement of the panel as required to track the sun. The proposed maximum angle will be about 45 degrees. The mounting structure influences the exposure of the PV panels to sunlight. The Single Axis Tracking System will either utilise ramming posts, pile drilling with backfilling, or concrete foundations which will be specified during the development phase.

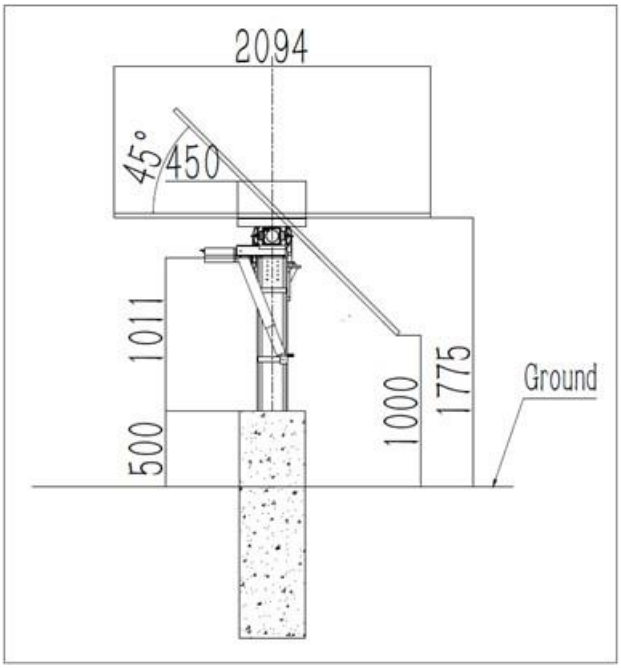


Figure 11: Design Image of Solar Panel

The ground below the Solar Plant will be scraped level and clear. Once level and clear, herbicide will be utilised to ensure no vegetation grows below the PV Solar Plant as this can be a fire hazard. The herbicide will be contained to only the PV Solar Plant, so as not to impact on adjacent natural habitat.

The PV panel arrays will be connected to each other in strings and the strings connected to the BESS by low voltage underground DC cables.

Battery Energy Storage System (BESS)

The battery storage system allows for balancing the supply and demand of electrical energy during the day and uses the stored energy during peak demand periods (typically in the mornings and evenings).

Figure 12: Typical Battery Storage Facility (www.spglobal.com)

The BESS will store electricity in lithium-ion batteries. A 33,546MWh BESS will be implemented and commissioned next to the 60 to 90ha PV Solar Farm. The BESS will require approximately 2ha of land and the foundations for the BESS will be concrete plinths, depth to be defined during the Studies, Surveys & Applications, for each BESS cubicle. Each BESS cubicle contains 372,7kWh of energy with dimensions 1 300mm x 2 280mm x 13 00mm (W x H x L) (approximately 3m^2 each). There will be 90 cubicles to produce the required energy of 33,546MWh Direct Current (DC).

From the BESS cubicles there will be DC cables running at 1500V, in specially designed trunking to the MVPS.

Key note: NEC XON (the design and operational team of the proposed PV Solar Plant) has a global plan to recycle end of life lithium-ion batteries. This global plan will be aligned to form a strategy and execution plan which will be implemented locally at the end of life of the lithium- ion batteries.

The coordinates for this facility are 27°51'25.12"S; 22°58'27.53"E.

The BESS does not trigger any listed activities on its own due to the small clearance footprint and the fact that it is located within the footprint of the PV facility. The 'clearance of indigenous vegetation' activities for the 1 hectare footprint of the BESS will be done within the authorised project description for the Khumani PV Solar Plant development and/or the approved final site layout plan. It should further be noted that this area is located in an already cleared area on the mine.

Furthermore, as confirmed by the "Guideline to EIA Regulations, 10 October 2012" unit of the Department of Environmental Affairs (DEA; now the Department of Forestry, Fisheries and the Environment [DFFE]), the identified activities relating to storage of dangerous goods will not be triggered by the proposed BESS installation, due to the following:

- A battery is not deemed to be a container; and
- The function of these batteries is deemed to be similar to transformers within substations: converting high voltage electricity to lower voltage electricity for further distribution. The function of the battery is not for "storage" or "storage and handling" of a dangerous good. The guideline document states that the storage of transformer oil in containers meeting the threshold will trigger this activity, however a transformer itself cannot be defined as a container or a storage facility and for this reason neither a transformer nor a battery triggers a listed activity.

Figure 13: Location of the BESS

Medium Voltage Power Station (MVPS) and Transformers

There will be 18 MVPSs which will be situated on designed concrete plinths. These MVPSs comprise of inverters. The inverters contained within the MVPSs have a rating of 67dB at a 10m distance. The dimensions of each MVPS are equal to a 20-foot high cube shipping container, 6 058mm x 2 896mm x 2 438mm (W x H x D).

The DC power flowing from the PV Solar Farm and the BESS will flow at 1 500V through the inverter. Power from the inverter will be transformed (increase in voltage to reduce power loss) through the transformer to provide an output of 22kV* Alternating Current (AC). The largest transformers proposed may be 40MVA (45dB per transformer). This will be finalised during the Detail Design. The transformer oil collection dam may be 3m - 3,5m deep, depending on the size of the transformer and the quantity of oil to be held.

The electric power is then transported to a proposed 22/132 kV onsite substation complex, via medium voltage underground cables (22kV). Cables and trenches required for underground cables will remain along internal roads and already disturbed areas as far as possible.

*The 22kV will be finalised after the Design Studies have been finalised. Depending on the fault levels the transformer can be either 11kV, 22kV, or 33kV.

Collector Substation

The Collector Substation is constructed to receive, convert and step up the electricity generated by the PV facility to a grid suitable power supply. The Collector Substation will be a concrete building which will be split into two (2) sections. The main section will contain all the incoming and outgoing electrical cables along with the 22kV switch gear. This room will contain all the necessary accessories such as fire suppression, Heating, Ventilation and Air Conditioning (HVAC), and access control.

The separate room next to the main section will be the control room containing the Supervisory Control and Data Acquisition (SCADA) system, and all the control panels to manage the 22kV switch gear. The Collector Substation's footprint will be approximately 60m x 85m.

The necessary lightning protection, which will be the highest point of the substation (at about 21m), will be defined once the design studies, environmental authorisation applications and associated specialist studies have been completed.

The energy will flow from the Collector Substation via overhead lines to the existing Mine Substation.

Coordinates of this facility will be finalised in the Final ESR depending on the outcomes of the specialist studies, including the alternatives assessment.

The Collector Substation does not trigger any listed activities on its own due to the small clearance footprint and the fact that it is located within the footprint of the PV facility. The 'clearance of indigenous vegetation' activities for the 1 hectare footprint of the BESS will be done within the authorised project description for the Khumani PV Solar Plant development and/or the approved final site layout plan.

Overhead Power Lines to the Mine Substation

The overhead lines will run approximately 2km from the Collector Substation to the Mine Substation. The structure will be a steel monopole design with the voltage to be determined once the Design Studies have been completed. The voltage will determine the servitude size as well as the distance required to clear the one railway line that must be crossed. The power lines will require crossing of the mine's railway line. It is currently proposed to install a conductor span of 110m - 150m crossing the rail lines. The poles will be steel monopole as per Eskom standards. The height of the poles will be a maximum of 30m. At the current project description at a 60 MW at 44 kV the line will be single conductor, however if the Design Studies indicate the need for 60 MW, it will require a 132 kV line at single conductor per phase.

The Mine Substation will receive the energy via the overhead lines into the substation building. At the Mine Substation there will be alterations made to the building to mimic the Collector Substation design. The specifications for the Collector Substation and Mine Substation will be the same. The energy will then flow from the Mine Substation to the Mine Operations.

Ancillary Infrastructure

- Access Roads (alternatives considered):
  - Access utilising existing Silo Access road with expansion requirements (overall road length: 2.2km at 8m width);
  - Access utilising the existing farm road with expansion requirements (overall road length: 2.6km at 8m width);
  - It is currently foreseen that addition al 10 vehicles will be permanently present on site during the Construction Phase and eight (8) during the operational phase.
  - It is important to note that during the construction phase the following equipment will be transported to the mine:
    - Building material (bricks, sand, aggregate, cement, gravel, sheeting, fencing, etc.);
    - Construction equipment (piling rigs, rollers, graders, batch plant, etc.);
    - Solar panels (panels, frames, etc.);
    - Electrical components (transformers, switch gear, inverters, cables, etc.);
    - Substation steelwork:
      - All bulk material required on site shall be transported to site on vehicles, which conform with the legal road requirements.
      - Solar panels and most of the electrical components required on site will be transported to site on heavy vehicles, which conform with the legal road requirements.
      - Transformers are to be transported to site by abnormal vehicles.
- Power line service road along power lines: approximately 2km in length;
- The internal roads will have a maximum width of 6m and will be gravel and/or dirt roads. The length of the internal roads will be confirmed as the location, design and layout of the facility progresses. Existing farm roads will be used and upgraded where required. The roads will be fitted with traffic control systems and stormwater channels or drainage controls as required. The internal site road network will be finalised during the detailed engineering phase of the project (i.e. post-EA). During the operational phase, the internal roads will provide access to the PV Solar Plant and associated infrastructure for maintenance, inspections and panel cleaning.
- The area where the Explosives Silos (Parson) will be decommissioned in terms of the 2018 Environmental Authorisation, may be utilised as a potential laydown area, thereby avoiding further vegetation clearance;
- Lights: The standard lighting masts are 14m and 21m in height. The substation lights get fitted onto the lighting mast at a height of 6-8m, depending on the lighting requirements, based on the design;
- Concrete batching facility;
- Temporary offices;
- Construction yard;
- Offices and Control Rooms;
- Perimeter fencing, internal security fencing and gates will be installed in accordance with the relevant

legislation; and

- A 24-hour security service will be required to guard the PV facility during the construction and operation phases. A guard hut and access control gate will be located on the access road at the site entrance

Utilities

- Electricity:
  - Any electricity required during the construction and the operational phase will be generated using onsite generators or supplied through auxiliary power from Eskom where necessary;
- Water:
  - In terms of water requirements for the construction and operation phases, the mine is considering two (2) options: transporting water from the closest town; or extracting water from an existing approved borehole at the railway siding. This borehole is authorised in terms of the NWA as a Section 21(a) water supply source providing 14 800m^3/a. This is not actively used by the mine and can supply water to the PV Solar Plant;
  - Water will be required about four (4) times a year for cleaning (water from the existing approved boreholes at Parson will supply this water and no additional water is required). This water will likely be stored in JoJo tanks or steel Braithwaite tanks;
  - Water storage – water will typically be stored in Braithwaite tanks or JoJo Tanks (one for cleaning water sourced from the borehole and one for potable water sourced from the existing mining supply). Typical storage capacities will be 1m^3 storage tanks.
  - Water supply volumes include:
    - Construction Phase – 9.5m^3/month. Water will likely be sourced from the existing mining operations.
    - Potable Water during Operational Phase: 5m3/month for potable use;
    - Cleaning Water during Operational Phase – 16.5m3 for PV cleaning practices (four cleaning cycles per year. The PV panel require regular cleaning and maintenance activities (at least quarterly) to ensure optimal operation and generation of electricity. The applicant will implement environmentally friendly dry-cleaning methods if possible and available or use water to clean the panels.
    - Dust suppression – the need and volumes will be required during EIA Phase. For dust suppression on the roads and within the construction area, it is planned that recycled water will be used if and where possible.
- Waste will be managed in line with the mine's existing Waste Management Programme. During the operational phase, minimal activities would occur on the site thus the generation of general waste would be minimal and result mainly from food wastes, packaging, paper, etc. Some maintenance activities will require the use of hydraulic oils, grease and other lubricants which may lead to accidental spillage of small amounts of oil for machinery maintenance or from vehicles. Waste will generally include:
  - Packaging material (cardboard, plastic and wood);
  - Hazardous waste (used tins, used oils, grease, soil containing oil and diesel (in the event of spills), and chemicals);
  - Building rubble (discarded bricks, wood and concrete);
  - Domestic waste generated by workers and contractors
    - Sanitary facilities will be provided by means of portable chemical toilets – which will be services through honey sucker trucks to collect and remove the waste to the local municipality (in line with the current mining practices); and
  - Organic waste (vegetation cleared from the site).
- Existing mining infrastructure will be utilised for the purpose of waste removal and sewage treatment. It is proposed that portable sanitation facilities (i.e. chemical toilets) are used as much as possible during the construction phase. During the operational phase, minimal activities would occur on the site thus the production of sewage (waste water) will be minimal. Portable sanitation facilities (i.e. chemical toilets) will be used at the security guard hut at the entrance of the site and any sewage generated will be collected, treated or disposed of at licensed facilities.

Table 14: Summary of technical details for the proposed PV Solar Plant

Infrastructure	Discussion
Generation capacity of the facility	Maximum installed capacity of 44.21MW of DC which would p approximately 36.8MW of Alternating Current (AC)
Height of PV panels	Approximately 2m
Area of PV Array	60-90ha
Number of inverters required	18 MVPS
Battery Energy Storage System	Battery Storage Facility: 38MW(AC)-33.546MWh(DC), Containe stacked and will cover an area less than 2ha
Battery Type	Lithium-ion
Area occupied by inverter/transformer station/substations	1ha
Capacity of onsite collector substation complex	22kV
Area occupied by onsite collector substation complex	0.5ha
Height of onsite substation complex infrastructure	21m (when considering lighting)
Area occupied by permanent and construction laydown areas, which will comprise of: • a concrete batching facility; • temporary offices; • a construction yard; and • a laydown area.	4ha
Area occupied by buildings	1ha
Access Roads	• Access utilsing existing Silo Access road with expansion requirements (overall road length: 2.2km at 8m width) • Access utilizing the existing farm road with expansion requirements (overall road length: 2.6km at 8m width) • Service road along power lines: approximately 2km in power line servitude)
Proximity to grid connection	2.5km
Height of grid connection	To be determined
Height of fencing	3m
Type of fencing	Security Fencing

The following table presents the typical discussions around the facility in terms of listed activities.

Table 15: PV Solar Plant footprint summary

Name of Activity	Extent (Ha)	Dimensions	Coordinates	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations
Project 6: Khumani Photovoltaic (PV) Solar Plant • 36.8MW(AC)-44.21MW (DC) Solar Farm; • Storage facility (dangerous goods) in excess of 80m³; • Electricity distribution (22&44kV lines); • Area for the PV Solar Plant between 60-100ha (depending on the	60-100ha	Solar Plant: 100ha (with the PV Plant specifically between 60-90ha) BESS: 2ha	**Solar Plant:** 27°50'51.68"S 22°57'24.05"E **BESS (Battery Storage)** 27°51'25.12"S 22°58'27.53"E **Laydown Area**	**Listing Notice 1**, Activity 12: The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse (depending on the outcomes of the specialist studies).

Name of Activity	Extent (Ha)	Dimensions	Coordinates	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations
outcomes of the specialist studies); • ≤1ha area for site office and Operations and Maintenance (O&M) buildings; • Area occupied by on-site substation (existing – 7 551m²); • Heigh of on-site substation complex infrastructure: To be determined; • Type of batteries: Lithium-ion; • Battery Storage Facility: 38MW(AC)-33.546MWh(DC), Containers not stacked and will cover an area less than 1ha; • Generation capacity of the facility: Maximum installed capacity of 44.21MW of DC which would produce approximately 36.8MW of Alternating Current (AC); • Proximity to grid connection: 2.5km; • Height of grid connection: To be determined; • Portable sanitation facilities during construction and operation; • Road: o Option 1: Access utilising existing Silo Access road with expansion requirements (overall road length: 2.2km at 8m width); o Option 2: Access utilising existing farm road (overall length: 2.6km at 8m width); o Service road along power lines: approximately 2km in power line servitude); • Temporary construction areas with a combined maximum size of approximately 4ha, including: o a concrete batching facility; o temporary offices; o a construction yard; and		Laydown Area: 1ha Offices and Control Room: 4ha Access Road 1: 2.6km at 8m width Access Road 2: 2.2km at 8m Service Road: 2km in power line servitude Power line Option 1: 2 540m Power line Option 2: 3 420m Water Supply Pipeline: 1 600m	27°50'35.17"S 22°57'48.90"E **Access Road Option 1** Start: 27°50'24.01"S; 22°58'35.00"E End: 27°50'49.39"S; 22°57'34.09"E **Access Road Option 2** Start: 27°50'40.79"S; 22°58'30.40"E End: 27°50'49.39"S; 22°57'34.09"E **Power line Option 1 & Power line Option 2** Start: 27°50'40.03"S; 22°57'23.33"E End: 27°51'30.77"S; 22°58'28.12"E **Water Supply Pipeline** Start: 27°51'30.86"S; 22°57'5.68"E End: 27°50'48.77"S; 22°57'38.45"E	**Listing Notice 1,** Activity 11: The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts. **Listing Notice 1,** Activity 14: The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. It is assumed that this activity is not triggered when considering the "Guideline to EIA Regulations, 10 October 2012" unit of the Department of Environmental Affairs, the identified activities relating to storage of dangerous goods, will not be triggered by the proposed BESS installation, due to the following: • A battery is not deemed to be a container; and • The function of these batteries is deemed to be similar to transformers within substations: converting high voltage electricity to lower voltage electricity for further distribution. The function of the battery is not for "storage" or "storage and handling" of a dangerous good. The guideline document states that the storage of transformer oil in containers meeting the threshold will trigger this activity, however a transformer itself cannot be defined as a container or a storage facility and for this reason neither a transformer or a battery triggers a listed activity. **Listing Notice 1,** Activity 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse (depending on the outcomes of the specialist studies).

Name of Activity	Extent (Ha)	Dimensions	Coordinates	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations
○ a laydown area				**Listing Notice 1,** Activity 24: The development of a road—with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road—which is 1 kilometre or shorter. Note: According to SAPAD (2021) the Bredenkamp Nature Reserve is located approximately 2,8 km west of the focus area and the Brooks Nature Reserve is located approximately 6 km to the west of the focus area. The SACAD (2021) and NPAES Databases (2010) do not indicate any other protected or conservation areas within a 10 km radius. Listing Notice 3, Activity 18 states: The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre outside urban areas and should consider (gg) (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve. As no protected areas in terms of the NEMPAA is indicated this activity is not applied for as a Listing Notice 3. **Listing Notice 1**, Activity 56: The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre— (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres. **Listing Notice 2,** Activity 1: The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more. **Listing Notice 2**, Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—the undertaking of a linear activity. According to SAPAD (2021) the Bredenkamp Nature Reserve is located approximately 2,8 km west of the focus area and the Brooks Nature Reserve is located approximately 6 km to the west of the focus area. Both these areas were proclaimed in 2018. The SACAD

Name of Activity	Extent (Ha)	Dimensions	Coordinates	Applicable Listing Notice (Regulation 983 and/or 984) as amended in the 2021 EIA Regulations
				(2021) and NPAES Databases (2010) do not indicate any other protected or conservation areas within a 10 km radius. **Listing Notice 3**, Activity 18 states: The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre outside urban areas and should consider (gg) (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve. **Listing Notice 3**, Activity 10 states: The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve – this activity is unlikely based on the following: Furthermore, as confirmed by the "Guideline to EIA Regulations, 10 October 2012" unit of the Department of Environmental Affairs, the identified activities relating to storage of dangerous goods, will not be triggered by the proposed BESS installation, due to the following: • A battery is not deemed to be a container; and The function of these batteries is deemed to be similar to transformers within substations: converting high voltage electricity to lower voltage electricity for further distribution. The function of the battery is not for "storage" or "storage and handling" of a dangerous good. The guideline document states that the storage of transformer oil in containers meeting the threshold will trigger this activity, however a transformer itself cannot be defined as a container or a storage facility and for this reason neither a transformer or a battery triggers a listed activity. It is requested that the DMRE provide guidance on this matter. **NWA: Section 21(c) & (i) depending on the outcomes of the Specialist Studies.**

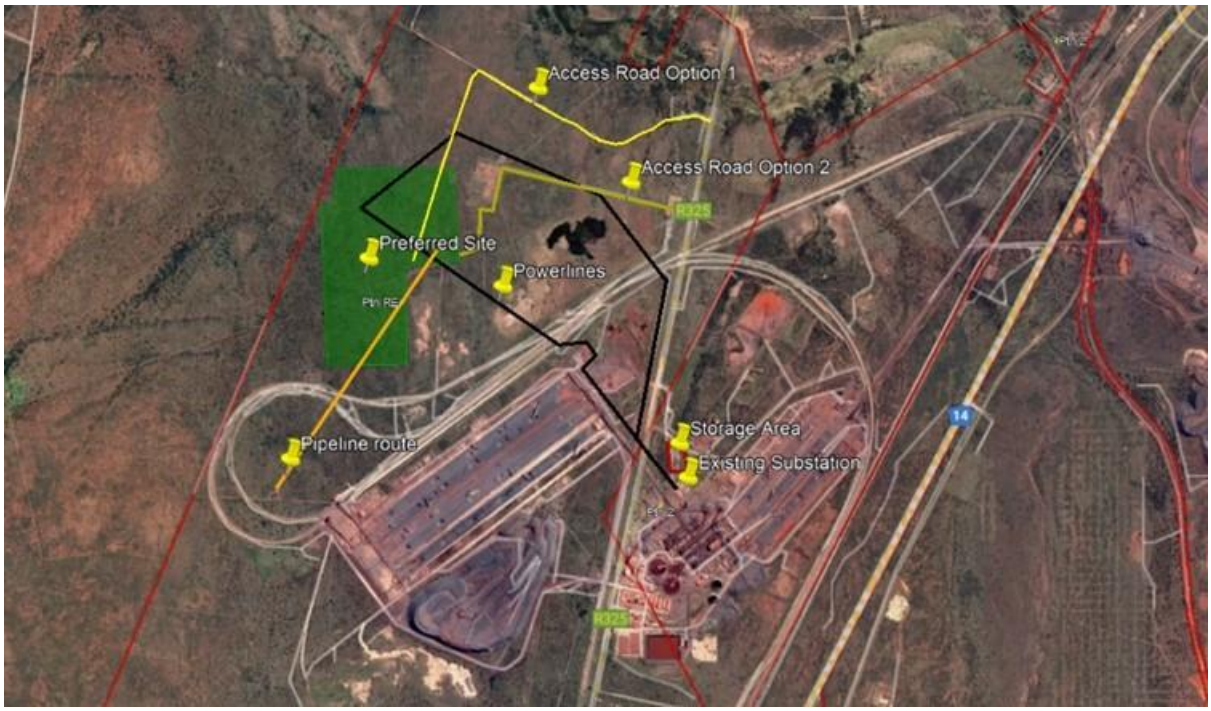


Figure 14: Overall Layout of the PV Solar Plant

1.d.iii Description of the Activities to be undertaken

The infrastructure and activities that will form part of the proposed project will include the following:

- Planning Phase:
  - Ensure the implementation of Legal Requirements (Environmental Permits and Authorisations)
- Construction Phase:
  - Demarcation and identification of protected species
  - Land and footprint clearance
  - Topsoil stripping and stockpiling
  - Establishment of surface infrastructure
  - Waste management
  - Storage of construction equipment within the demarcated laydown area
- Operational Phase:
  - Ongoing opencast mining operations, including the movement of ROM to the Crushers (the latter is already being undertaken)
  - Ongoing stockpiling of low grade material which involves the movement of trucks on haul roads;
  - Stockpiling of Plant Product Spillages in formalised area
  - Generation of PV Electricity
  - Transportation (roads)
  - Operation of infrastructure and roads
  - Water management
  - Dust suppression
  - Waste management
  - Removal of batteries
- Closure Phase:
  - Rehabilitation of the KM02 Mine Residue Stockpile
  - Ensure the implementation of Legal Requirements (Environmental Permits)
  - Rehabilitation of TSF and associated RWD
  - Dismantling of pipelines and associated soil remediation where required
  - Dismantling and decommissioning of infrastructure and buildings, including product stockpiles
  - Earth moving, shaping and ripping of soils
  - Cessation of Labour Contracts
  - Waste Management

1.e Policy and Legislative Context

South Africa has a comprehensive environmental governance framework underpinned by an extensive array of environmental laws. The past years have evidenced the wholesale reform of South Africa's environmental legal framework under the guidance of the Constitution.

Historically, the mining industry in South Africa has not been subjected to comprehensive environmental regulation. However, in recent years, this has changed significantly and the industry is now required to comply with a multifaceted network of mining and environmental legislation. There are no shortages of policy and legal frameworks to ensure "responsible" mining in South Africa. The Minerals and Mining Policy for South Africa, 1998 affirmed that the State, as custodian of the nation's natural resources, will support mining development while maintaining and enhancing environmental awareness of the mining industry in accordance with national environmental policy, norms and standards.

The following table presents the key policy and legislative considerations as part of this application.

Table 16: Policy and Legislative Context

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT
1. Constitution of the Republic of South Africa (Act No. 108 of 1996) Environmental legislation is shaped by the Bill of Rights of the Constitution of the Republic of South Africa ("**Constitution**"). Section 24 of the Constitution, known as the '**Environmental Right**', guarantees every person the right to an environment that is not harmful to their health or well-being; provides for the protection of the environment against pollution; and degradation and centres sustainable development as the cornerstone of South Africa's environmental law regime. This right is binding on the State and people, both natural and juristic. In fulfilment of its constitutional mandate to take reasonable legislative measures that gives effect to Section 24 of the Constitution, the government has promulgated several environmental laws. These laws provide a legal framework that embodies internationally recognised legal principles. The principal act governing activities that affect the environment is NEMA. ***Applicability to the EIA Process*** The proposed project will allow for the implementation of strategic projects to allow for the continuation and optimisation of the mining activities and associated provision of economic injections into the local economic in terms of the multiplier effect, and job creation. However, with the implementation of mining activities and related infrastructure comes the obligation by the Licence Holder to ensure that it will not result in pollution and/or ecological degradation, and that the activity is ecologically sustainable while promoting justifiable economic and social development. The benefit specifically to the Local Municipality and community in terms of this project, mainly relates to the PV Solar Plant, which will reduce the load requirements by Khumani on the existing Eskom Grid. According to an article dated 21 July 2022 in Engineering News (www.engineeringnews.co.za), Barbara Creecy, the Minister of Forestry and Fisheries and Environmental Affairs announced EIA Exemption for Solar PV Projects in low and medium risk areas, whereby the DFFE will implement exemption from EIA requirements for certain energy projects. The purpose of this is to resolve the country's energy crisis by reducing the need to obtain the necessary Environmental Authorisations. It is however understood that these notices will only come into effect in August 2022. When considering the DFFE Screening Tool conducted for the Khumani Solar Farm, the following was observed for the Project 6: Khumani Photovoltaic Solar Plant. • Medium Agricultural Theme; • Medium Animal Species Theme; • Very High Aquatic Biodiversity Theme; • Low Archaeological and Cultural Heritage Theme; • Low Civil Aviation Theme; • Low Defence Theme; • High Palaeontology Theme; • Low Plant Species Theme; • Very High Terrestrial Biodiversity Theme. The definition of low, medium and high risk will have to be clarified in order to determine whether projects such as this for Khumani would require an Environmental Authorisation in the future.
2. National Environmental Management Act (Act No. 107 of 1998) (NEMA) In terms of sections 24(2) and 24D of NEMA the Minister of Forestry, Fisheries and Environment promulgated certain activities that may not commence without an Environmental Authorisation. Activities promulgated in terms of GN 983 and GN 985 require a Basic Assessment process, while activities promulgated in terms of GN 984 require that a full Scoping and EIA process be conducted (GN 983, 984 and 985 promulgated under NEMA in Government Gazette (GG) 38282 of 4 December 2014 [as amended in 2017 and 2021]). The requirements for an EIA and EMPr are specified in Appendix 3 and Appendix 4 of GN 982 promulgated under NEMA in GG 38282 of 4 December 2014 (as amended in 2017 and 2021) ("**2014 EIA Regulations**")].

Section 24C(2A) of NEMA indicates that where listed activities are directly related to the extraction and primary processing of a mineral or petroleum resource the Minister of Mineral Resources (now DMRE) is the Competent Authority or officials at the DMRE to whom he has delegated his authority, being the Regional Managers.

Applicability to the EIA Process

Various listed activities are triggered by the proposed project. For this reason, an Environmental Authorisation in terms of the NEMA is required.

A Financial Provision will be developed as part of this EIA process and will be included with the EIA report and EMPr.

Section 28 of the NEMA places a duty of care on all persons to prevent, limit or remediate any pollution or degradation of the environment. This duty of care should be adhered to at all times during construction, operation and decommissioning of a project. Section 28 applies to all activities taking place, and is not solely focused on the listed activities being applied for.

3. EIA Regulations (2014 EIA Regulations)

Chapter 6 of the 2014 EIA Regulations provides for the requirements for Public Participation Processes (PPP), which must be carried out as part of the DMRE Environmental Authorisation application process. In terms of Regulations 21 and 23, the outcome of the PPP must be reported in this report submitted to the Competent Authorities. The PPP "*must give all potential or registered interested and affected parties, including the competent authority a period of at least 30 days to submit comments on each of the EMPr, scoping report and environmental impact assessment report, and where applicable the closure plan, as well as the report contemplated in regulation 32, if such reports or plans are submitted at different times*" (Regulation 40 (1)).

The PPP must also:

- provide access to all information that reasonably has or may have the potential to influence any decision regarding an application;
- involve consultation with the Competent Authorities, every state department that administers a law relating to the environment relevant to the application, all relevant organs of state and all potential, or where relevant, and registered Interested & Affected Parties (I&APs); and
- provide opportunity for I&APs to comment on reports and plans prior to submission of an application but must be provided with an opportunity to comment on such reports once an application has been submitted to the Competent Authorities.

The process must include the following:

"*(1) If the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land.*

(2) Sub regulation (1) does not apply in respect of—

(a) linear activities;

(b) activities constituting, or activities directly related to prospecting or exploration of a mineral and petroleum resource or extraction and primary processing of a mineral or petroleum resource; and

(c) strategic integrated projects as contemplated in the Infrastructure Development Act, 2014."

Applicability to the EIA Process

An integrated PPP will be undertaken for this process and will continue throughout the EIA and EMPr review process.

4. NEMA Listed Activities (GN 983 and GN 984) 2014 as amended 2017 and again in 2021

Regulation 54 (2) of the NEMA provides that "An application submitted after the commencement of these Regulations for an amendment of an Environmental Management Programme, issued in terms of the MPRDA, must be dealt with in terms of Part 1 or Part 2 of Chapter 5 of these Regulations".

Applicability to the EIA Process

Various listed activities are triggered by the optimisation of activities planned as part of this project. For this reason, an Environmental Authorisation in terms of the NEMA is required.

A financial provision plan will be developed as part of the EIA process and will be submitted with this EIA Report and EMPr.

Section 28 of the NEMA places a duty of care on all persons to prevent, limit or remediate any pollution or degradation of the environment. This duty of care should be adhered to at all times during construction, operation and decommissioning of a project. Section 28 applies to all activities taking place.

5. National Environmental Management: Air Quality Act (Act No. 39 of 2004) (NEMAQA)

The National Environmental Management: Air Quality Act (Act No. 39 of 2004) **(**NEMAQA) was promulgated to ensure the protection and regulation of air quality and provide measures that will prevent pollution and sustainability. Under NEMAQA, the Minister of Minister of Forestry and Fisheries and Environmental Affairs must identify substances in ambient air which present a threat to health, well-being or the environment and establish national standards for ambient air quality, including the permissible quantity or concentration of each substance in ambient air.

The following regulations promulgated under NEMAQA were considered for the project:

- National Dust Control Regulations published under GN827 in GG 36974 of 1 November 2013, which provide that an acceptable dust fallout rate for a non-residential area is considered more than 600mg/m^2/day but less than 1,200mg/m^2/day (30-day average), with maximum allowable two exceedances per year, provided these exceedances do not take place in consecutive months. Where the dust fallout rate is exceeded, a dust fall monitoring programme, as prescribed in terms of the Regulations, must include:
  - the establishment of a network of dust monitoring points using method ASTM D1739:1970 (or an equivalent standard), sufficient in number to establish the contribution to dust fallout in residential and non-residential areas near the premises, monitor identified or likely sensitive receptor locations, and establish the baseline dust fall for the district; and
  - a schedule for submitting to the air quality officer dust fallout monitoring reports annually or at more frequent intervals if so, requested by the Air Quality Officer (AQO).

The priority pollutants, as defined by the NEMAQA, are Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2), PM10 and PM2.5, Carbon Monoxide (CO), Benzene (C_6H_6), Lead (Pb) and Ozone (O_3). The NEMAQA National Dust Control Regulations are based on the SANS guidelines and present acceptable/allowable dust fallout rates for both residential and non-residential areas. Within the National Dust Control Regulations, conditions are provided for Dust Management Plans as follows:

- Any person who has exceeded the standards must, within 3 months after submission of the monitoring report, develop and submit a Dust Management Plan, as contemplated in the National Dust Control regulations, to the AQO for approval;
- The Dust Management Plan must be implemented within a month of the date of approval; and
- An implementation progress report must be submitted to the AQO at agreed time intervals.

The National Dust Control Regulations further stipulate that the latest ASTM method (2010) must be applied to dust fallout monitoring in South Africa. This requirement has a number of implications, with key items including:

- Permission to exclude exceedances caused by non-anthropogenic sources;
- The latest ASTM requires samplers be installed with a wind shield, which has been proven to increase the accuracy of capturing dust fallout;
- All mining operations must implement a Dust Fallout (DFO) programme;
- Sample analysis must now also include soluble content of samples, no longer only limited to the insoluble content of samples, as is the case with the current regulations;
- Submission of dust fallout monitoring reports on a monthly basis to the relevant AQO;
- Current fallout levels compared to historic results for at least the previous four years (where available);
- All mining operations must implement a dust management plan; and
- Provide proof of the implementation of the dust management plan in the monthly monitoring reports.

Applicability to the EIA Process

Khumani has a Dust Fallout Monitoring Programme in place measuring dust fall out, PM10 and PM2.5. An Air Quality study will be conducted as part of the EIA phase to determine the potential impact of the proposed projects dust fall out, specifically PM10 or PM2.5 beyond the mining boundary.

- **National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA) and related Legislation**

In line with the Convention on Biological Diversity, the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA) aims to legally provide for biodiversity conservation, sustainable use and equitable access and benefit sharing. NEMBA creates a basic legal framework for the formation of a national biodiversity strategy and action plan and identification of biodiversity hotspots and bioregions, which may then be given legal recognition. It imposes obligations on landowners (state or private) regarding alien invasive species. It requires that provision is made by a site developer to remove any aliens which have been introduced to the site or are present on the site.

The NEMBA also provides for listing of threatened or protected ecosystems, in one of four categories: 'Critically Endangered (CR)', 'Endangered (EN)', 'Vulnerable (VU)' and 'Protected'. Threatened ecosystems are listed to reduce the rate of ecosystem and species extinction, by preventing further degradation and loss of structure, function and composition of threatened ecosystems. The purpose of listing protected ecosystems is primarily to conserve sites of exceptionally high conservation value.

National List of Ecosystems that are Threatened and in need of Protection (2011)

The NEMBA provides for the listing of threatened or protected ecosystems in one of four categories: 'Critically Endangered (CR)', 'Endangered (EN)', 'Vulnerable (VU)' and 'Protected'. Threatened ecosystems are listed in order to reduce the rate of ecosystem and species extinction by preventing further degradation and loss of structure, function and composition of threatened ecosystems.

According to the National List of Threatened Terrestrial Ecosystems database (2011), the project area is not situated within any listed Threatened Ecosystems.

Threatened or Protected Species Regulations (2007)

The NEMBA provides for listing of Threatened or Protected Species (ToPS). If a species is listed as threatened, it must be further classified as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU). In addition to these categories, protected species are defined as "any species which is of such high conservation value or national importance that it requires national protection". Species listed in this category may include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). It should be noted that currently the 2007 Regulations are still in effect. The 2016 Regulations (notice 255 of 2015) have to date not been promulgated. As such, TOPS from both the 2007 (promulgated) and the 2015 (still draft) regulations are listed below.

Applicability to the EIA Process

Species will be assessed in terms of the following:

- 2007 ToPS List
- 2015 ToPS List.

National Forests Act (Act No. 84 of 1998)

An updated list of protected tree species was published under section 12(1) (d) of the National Forests Act (Act No. 84 of 1998) on 25 March 2022. In terms of section 15(1) of this Act, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. No indigenous forests occur within the Mine boundary.

Protected tree species will be assessed as part of the project.

Should any protected tree species fall within the project development footprint areas, the necessary permits must be obtained from DFFE for the destruction, removal or relocation of such species.

Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA)

This Act provides a list of Specially Protected Species (Schedule 1) (Section 49[1] of the NCNCA) and Protected Species (Schedule 2) (Section 50[1] of the NCNCA) for the Northern Cape Province. Permits from Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (NCDAERL)should be obtained to remove, cut or destroy protected species identified during the specialist studies before any vegetation clearing may take place.

National Environmental Management: Protected Areas Act (Act No. 57 of 2003) (NEMPAA)

The NEMPAA was promulgated in order to provide for (among other things) the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes; for the establishment of a national Register of Protected Areas, and for the management of those areas in accordance with national norms and standards.

South African Protected Areas Database (SAPAD, 2022) and South African Conservation Areas Database (SACAD, 2022)

The primary function of protected areas is to ensure the conservation of habitats, environmental processes and species occurring within these ecosystems. The SAPAD and SACAD are Geographic Information System (GIS) inventories of all Protected and Conservation areas in South Africa. The Protected and Conservation Areas (PACA) database also includes data on privately owned protected areas. This Register comprises of all data required for the Register of Protected Areas (legally declared) as well as data on Conservation Areas (areas responsibly managed for biodiversity conservation but not legally declared as Protected Areas).

The National Protected Areas Expansion Strategy (NPAES; 2018)

Focus areas for land-based protected area expansion are large, intact and unfragmented areas of high importance for biodiversity representation and ecological persistence, suitable for the creation or expansion of large, protected areas. The focus areas were identified through a systematic biodiversity planning process undertaken as part of the development of the National Protected Area Expansion Strategy (NPAES,). According to the South African Protected Areas Database SAPAD (2022) the Bredenkamp Nature Reserve is located approximately 2.8km west of the project area and the Brooks Nature Reserve is located approximately 6km to the west of the project area. Both these areas were proclaimed in 2018. The South African Conservation Areas Database (SACAD) (2022) and National Protected Areas Expansion Strategy (NPAES) database (2018) do not indicate any other conservation areas or NPAES Focus Areas within a 10km radius.

Important Bird and Biodiversity Areas (IBA; 2015)

Various sites within the country have been identified as important for maintaining viable populations of endemic, range restricted and threatened bird species. The primary aim of the IBA programme is to ensure the long-term conservation of important avifaunal habitats. They also provide essential benefits to people, such as food, materials, water, climate regulation and flood attenuation, as well as opportunities for recreation and spiritual fulfilment. According to BirdLife South Africa, one-third of the 112 IBAs located within South Africa are under threat by invasive alien vegetation, habitat modification/ degradation and agricultural expansion (Marnewick et al., 2015). Further to this, 52% of IBAs fall outside formally Protected Areas, further complicating avian habitat conservation. No IBAs are located near Khumani.

Alien and Invasive Species Regulations (2020)

These regulations only come into force on 1 March 2021 (see GN 1100: NEMBA: Extension of commencement date of the Alien and Invasive Species Lists, 2020 and the Alien and Invasive Species Regulations, 2020)

The NEMBA Alien and Invasive Species Regulations (2020) aim to:

- Prevent the unauthorised introduction and spread of alien and invasive species to ecosystems and habitats where they do not naturally occur;
- Manage and control alien and invasive species, to prevent or minimise harm to the environment and biodiversity; and
- Eradicate alien and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats.

Alien and invasive species categories according to the Alien and Invasive Species Regulations (2020) are as follows:

- Category 1a: Invasive species requiring compulsory control. Plants are to be removed and destroyed. Any Category 1a listed plants must be combatted or eradicated.
- Category 1b: Invasive species that require control by means of an invasive species management programme.
- Category 2: Invasive species that require a permit to carry out a restricted activity within an area, as specified in the permit. If an invasive species management programme has been developed, a person must control the listed invasive species in accordance with such a programme.

- Category 3: Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purpose of the regulation be considered to be a Category 1b Listed Invasive Species. If an invasive species management programme has been developed, a person must control the listed invasive species in accordance with such a programme.

The NEMBA Alien and Invasive Species Lists (2020) include national lists of invasive species to be read together with the Alien and Invasive Species Regulations (2020).

National Biodiversity Assessment (NBA; 2018)

The most recent National Biodiversity Assessment (NBA), dated 2018, is a collaborative effort to synthesise the best available science on South Africa's biodiversity. The NBA is used to inform policy in the biodiversity sector and other sectors that rely on or impact on natural resources, such as water, agriculture, mining and human settlements. The NBA provides information to help prioritise resources for managing and conserving biodiversity and provides context and information that underpins biodiversity inputs to land use planning processes (Skowno et al., 2019).

Mining and Biodiversity Guidelines (2012)

The Mining and Biodiversity Guidelines (2012) enables regulators, industry and practitioners to minimise the impact of mining on biodiversity and ecosystem services by promoting the sustainable development of mineral resources. Biodiversity priority areas (as per the guidelines), are likely to be sensitive to the impacts of mining and as such, should inform and influence spatial land use policies and plans for mining activities (DEA et al., 2013).

No areas of increased biodiversity in term of the Mining and Biodiversity Guidelines (2012) have been identified within the project areas.

Northern Cape Critical Biodiversity Areas (NCDENC, 2016) dataset

The Northern Cape Critical Biodiversity Areas (CBAs) dataset (2016) identifies biodiversity priority areas, namely CBAs and Ecological Support Areas (ESAs), which, together with protected areas, that are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of a landscape as a whole.

CBAs are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan, while ESAs are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of CBAs and/or in delivering ecosystem services. The primary purpose of CBA and ESAs maps is to guide decision-making about where best to locate development and to encourage appropriate land uses that are compatible with the desired state of CBAs and ESAs. It should inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity. It is the biodiversity sector's input into multi-sectoral planning and decision-making processes.

- According to the Northern Cape CBA dataset, no CBAs are located in close proximity to the mine.

6. National Environmental Management: Waste Act (Act No. 59 of 2008) (NEMWA)

The purpose of the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEMWA) is to: assist in regulating waste management; ensure the protection of human health; and prevent pollution and environmental degradation through sound waste management principles and guidelines. It furthermore provides for:

- national norms and standards for regulating the management of waste by all spheres of government;
- licensing and control of waste management activities;
- remediation of contaminated land;
- a national waste information system; and
- provision for compliance and enforcement.

The NEMWA broadly defines waste as "*any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be reused, recycled or recovered.*" It also regulates processing of mining residue deposits or stockpiles.

The NEMWA imposes a general duty upon waste holders to take reasonable measures to avoid waste generation and, where this is impossible, to: minimise the toxicity and quantities of waste generated; reuse, reduce, recycle and recover waste; and ensure that it is treated and disposed of in an environmentally-sound way. Failure to do so is a criminal offence, with a maximum fine of R10 million or imprisonment of up to 10 years, or both.

It is necessary to hold a Waste Management Licence (WML) for defined waste management activities.

The Department of Environmental Affairs (DEA, now DFFE) promulgated the 2013 Waste Management Regulations, which provides that a WML is required for undertaking certain waste management activities ("**Waste Listed Activities**"). The Waste Listed Activities are separated into three categories, namely Category A, Category B and Category C. Category A and B Waste Listed Activities require a WML, for which either a Basic Assessment or an EIA process needs to be undertaken that complies with the 2014 EIA Regulations. The procedures for licensing Waste Listed Activities are stipulated in Chapter 5 of NEMWA and are not applicable to this project.

Classification of certain waste streams is required in terms of the Waste Classification and Management Regulations, published in GN 634 of GG 36784 on 23 August 2013, to ensure that the correct waste management standards and disposal methods are implemented.

The National Norms and Standards for the Assessment of Waste for Landfill Disposal and the National Norms and Standards for the Disposal of Waste to Landfill (published under GN 635 and GN 636, respectively in GG 36784 of 23 August 2013) provide the norms and standards for disposal of waste to landfill. This includes liner requirements and design specifications.

In 2014 the National Environmental Management: Waste Amendment Act (Act No 25 of 2014) was promulgated to include residue deposits and residue stockpiles from:

- Mineral excavation;
- Physical and chemical processing of metalliferous minerals;
- Physical and chemical processing of non-metalliferous minerals; and
- Drilling operations.

Residue deposits are defined in the MPRDA as "*any residue stockpile remaining at the termination, cancellation or expiry of a prospecting right, mining right, mining permit, exploration right or production right*". Residue stockpiles, in turn, are defined in the MPRDA as "*any debris, discard, tailings, slimes, screening, slurry, waste rock, foundry sand, beneficiation plant waste, ash or any other product derived from or incidental to a mining operation and which is stockpiled, stored or accumulated for potential re-use, or which is disposed of, by the holder of a mining right, mining permit, production right or an old order right.*"

The Regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits ("**Residue Regulations**"), published under GN 632 in GG 39020 of 24 July 2015, provide for the planning, management and reporting of residue stockpiles and residue deposits, which obligations include:

- The assessment of impacts and analyses of risks relating to the management of residue stockpiles;
- Residue deposits; characterisation of residue stockpiles and residue deposits;
- Classification of residue stockpiles and residue deposits;
- Investigation and the selection of site for residue stockpiling;
- Design of the residue stockpiles and residue deposits;
- Impact management;
- Duties of the holder of right or permit;
- Monitoring and reporting systems;
- Dust management and control; and
- Decommissioning, closure and post closure management requirements.

The Residue Regulations provide the tools for and correspond to the statutory provision relating to managing residue stockpiles and residue deposits in the manner prescribed in section 43A of the NEMWA.

Applicability to the EIA Process:

In terms of the existing Mine Residue Stockpiles and reworking activities it should be noted that on 24 July 2015, GN 633 introduced transitional provisions that seek to regulate the transition of waste management at mines from an EMPr approved in terms of the MPRDA to a WML in terms of the NEMWA. In this regard the transitional provisions state that:

"An environmental management programme or plan approved in terms of the Mineral and Petroleum Resources Development Act, 2002 shall be deemed to have been approved and issued in terms of the NEMWA." (WML).

"The Minister responsible for mineral resources may direct any holder of a prospecting right, mining permit, mining right, exploration right, or production right, if he or she is of the opinion that the residue stockpile or residue deposit in question is likely to result in significant pollution, degradation or damage to the environment, to take such action to upgrade the environmental management programme or plan to address any deficiency in the environmental management programme or plan.

An environmental management programme or plan submitted in terms of the Mineral and Petroleum Resources Regulations, 2004 and which is pending when the Notice took effect, must despite the repeal of the Mineral and Petroleum Resources Regulations, 2004 be dispensed with in terms of the Mineral and Petroleum Resources Regulations, 2004 as if those regulations were not repealed.

7. National Heritage Resources Act (Act No. 25 of 1999) (NHRA)

For this project, the following has been considered as part of the specialist studies in terms of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) are triggered when considering:

a) Archaeological artefacts, structures and sites older than 100 years;
b) Ethnographic art objects (e.g. prehistoric rock art) and ethnography;
c) Objects of decorative and visual arts;
d) Military objects, structures and sites older than 75 years;
e) Historical objects, structures and sites older than 60 years;
f) Proclaimed heritage sites;
g) Grave yards and graves older than 60 years;
h) Meteorites and fossils; and
i) Objects, structures and sites or scientific or technological value.

Section 34 of the NHRA deals with structures that are older than 60 years. Section 35(4) of the NHRA deals with archaeology, palaeontology and meteorites. Section 36 of the NHRA, deal with human remains older than 60 years. Unidentified/ unknown graves are also handled as older than 60 years until proven otherwise.

According to Regulation 38 of the NHRA, any development or other activity which will change the character of a site exceeding 5 000m^2 in extent requires notification to the South African Heritage Resources Agency (SAHRA). This process, as well as the outcomes of the heritage and paleontological study will be undertaken as part of the Environmental Authorisation process.

Applicability to the EIA Process:

The project areas are regarded as having a high sensitivity for palaeontological themes and low sensitivity for archaeological themes. For this reason, specific specialist studies in this regard will be conducted.

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

The National Water Act (Act No. 36 of 1998) (NWA) is the primary regulatory legislation controlling and managing the use of water resources and pollution thereof. It provides for fundamental reformation of legislation relating to water resource use. The preamble to the NWA recognises that the ultimate aim of water resource management is to achieve sustainable use of water for the benefit of all users and that water resources quality protection is necessary to ensure sustainability of the nation's water resources in the interests of all water users. The NWA's purpose is stated in section 2 and enforced by the Department of Water and Sanitation (DWS). Section 2 of the NWA relates to the following:

- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources; and
- Meeting international obligations.

The NWA presents strategies to facilitate sound management of water resources; provides for the protection of water resources; and regulates use of water by means of Catchment Management Agencies (CMAs), Water User Associations (WUAs), Advisory Committees and International Water Management. As the NWA is founded on the principle of trusteeship, the government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and industry (including mines) can only be entitled to use water if the use is permissible under the NWA.

In terms of section 21 of the NWA, certain consumptive and non-consumptive water uses are identified and can only commence once authorised. Where a water use constitutes a Scheduled 1 Use (permissible use without an authorisation requirement); permissible water uses in terms of section 22 of the NWA; or is authorised in terms of a General Authorisation, a Water Use Licence (WUL) is not required.

The NWA further requires that:

- a motivation in terms of Section 27 be submitted as part of a Water Use Licence Application (WULA);
- the necessary water uses application forms be compiled and submitted in support of the WULA;
- the requirements of GN 704 and detail surrounding these activities will be considered in the WULA; and
- an integrated waste and water management plan be submitted in support of the Integrated WULA (IWULA).

Applicability to the EIA Process:

- Various water uses are triggered by this project, resulting from the expansion of WRD, new Off Grade ROM Stockpile and taking into consideration the potential presence of pans in this area and location of watercourses in close proximity to the Solar Farm specifically.

<u>GN 704 Exemption:</u>

GN 704 was promulgated in terms of section 26(1) of the NWA and is specifically aimed at the protection of water resources associated with mining related activities. It provides minimum requirements which need to be adhered to for the protection of the water resources on a mine. GN 704 regulates the use of water, management of dirty and clean water infrastructure and related activities at mines. This includes minimum requirements for infrastructure that hold dirty water. A mine can apply for exemptions from these requirements and could be granted approval should sufficient management measures be put in place to ensure the protection of the environment. Regulation 4 of GN 704 places some restrictions in terms of the locality of certain infrastructure which could have an impact on water resources.

In terms of GN 704 exemptions, the GN 704 Regulations relate to both existing and new water use activities and each section should be read and interpreted individually. It is recommended that exemption be applied for in terms of the GN 704 Regulations based on the nature of the activities.

9. Integrated Development Plan (IDP)

9.1 Gamagara Local Municipality

The IDP specifically states that the provision of infrastructure and basic services is one of the key performance areas and infrastructure remains a challenge. The document states that over the past months, the municipality experienced shortage of water, illegal connection of electricity and water, electricity cable theft, water leakages as a result of aging infrastructure an insufficient bulk infrastructure. It is stated that only 87.9% of households have access to electricity at or above the Reconstruction and Redevelopment Programme (RDP) level. Some households within the municipality are not electrified due to the lack of electrical capacity, especially in Olifantshoek. The reports mentions that electrical infrastructure and electrification remains a challenge due to the continuous growth of information settlements and lack of funding. Electrical infrastructure and electricity cannot be installed in informal settlement prior to township development. Other major challenges regarding electricity are vandalism and copper theft, especially in Dingleton area, that lead to equipment damage, electricity supply interruptions and possible fatalities to municipal employees and members of the public.

In addition to the above the Gamagara Local Municipality has become a significant player in the Northern Cape Province and an important contributor to the South African mining sector and international mining value change. The IDP states that this is therefore a centre of concentration on the development for providing relevant and up to date infrastructure to accommodate mining activities.

9.2 Tsantsabane Local Municipality

The Draft Social Development Framework (SDF) cited Provincial Treasury (2014) indicates that "during 2012 the primary sector contributed 76% of all the sectors' contribution to the Gross Domestic Product (GDP) of Tsantsabane Local Municipality. Mining is the single biggest contributor of all industries to the GDP. Mining contributed 74%, namely R3.9 billion, and tertiary sector contributed 4% and 20% respectively". The current IDP indicates that mining accounts for 55% of the GDP within the region

In terms of electricity, there has been a general increase in the number of people having access to electricity, across the country. 2011 Stats SA indicates that 8211 households use electricity for lighting while 1356 households use candles.

10. National Development Plan (NDP)

The IDP/ Budget argues that South Africa displays what could be seen or described as a "top-down, and, at the same time, bottom-up" process of development planning. The NDP is a plan for the country to encourage long term planning, i.e. up to 2030. The municipality incorporates the long term visioning as espoused in the NDP. The following six pillars have widespread merits for strategic planning:

- Unite all South Africans around a common programme to fight poverty and inequality and promote social cohesion;
- Have South Africans be active citizens in their community and in the development of the country;
- A growing and inclusive economy with higher investment, better skills, rising savings and greater levels of competitiveness;
- Building capabilities of the people and the state;
- A developmental state capable of correcting historical inequalities and creating opportunities for more people while being professional, competent and responsive to the needs of all citizens; and
- South African leaders putting aside narrow sectarian interests in favour of national interest and putting the country first.

According to an article in Engineering News – Creecy announces EIA Exemption for Solar PV Project in low and medium risk areas, dated July 2022, the DFFE will implement exemption from EIA requirements for certain energy projects. The purposed of this is to resolve the country's energy crisis by reducing the need to obtain the necessary Environmental Authorisations. It is however understood that these notices will only come into effect in August 2022. When considering the DFFE Screening Tool conducted for the Khumani Solar Farm, the following was observed for the Project 6: Khumani Photovoltaic Solar Plant.

- Medium Agricultural Theme;
- Medium Animal Species Theme;
- Very High Aquatic Biodiversity Theme;
- Low Archaeological and Cultural Heritage Theme;
- Low Civil Aviation Theme;
- Low Defence Theme;
- High Palaeontology Theme;
- Low Plant Species Theme;
- Very High Terrestrial Biodiversity Theme.

The definition of low, medium and high risk will have to be clarified in order to determine whether projects such as this for Khumani would require an EA in the future.

1.f Need and Desirability of the Proposed Activities

In terms of Projects 1 – 5, no alternatives are available as these project relate to existing projects and infrastructure. However some considerations for each of the projects have been made as part of this ESR. The key area for which alternatives and desirability are relevant is for Project 6 – PV Solar Plant.

For all the projects, the importance of mining in the economic setting of Local Municipalities must be considered with both the Gamagara and Tsantsabane Local Municipality IDPs stating that mining is one of the key contributors to the GDP of these municipalities.

1.f.i Project 1: King Mine Optimisation; Project 3: New Bruce Block A & B Off-Grade ROM Stockpile; and Project 4: Product Stockpile Formalisation

An important consideration to keep in mind is the obligation of the mine to fulfil its Mining Works Programme. Section 23(1)(a) of the MPRDA states in Section 1(a), that subject to subsection (4), the Minister must grant a mining right if the mineral can be mined optimally in accordance with the mining work programme. The Mine has been awarded a Mining Right by the DMR (now DMRE) and therefore has an obligation to give effect to the following:

- The ongoing development and improvement of the Mining Work Programme which details the planned mining activities to be followed in order to mine the mineral resource optimally; and
- Optimal mining of minerals must be undertaken, as the Minerals and Petroleum Board may recommend to the Minister to direct the holder of a mining right to take corrective measures if the Board establishes that the minerals are not being mined optimally in accordance with the Mining Work Programme. The Minister may, on the recommendation of the Board, suspend or cancel a mining right if the Minister is convinced that any act or omission by the holder justifies the suspension or cancellation of the right.

Projects 1, 3 and 4, together with the ongoing opencast mining operations, will give effect to the requirements of Section 23 of the MPRDA, as well as ensure the continuation of mining activities as an economic activity within the Local Municipalities.

1.f.ii Project 2: King Mine KM02 Mine Residue Stockpile Rehabilitation

The rehabilitation of the KM02 Mine Residue Stockpile gives effect to the approved Closure Objectives of the EMPr, as approved in 2009. The intent of the proposed rehabilitation is to ensure that the facility is stable and to ensure that the final land use objectives are achieved. The greater part of the mine will have the capability of at least grazing land, including the areas where grazing land currently exists, once closure is achieved. The rehabilitated Paste Disposal Facility and the deep unrehabilitated opencast voids will, however, not be used as grazing land due to the moderately steep side slopes where erosion could occur if grazed and due to safety factors, and for this reason is indicated as “restricted”. It is a requirement and commitment by the mine to rehabilitate the Mine Residue Deposits and therefore this project is a legal requirement to be implemented.

1.f.iii Project 5: Discard Low Grade Stockpile Design Change

The current approved footprint of the Discard Low Grade Stockpile encroaches over two (2) identified pans. The redesign of the facility will result in the protection of these two (2) systems.

1.f.iv Project 6: Khumani Photovoltaic Solar Plant

1.f.iv.1 Electricity Supply on a National Level

According to the Ministry of Mineral Resources and Energy, South Africa’s total domestic electricity generation capacity is 58,095 megawatts (MW) from all sources. Currently coal is by far the major energy source for South Africa, comprising around 80 percent of the country’s energy mix (USAID, 2022). President Cyril Ramaphosa further addressed South Africa on 25 July 2022 during which time he confirmed that South Africa is without a reliable electricity supply. The president called for all South Africans to be part of the solution; to contribute in whatever way they can to ending energy scarcity in South Africa. Various actions were listed during this meeting in which includes to massively increase private investment in generation capacity. The President also alluded to the potential in the near future that Solar Projects may no longer require permits or licencing. According to an article in Engineering News – Creecy announces EIA Exemption for Solar PV Project in low and medium risk areas,

dated July 2022, the DFFE will implement exemption from EIA requirements for certain energy projects. The purposed of this is to resolve the country's energy crisis by reducing the need to obtain the necessary Environmental Authorisations. It is however understood that these notices will only come into effect in August 2022. When considering the DFFE Screening Tool conducted for the Khumani Solar Farm, the following was observed for the Project 6: Khumani Photovoltaic Solar Plant.

- Medium Agricultural Theme;
- Medium Animal Species Theme;
- Very High Aquatic Biodiversity Theme;
- Low Archaeological and Cultural Heritage Theme;
- Low Civil Aviation Theme;
- Low Defence Theme;
- High Palaeontology Theme;
- Low Plant Species Theme;
- Very High Terrestrial Biodiversity Theme.

The definition of low, medium and high risk will have to be clarified in order to determine whether projects such as this for Khumani would require an EA in the future.

Based on the above the clear need for alternative power generators have been raised on a National Level.

1.f.iv.2 Electricity Supply on a Municipal Level

For the Gamagara Local Municipality in which the proposed PV Solar Farm is planned, the IDP (2020/2021) specifically states that the provision of infrastructure and basic services is one of the key performance areas and infrastructure remains a challenge. The document states that over the past months, the municipality experienced shortage of water, illegal connection of electricity and water, electricity cable theft, water leakages as a result of aging infrastructure an insufficient bulk infrastructure. It is stated that only 87.9% of households have access to electricity at or above the RDP level. Some households within the municipality are not electrified due to the lack of electrical capacity, especially in Olifantshoek. The reports mentions that electrical infrastructure and electrification remains a challenge due to the continuous growth of information settlements and lack of funding. Electrical infrastructure and electricity cannot be installed in informal settlement prior to township development. Other major challenges regarding electricity are vandalism and copper theft, especially in Dingleton area, that lead to equipment damage, electricity supply interruptions and possible fatalities to municipal employees and members of the public.

This project will further significantly reduce the Eskom Load Requirement from the mine. During the financial year 2021 and 2022 the mine used 200 799 039kWh. The mine had to work on a load reduction bases which required Black Rock Manganese Mine (also owned by Assmang) (Black Rock) to generate electricity through generators and supply to Eskom on behalf of the Assmang group. The electricity that Blackrock generated on behalf of Khumani was 6 965KWh (2.4mil liter diesel). The Solar Farm Project will therefore result in a significant positive contribution by reducing the need for electricity generation by means of generators and in so reduce the diesel usage requirements, a strong Carbon Footprint benefit.

1.f.iv.3 Photovoltaic Power Potential

According to the Global Solar Atlas, the area in which the PV Solar Plant is planned has a yearly total of between 1899 to 2045kW/h/kWp.

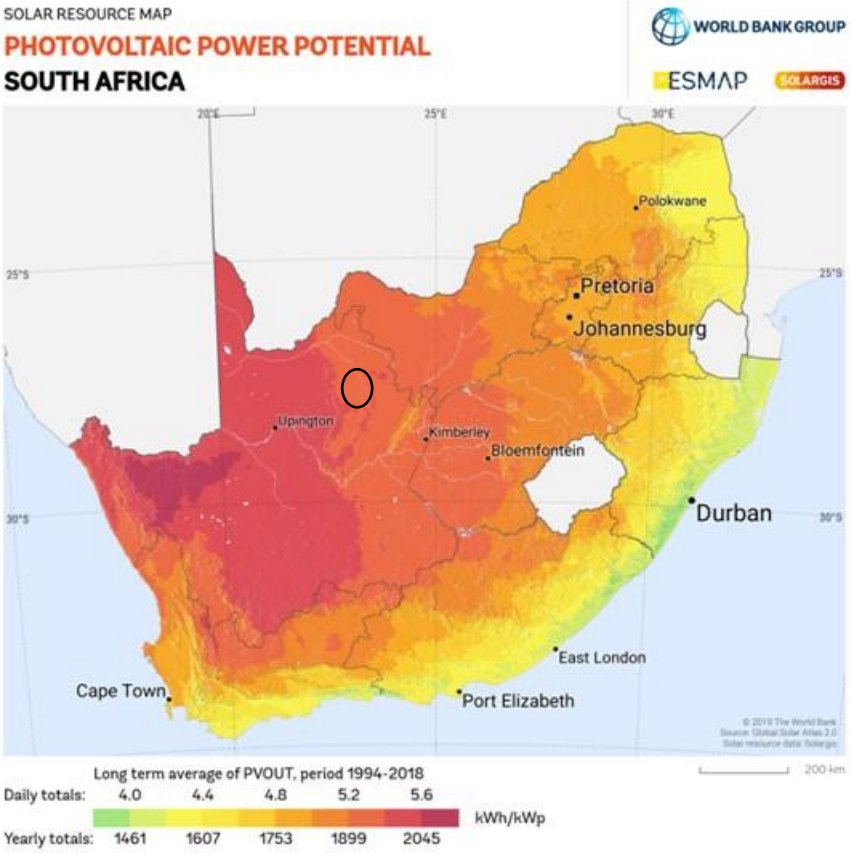


Figure 15: Photovoltaic Power Potential

The figure hereafter indicates that the site location has excellent solar energy resource (average Global Horizontal Radiation of approximately 2273 kWh/m^2 /year

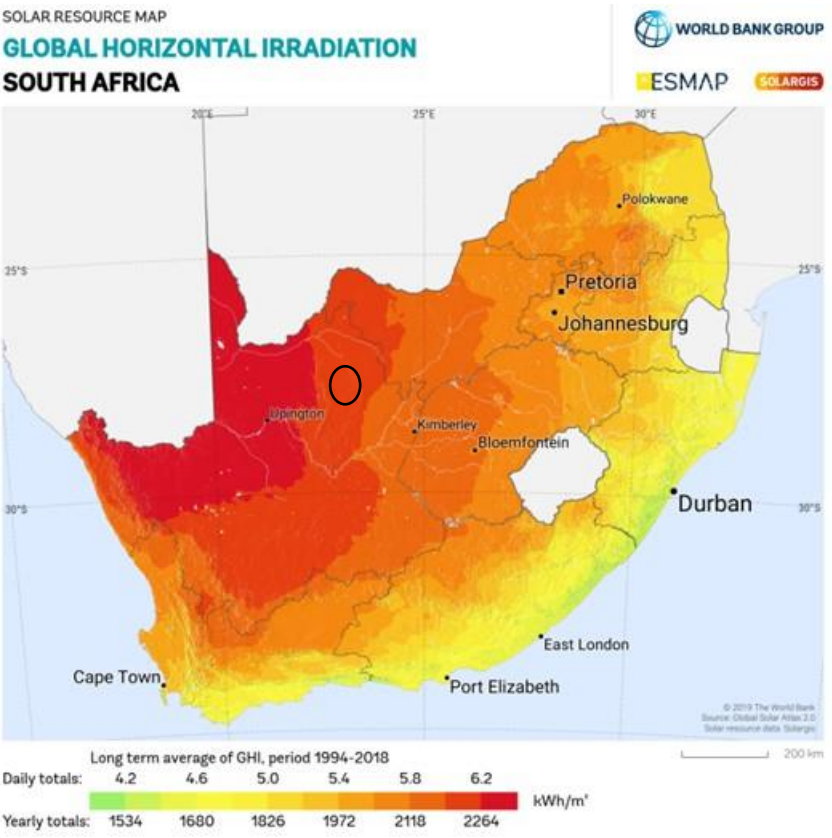


Figure 16: Global Horizontal Irradiation

When considering the number of approved Solar Plants in the Northern Cape in terms of the DFFE National Screening tool, the opportunity for the use of Solar Electricity is further highlighted:

Table 17: PV Solar Plants approved within 30km from the project areas (National Screening Tool, 2022)

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	14/12/16/3/3/2/819/AM2	Solar PV	Approved	13.2
2	12/12/20/1858/2	Solar PV	Approved	28.3
3	12/12/20/1906	Solar PV	Approved	18.4
4	14/12/16/3/3/2/820	Solar PV	Approved	13.2
5	12/12/20/1994/3	Solar PV	Approved	21.7
6	14/12/16/3/3/2/935	Solar PV	Approved	24.8
7	14/12/16/3/3/2/1111	Solar PV	Approved	29.7
8	12/12/20/1994/2	Solar PV	Approved	21.7
9	14/12/16/3/3/2/273	Solar PV	Approved	28.3
10	12/12/20/1858/1	Solar PV	Approved	28.3
11	12/12/20/1994/1	Solar PV	Approved	21.7
12	14/12/16/3/3/2/1109	Solar PV	Approved	24.1
13	14/12/16/3/3/2/911	Solar PV	Approved	17.7
14	12/12/20/1994	Solar PV	Approved	21.7
15	14/12/16/3/3/2/1082	Solar PV	Approved	13
16	14/12/16/3/3/2/819	Solar PV	Approved	14.9
17	12/12/20/1860	Solar PV	Approved	28.3

1.f.iv.4 Access Routes

Two (2) access route options are proposed to gain access to the proposed Solar PV Plant from the Dingleton Road:

- Access Route Option 1 utilising the existing Silo Access Road with expansion requirements (overall road length: 2.2km at 8m width); and
- Access Route Option 2 utilising the existing farm road with expansion requirements (overall road length: 2.6km at 8m width).

Final route option however dependent on outcomes of specialist studies.

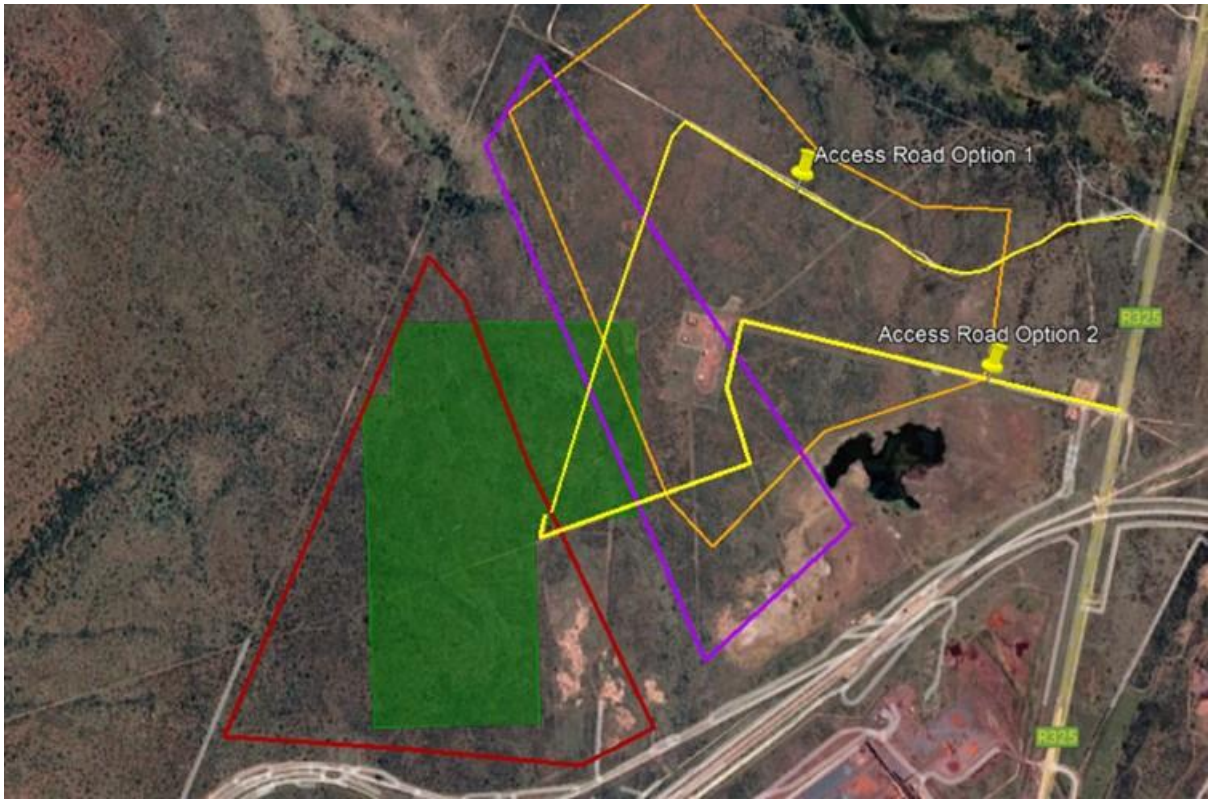


Figure 17: Location alternatives for Access Roads

1.f.iv.5 Power Line Routes

Two (2) alternative power line routes from the Solar Farm to the mine substation are proposed:

- Power line Option 1: 2 540m
- Power line Option 2: 3 420m

Both the power lines start and end at the same location; the final route will only be concluded upon the final design of the proposed PV Solar Plant, as it will depend on the requirements of the existing railway line loop and final outcomes of the specialist studies.

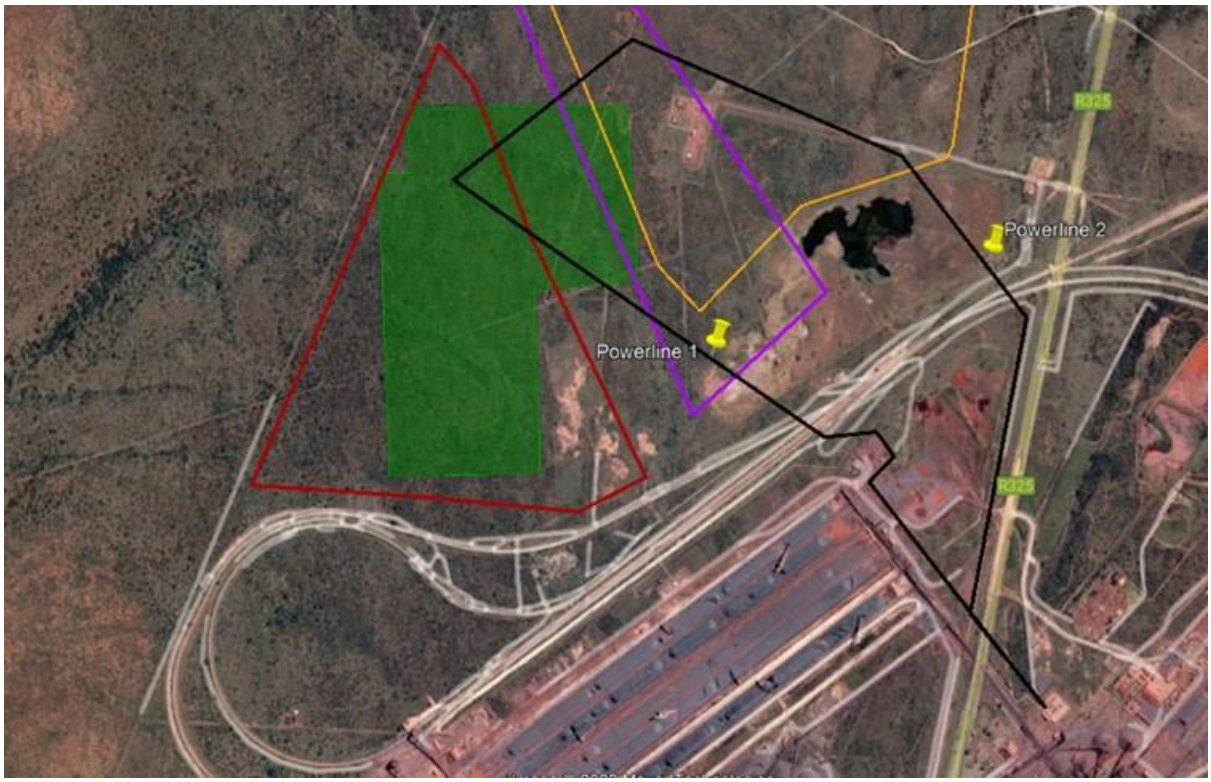


Figure 18: Location alternatives for Power Lines

1.f.iv.6 Type of technology

The two (2) photovoltaic (PV) technology alternatives considered by the mine are fixed mounting and tracking mounting structures. Typically, in a tracking system, the panels are mounted on a steel rack and a tracking motor is placed at the end of the array to control the tilt and movement of the panel as required to track the sun. The mounting structure influence the exposure of the PV panels to sunlight with single axis tracking systems, dual axis tracking systems, and fixed tilt mounting structure.

1.f.iv.7 Batteries

The project design team indicated that the lithium-ion batteries will be used. No other alternative was considered. The proposed lithium-ion technology was chosen due to the following reasons:

- Lithium – ion technology is very mature in the market with multiple global references
- There are multiple Tier 1 manufacturing and supply companies
- Availability to supply and support in a global market
- Lithium-ion provides great versatility (Power and Energy Applications)
- Energy density
- Charge rate
- 20 years of global market experience
- Minimised financial risk

1.f.iv.8 Location

An overall area of approximately 285ha is available on Portion RE of the farm Parson. This area is not planned for future mining and will therefore not result in the potential to sterilise reserves. Within this 285ha area, three (3) distinct blocks (A, B and C) for specialist investigation were identified to find the most suitable area for this facility. Within these blocks, the developer (NEC XON) has indicated the preferred site based on the location and placement of infrastructure (green block) – see figure below.

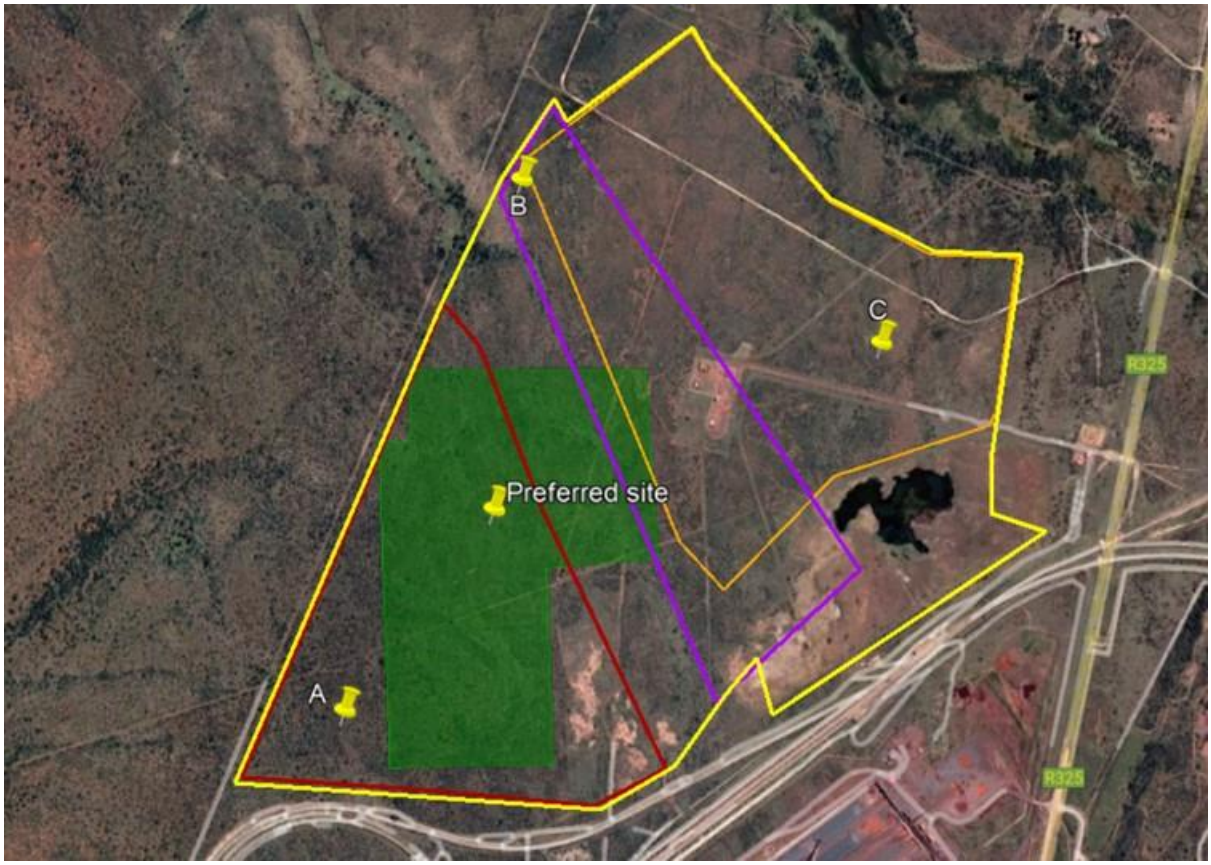


Figure 19: Proposed location options

The site location has:

- Excellent Solar Energy Resource (see previous section);
- Low rainfall and a dry climate;
- Flat slope which is preferred for a PV installation;
- Sufficient availability of usable area to make provision for any constraints that may arise during the environmental authorisation process and to avoid such areas;
- In close proximity to the mine's substation;
- Surface land is owned by the mine;
- Access roads are available to the site;
- Not located in a CBA or specific sensitive areas; and
- Current land use is characterised by grazing and surrounding mining activities.

1.f.iv.9 Location Alternatives

The mine has identified an area of 285ha available for the PV Solar Plant, which will not result in the sterilisation of resources. The PV Solar Plant itself requires and area of 60-90 ha to allow for future expansions. The project will initiate as a 60ha facility, with the potential to expand to a 90ha facility. This will allow for expansions in the future should it be required. To identify the most suitable area various investigation blocks were identified within the 285ha area (Blocks A, B, C) and the preferred option.

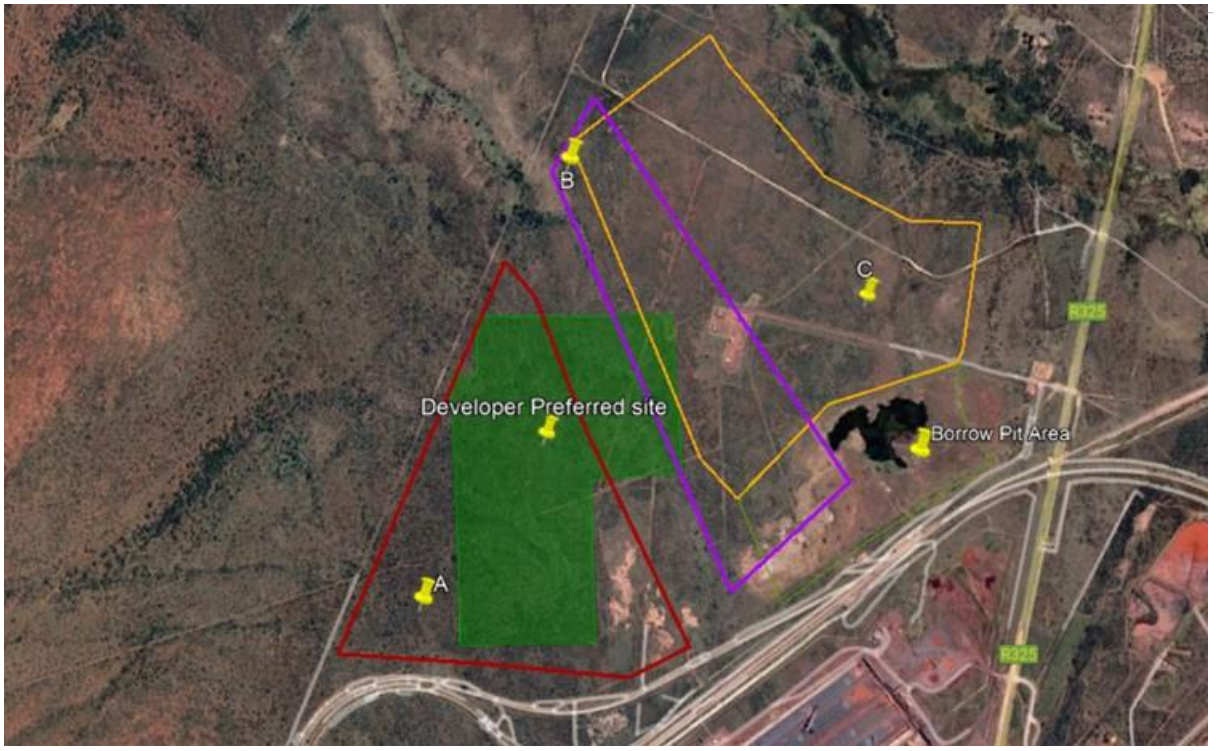


Figure 20: Alternative Site Locations

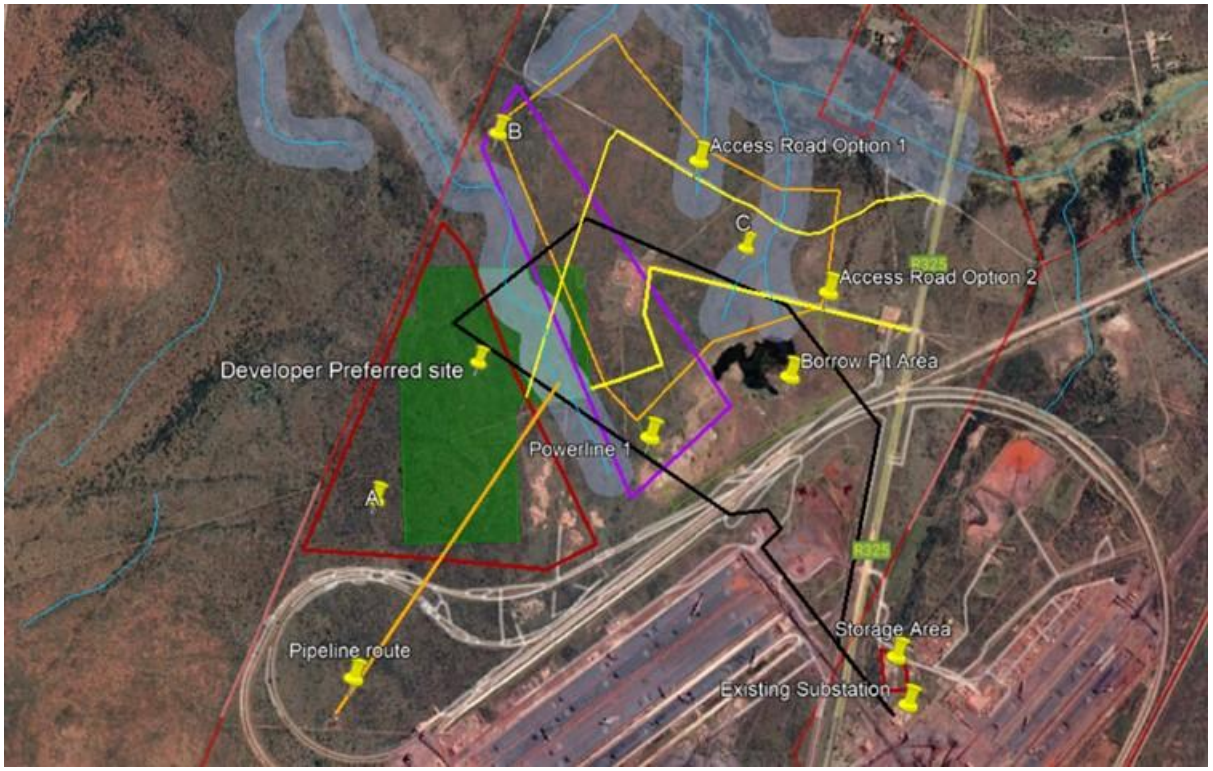


Figure 21: Proposed Main Infrastructure

For each of these option blocks the following environmental aspects were considered:

- Soil Setting;
- Terrestrial Ecological Setting;
- Freshwater Ecosystem Setting;
- Hydrological Setting
- Visual Setting;
- Noise and Vibration Setting;
- Heritage and Paleontological Setting; and

- Social Setting (Residential).

1.f.iv.9.a Soil Setting

The majority of the soils within the footprint areas earmarked for the proposed Solar PV facility are characterised by soils of restricted to very low agricultural potential as a result of mining and related activities. In addition, considering the climatic conditions of the area which is associated with limited rainfall as per the desktop review and the absence of any potential irrigation scheme, this renders the focus areas largely unsuitable for any large-scale dryland cultivation enterprises. These soils thus have little significance in terms of agricultural productivity, with limited contribution to the local, regional and provincial as well as national food production. Therefore, from a soil and land capability point of view the constraints for all the proposed options ranges from Low to Negligible. The solar PV Plant options have however been listed from the best to least preferred option. This was based on the premise that the impact of the solar PV should be localised to the already disturbance footprints as far as possible so that the overall impact is managed in a holistic manner.

Table 18: Summary of the outcome of the solar site selection - Soils

PV Solar Plant Site Option	Rank
Option A	1
Preferred Option	2
Option B	3
Option C	5

1.f.iv.9.b Ecological Setting

The Solar PV Plant options are located within the Kathu Bushveld vegetation type. The Kathu Bushveld vegetation type is listed as Least Concern in both Mucina and Rutherford (2006) and in the updated 2018 Vegetation Map of South Africa, Lesotho, and Swaziland (SANBI, 2018a)).

During the field assessment, three habitat units (Figures 22 & 23) were identified across the Solar PV Plant options, namely:

1. *Senegalia-Tarchonanthus* Bushveld Habitat – this habitat comprises the largest extent of the different Solar PV Plant locality options. The habitat consists largely of open thornveld habitat dominated by *Senegalia mellifera* subsp*. detinens* and *Tarchonanthus camphoratus*. Soils associated with this habitat were characterised by a mosaic of deep, red, sandy soils and more lithic, shallow Calcrete-based soils. Although woody species abundance (especially *Senegalia mellifera* subsp. *detinens*) varied spatially across the immediate landscape, the overall species composition was very similar throughout, hence the classification as one habitat unit. The unit provides both suitable forage and shelter for fauna within the focus area although limited niche opportunities exist within this broadly homogenous unit. This habitat unit is supported a moderate to moderately high floral species diversity and is considered to be of intermediate floral sensitivity. From a faunal perspective the unit is considered of intermediate sensitivity;
2. Freshwater Habitat – this habitat was associated with both watercourse habitat (i.e., episodic drainage lines with associated riparian habitat) and non-watercourse habitat (i.e. man-made features including a quarry and a farm dam). The vegetation associated with the Freshwater Habitat typically consists of species that have an increased affinity for wetter conditions. Fauna associated with this unit largely mimics the communities noted adjacent to this unit, however, unique characters provided during high rainfall conditions will provide fauna with niche habitat and sources of water. Typically, the Watercourse habitat is associated with a moderately high floral diversity and is considered to be of moderately high floral and faunal sensitivity (especially given the important ecological functions these features provide within the greater landscape). In contrast, the non-watercourse habitat supports a moderately low floral diversity and is considered to be of moderately low floral sensitivity. The non-watercourse habitat does provide fauna with possible sources of water, but the integrity is degraded, limiting further opportunities for fauna.; and
3. Transformed Habitat – this habitat was associated with areas in which anthropogenic transformation (i.e. mining related activities, such as old borrow pits) has occurred and has resulted in a vegetation and faunal community that is largely degraded or diminished in nature and that is associated with alien and

invasive plant species. Overall floral species richness is low and thus faunal opportunities reduced. This habitat is considered to be of low floral and faunal sensitivity.

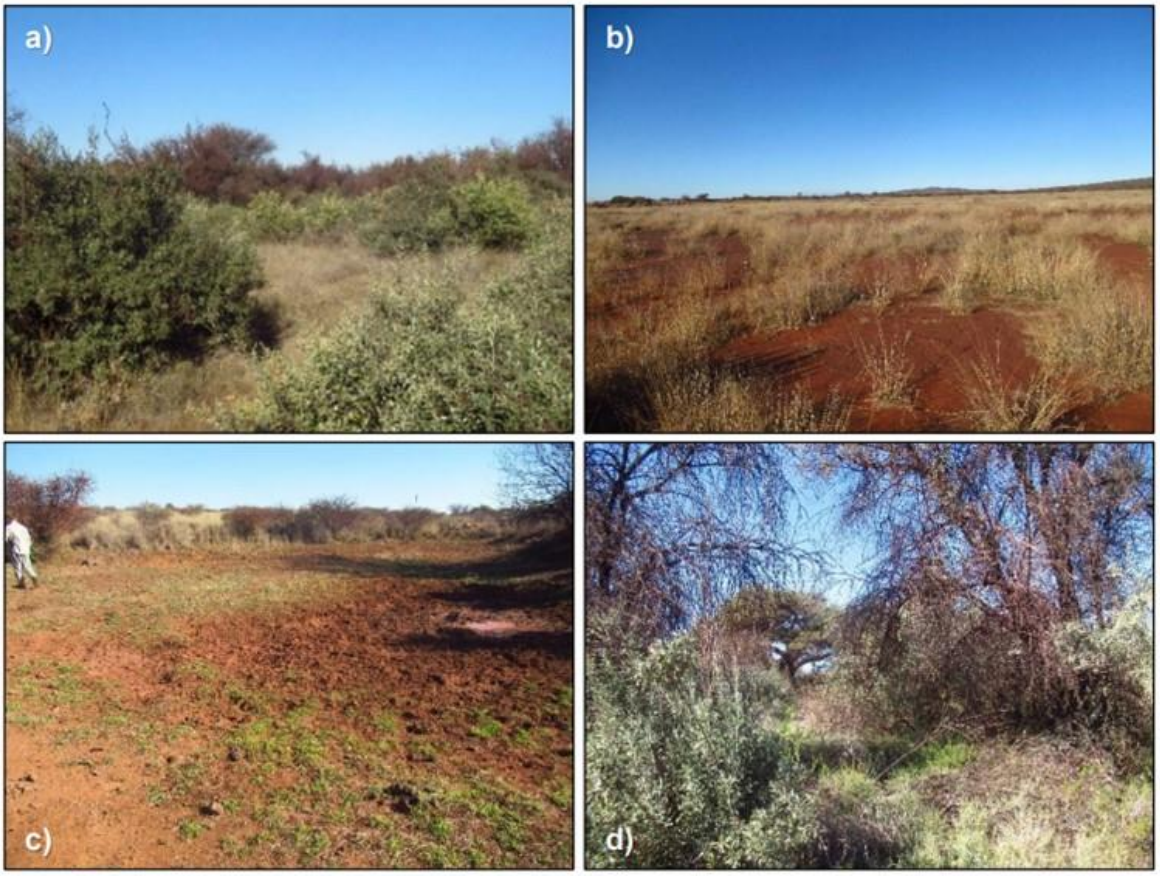


Figure 22: Top left (a): Representative photograph of the Senegalia-Tarchonanthus Bushveld Habitat. Top right (b): Representative photograph of the Transformed Habitat associated with an old borrow pit. Bottom left (c): typical habitat associated with the farm dam (i.e. part of the non-watercourse habitat located on Solar PV Plant Option C), and Bottom right (d): typical habitat associated with the episodic drainage lines that supported riparian vegetation characteristics (i.e., part of the watercourse habitat).

The results of the field assessment (below) were used to identify which of the Solar PV Plant options would be most preferred from a terrestrial biodiversity perspective. However, the final layout should be informed by several disciplines including terrestrial biodiversity (flora and fauna), freshwater, hydrological, hydro-pedological, and archaeological findings (to name a few). The table below indicates which habitats are associated with the different solar PV facility options:

Table 19: Habitat units associated with the Solar PV Plant options

PV facility option	*Senegalia-Tarchonanthus* Bushveld	Freshwater Habitat		Transformed Habitat
		Watercourse habitat	Non-watercourse habitat	
Option A	x		x	x
Option B	x	x		x
Option C	x	x[14]	x	x
Preferred Option	x	x		

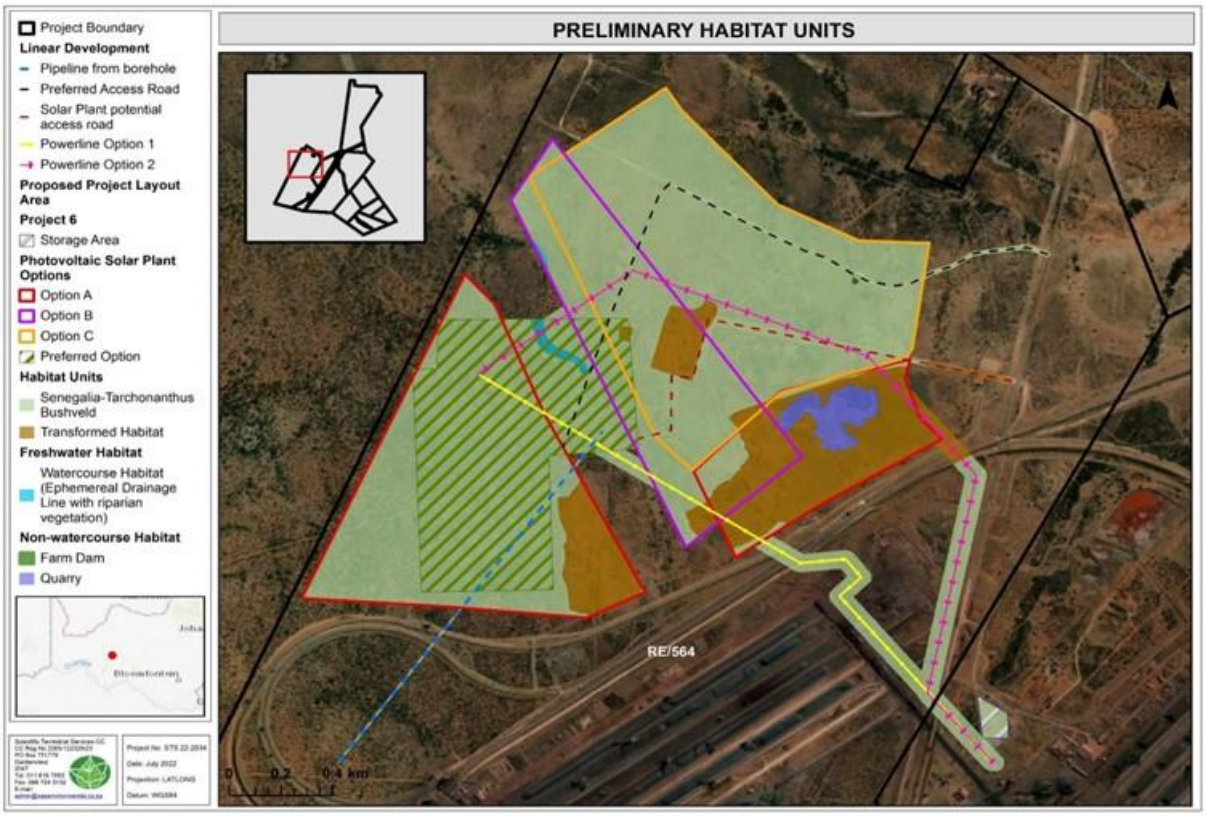


Figure 23: Preliminary Habitat Units, with proposed infrastructure development layout, associated with the Solar PV Plant options

Conservation significance associated with the Solar PV Options:

The Solar PV Plant options are associated with different features of conservation significance (ESAs and Other Natural Area (ONAs) as per the databases consulted. The table below provides a summary of the association of each proposed PV facility option and areas of conservation significance.

Table 20: Conservation significance (as per desktop analysis) associated with the Solar PV Plant options

PV facility option	ESA	Other natural Areas (ONA)
Option A	x	x
Option B		x
Option C		x
Preferred Option	x	x

Species of Conservation Concern (SCC) associated with the Solar PV Options:

The identified habitat units (within the Solar PV Plant options) provide different habitat suitability for a variety of SCC and Protected species.

- SCC comprise nationally protected species including:
  - Threatened species (in terms of Section 56 of the NEMBA) falling into the Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) categories of threat status.
- Protected tree species as per the National Forests Act, 1998.
- Threatened or Protected Species (TOPS) List as per the 2007 (and draft 2015) Regulations.
- Provincially protected species including:
  - Specially Protected Species (Schedule 1) and Protected Species (Schedule 2) as listed under the NCNCA.

Table 20 and 21 below presents the preliminary floral and faunal SCC assessments for the habitats identified within the proposed Solar PV Plant options. Probability of Occurrence (POC; e.g., Confirmed, High, Medium or Low) is additionally provided as an indication of the likelihood of finding each species within the focus area. It should be noted that permits from the NCDAERL, for provincially protected species) and authorisation from the DFFE (for nationally protected species) will be required to remove, cut, or destroy any of the above-mentioned protected and/or threatened species before any vegetation clearing may take place.

Table 21: Floral SCC assessment (including POC) for the habitats identified within the proposed Solar PV Plant options.

Habitat Unit	Protection status	Relevant Species	POC
***Senegalia-Tarchonanthus* Bushveld**	RDL Species[15]	None recorded during field assessment	Low
	NCNCA	*Gymnosporia buxifolia* (LC)	Confirmed
		Gomphocarpus fruticosus (LC)	Confirmed
		Genus: *Oxalis*	Confirmed
		Babiana bainesii (LC)	High
		Babiana hypogaea (LC)	High
		Gomphocarpus tomentosa (LC)	High
		Jamesbrittenia atropurpurea (LC)	High
		Olea europaea subsp. *africana* (LC)	High
		Chasmatophyllum musculinum (LC)	Medium
		Crassula corallina (LC)	Medium
		Kalanchoe rotundifolia (LC)	Medium
		Ruschia griquensis (LC)	Medium
	TOPs List	*Harpagophytum procumbens* (LC)	High
	NFA Trees	*Boscia albitrunca* (LC)	Confirmed
		Vachellia erioloba (LC)	Confirmed
		Vachellia haematoxylon (LC)	High
Watercourse habitat (comprising part of the Freshwater Habitat)	RDL Species	None recorded during field assessment	Low
	NCNCA	*Olea europaea* subsp. *africana* (LC)	High
		Jamesbrittenia tysoni (LC)	High
		Nerine laticoma (LC)	High
	TOPs List	None recorded during field assessment	Low
	NFA Trees	*Vachellia erioloba* (LC)	Confirmed
Non-watercourse habitat (comprising part of the Freshwater Habitat)	RDL Species	None recorded during field assessment	Low
	NCNCA	*Olea europaea* subsp. *africana* (LC)	Medium
		Nerine laticoma (LC)	High
	TOPs List	None recorded during field assessment	Low
	NFA Trees	*Boscia albitrunca* (LC)	High

Habitat Unit	Protection status	Relevant Species	POC
		Vachellia erioloba (LC)	High
Transformed Habitat	RDL Species	None recorded during field assessment	Low
	NCNCA	*Gymnosporia buxifolia* (LC)	Confirmed
		Gomphocarpus fruticosus (LC)	High
	TOPS	None recorded during field assessment	Low
	NFA Trees	None recorded during field assessment	Low

Discussion:

The following considerations are provided for each of the PV Plant options:

Option A:

- Option A is associated with *Senegalia-Tarchonanthus* Bushveld, Non-watercourse habitat (within the Freshwater habitat), and Transformed habitat. Permits from the relative authorities (including the DFFE and the NCDAERL) will be required for the removal or destruction of any threatened or protected species. It is recommended that, if the proposed development were to be approved, where possible trees are relocated to similar suitable habitat close to the area of development but outside of the development footprint itself;
- Option A (in the west) is associated with ESA habitat. ESAs should ideally be maintained in at least semi-natural ecological condition to allow for ecological support functioning within the landscape. Option A is not associated with ESA habitat, especially where Transformed habitat is situated; and
- Option A is located near watercourse habitat (i.e. episodic drainage systems with riparian habitat to the northeast). The requirements as stipulated in GN 509 of 2016 as it relates to the NWA must be adhered to.

Option B:

- Option B is associated with habitats that provide favourable conditions for several SCC, namely *Senegalia-Tarchonanthus* Bushveld, Watercourse habitat (within the Freshwater habitat), and Transformed Habitat. Permits from the relative authorities (including the DFFE and the NCDAERL) will be required for the removal or destruction of any protected species. It is recommended that, if the proposed development were to be approved, where possible trees are relocated to similar suitable habitat close to the area of development but outside of the development footprint itself;
- The site is not associated with ESA habitat; and

Option B is directly associated with Watercourse habitat (i.e., Episodic drainage systems with riparian habitat). The requirements as stipulated in GN 509 of 2016 as it relates to the NWA must be adhered to.

Table 22: Faunal SCC assessment (including POC) for the habitats identified within the proposed Solar PV Plant options

Habitat	Species	Threat Status	POC
***Senegalia-Tarchonanthus* Bushveld, Watercourse habitat, Non-watercourse habitat and Transformed habitat.**	*Otocyon megalotis* (Bat-eared Fox)	LC – IUCN Specially Protected – NCNCA	Confirmed
	Orycteropus afer (Aardvark)	LC – IUCN Specially Protected – NCNCA	High
	Vulpes chama (Cape Fox)	LC – IUCN Protected – TOPS Specially Protected – NCNCA	Medium
	Ictonyx striatus (Striped Polecat)	LC – IUCN Specially Protected – NCNCA	Confirmed
	Felis nigripes (Black-footed Cat)	VU – IUCN Protected – TOPS Specially Protected – NCNCA	Medium
	Polemeatus bellicosus (Martial Eagle, EN)	EN – IUCN (Taylor *et al.* – EN) VU – TOPS Specially Protected – NCNCA	Medium
	Aquila rapax (Tawny Eagle, EN)	VU – IUCN (Taylor *et al.* – EN) VU – TOPS Specially Protected – NCNCA	Medium
	Falco biarmicus (Lanner Falcon)	LC – IUCN (Taylor *et al.* – VU) Specially Protected – NCNCA	Medium
	Ardeotis kori (Kori Bustard)	NT – IUCN (Taylor *et al.* – NT) VU – TOPS	Confirmed
	Neotis ludwigii (Ludwig's Bustard)	EN – IUCN (Taylor *et al.* – EN) VU – TOPS Specially Protected – NCNCA	Medium
	Sagittarius serpentarius (Secretarybird)	EN – IUCN (Taylor *et al.* – VU) Specially Protected – NCNCA	Medium
	Python natalensis (African rock python, TOPS)	LC – IUCN Protected – TOPS Specially Protected – NCNCA	Medium
***Senegalia-Tarchonanthus* Bushveld**	*Opistophthalmus fitzsimonsi* (FitzSimons' Burrowing Scorpion), *Opistophthalmus carinatus* (Robust Burrowing Scorpion) and *O. wahlbergii* (Kalahari Burrower)	Protected – NCNCA Protected – TOPS	High/Medium
	Cursorius rufus (Burchell's Courser, VU)	LC – IUCN (Taylor *et al.* – VU)	Medium

Option C:

- Option C is associated with habitats that provide favourable conditions for several SCC, namely *Senegalia-Tarchonanthus* Bushveld, Non-watercourse habitat (within the Freshwater habitat, including a farm dam), and Transformed Habitat. Permits from the relative authorities (including the DFFE and the NCDAERL) will be required for the removal or destruction of any protected species. It is recommended that, if the proposed development were to be approved, where possible trees are relocated to similar suitable habitat close to the area of development but outside of the development footprint itself;
- Option C is not associated with ESA habitat; and
- Option C is not associated directly with watercourse habitat; however this option is located near watercourse habitat (i.e., Episodic drainage systems with riparian habitat to the north). The requirements as stipulated in GN 509 of 2016 as it relates to the NWA must be adhered to

Developer Preferred Option:

- The Preferred PV Plant option is associated with habitats that provide favourable conditions for several SCC, *Senegalia-Tarchonanthus* Bushveld, Watercourse habitat (within the Freshwater habitat), and Transformed Habitat; Permits from the relative authorities (including the DFFE and the NCDAERL) will be required for the removal or destruction of any protected species. It is recommended that, if the proposed development were to be approved, where possible trees are relocated to similar suitable habitat close to the area of development but outside of the development footprint itself;
- The Preferred PV Plant option is associated with ESA habitat. ESAs should ideally be maintained in at least semi-natural ecological condition to allow for ecological support functioning within the landscape; and

- The Preferred PV Plant option is directly associated with watercourse habitat (i.e., Episodic drainage systems with riparian habitat to the north). The requirements as stipulated in GN 509 of 2016 as it relates to the NWA must be adhered to.

It is recommended that the layouts be developed to avoid freshwater habitat (particularly watercourse habitat) and adhere to requirements as stipulated in GN 509 of 2016 as it relates to the NWA. Furthermore, ESA habitat should be avoided as much as is possible. To achieve this, it is recommended that the PV plant layouts be designed to maximise the use of already disturbed habitat (i.e., Transformed habitat), and kept close to exiting mining infrastructure (so to reduce habitat fragmentation).

Table 23: Summary of the outcome of the solar site selection – Terrestrial Ecology

PV Solar Plant Site Option	Rank
Option B	1
Option A	2
Option C	3
Preferred Option by Developer	4

Option B is most preferred as it will allow connective corridors to be maintained in the surrounding area (although buffers will be required to avoid Freshwater habitat). Option A follows because the A1 section utilises existing transformed habitat thus decreasing the impacts on the receiving environmental (although the remaining portion of option A will result in increased impacts to the receiving environment). Option C is third on the list (given its location to two Freshwater features, including its proximity to the Gamagara River, for which edge effects will be problematic). The Preferred Option is least preferred because it encroaches onto Freshwater habitat and does not utilise any pre-existing Transformed habitat. This option will also result in the most fragmentation of surrounding habitat.

1.f.iv.9.c Freshwater Ecosystem Setting

Form a Freshwater Ecosystem Setting, no watercourses were identified directly within Options A, B or C, however, an episodic drainage line is partially located within the Preferred Option, and the associated riparian zone marginally encroaches into Option B. In addition an episodic drainage line is within 21m of the northern border of Option C.

Therefore, from a freshwater ecological management perspective, Options A, B or C are considered acceptable with the proviso that the necessary authorisations are obtained should infrastructure need to encroach within the applicable Zones of Regulation, and that appropriate mitigation measures are implemented to ensure that edge effects do not lead to indirect impacts on the adjacent watercourses.

The 'preferred solar PV facility option' is not supported from a freshwater ecological management perspective however, as the episodic drainage line which flows between Options A and B is located directly within the 'preferred option'.

In the event that it is not feasible to plan the proposed PV Solar facility around the identified freshwater ecosystems and their associated Zones of Regulation to completely avoid the systems, the strict implementation of mitigation measures will be required to minimise impact significance.

Table 24: Summary of the outcome of the solar site selection – Freshwater Ecosystems

PV Solar Plant Site Option	Rank
Option A	1
Option C	2
Option B	3
Preferred Option by Developer	4

1.f.iv.9.d Hydrological Consideration

A site selection process was undertaken to determine the PV Solar option that would have the least disturbance from a surface water perspective. The watercourses (non-perennial drainage channels) within the vicinity of the PV Solar options were verified during the site investigation and are indicated in Figure 65. A 100m buffer was placed around the watercourses, as it is a GN704 regulation requirement that infrastructure is not placed within 100m of a watercourse.

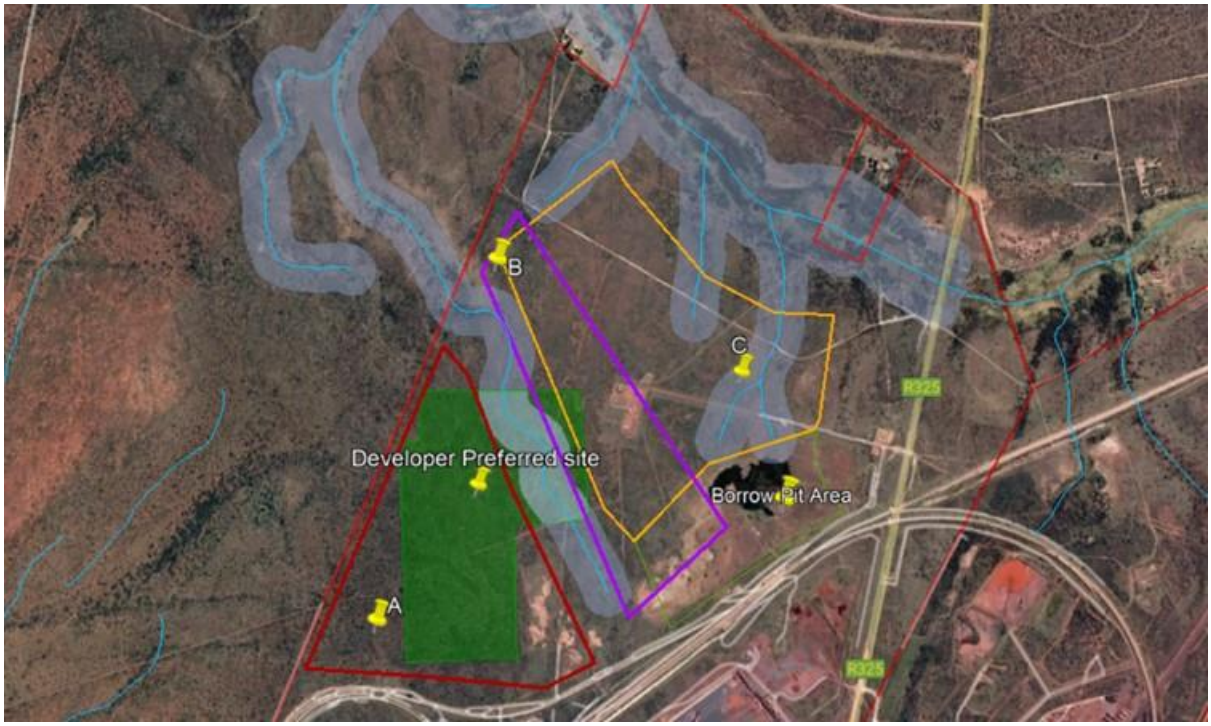


Figure 24: Watercourses and 100m buffers

The PV Solar site option that contained the least amount of area of the 100m watercourse buffer was considered the most favourable option and was ranked 1, with the least favourable ranked 4. The following table provides a summary of the outcome of the PV Solar Plant site selection and shows that Option A is the most favourable option.

Table 25: Summary of the outcome of the solar site selection - Hydrology

PV Solar Plant Site Option	Watercourse Buffer Area (ha)	Rank
Option A	0.07	1
Option B	6.42	2
Preferred Option by Developer	12.65	3
Option C	23.73	4

1.f.iv.9.e Visual Setting

A site selection process was undertaken to determine the solar site option that would have the least impact on visual receptors. Viewshed modelling was undertaken using the infrastructure heights provided in the following table in combination with a Digital Elevation Model (DEM). Figure 25 to Figure 28 show the visibility of the proposed PV Solar Plant site options along with the affected visual receptors. The most favourable site was selected based on the least visual receptors followed by the smallest visible area. The outcome of the site selection indicated that the Option C is the most favourable site (rank 1), however not practical for implementation, with Option B being the least favourable (rank 4).

Table 26: Summary of the outcome of the solar site selection - Visual

PV Solar Plant Site Option	Visible Area (km²)	Receptors in Visible Area	Rank
Option C	159	36	1
Option A	169	39	2
Developer Preferred Site	161	40	3
Option B	156	41	4

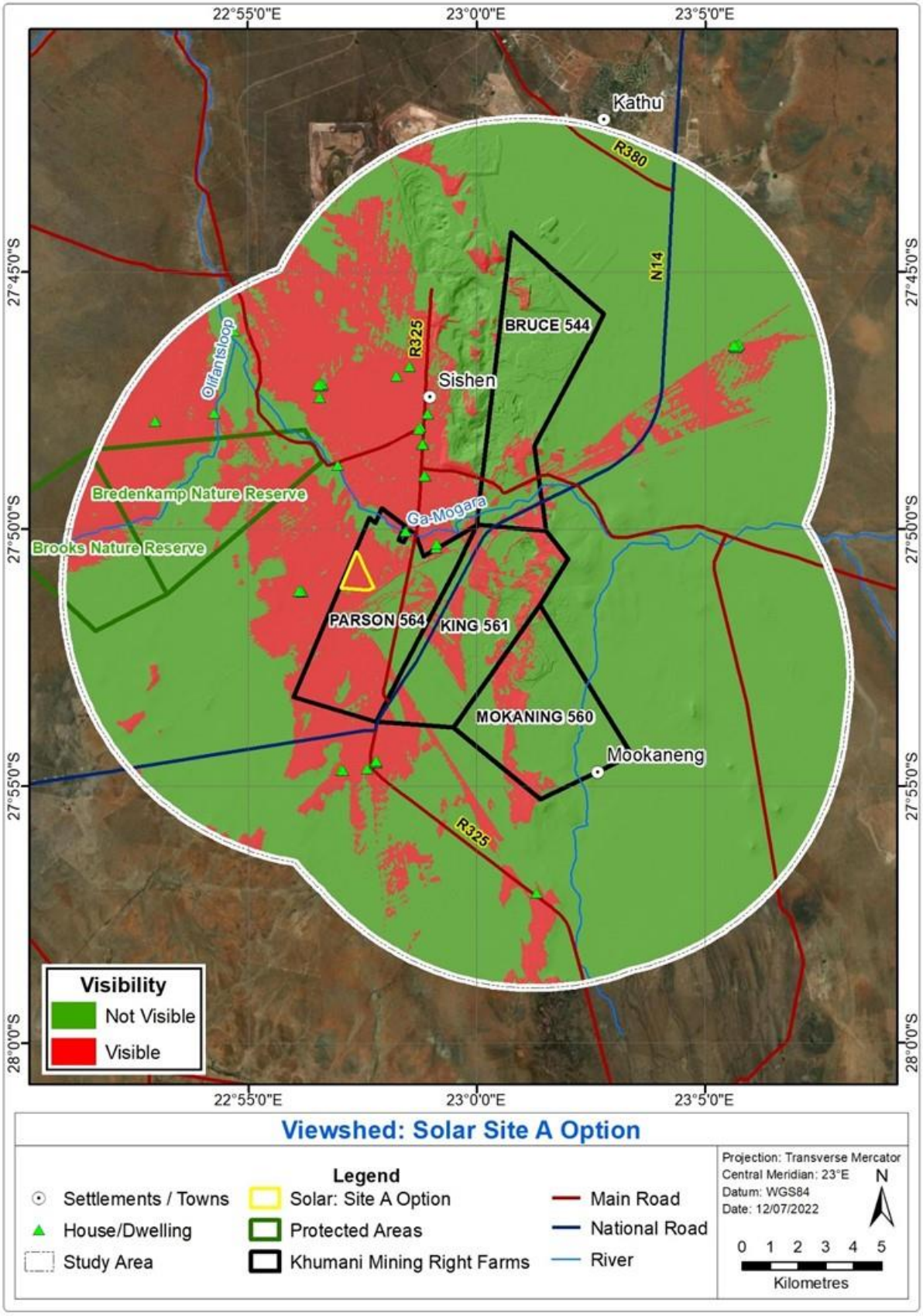


Figure 25: Visibility of Solar Site Option A

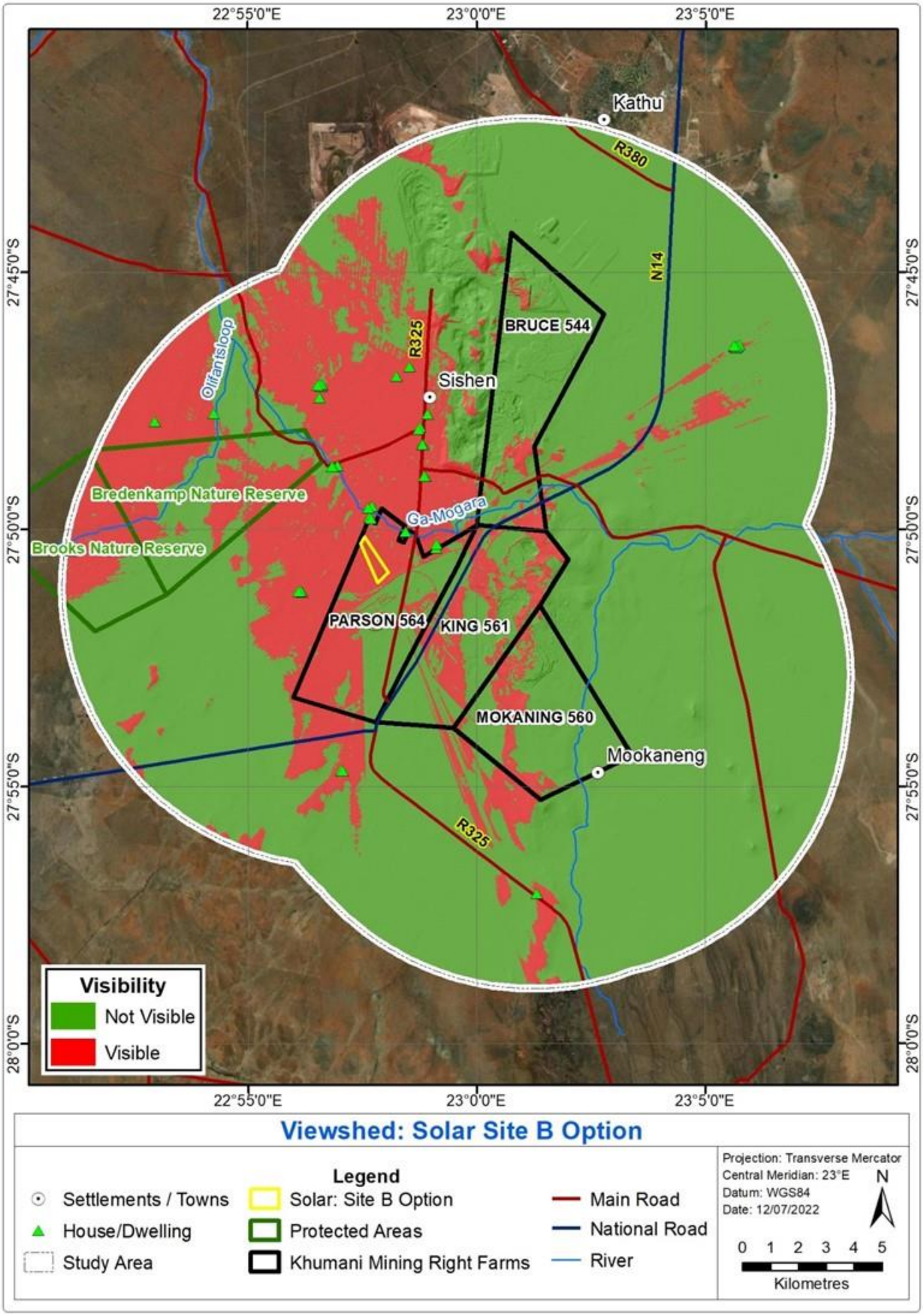


Figure 26: Visibility of Solar Site Option B

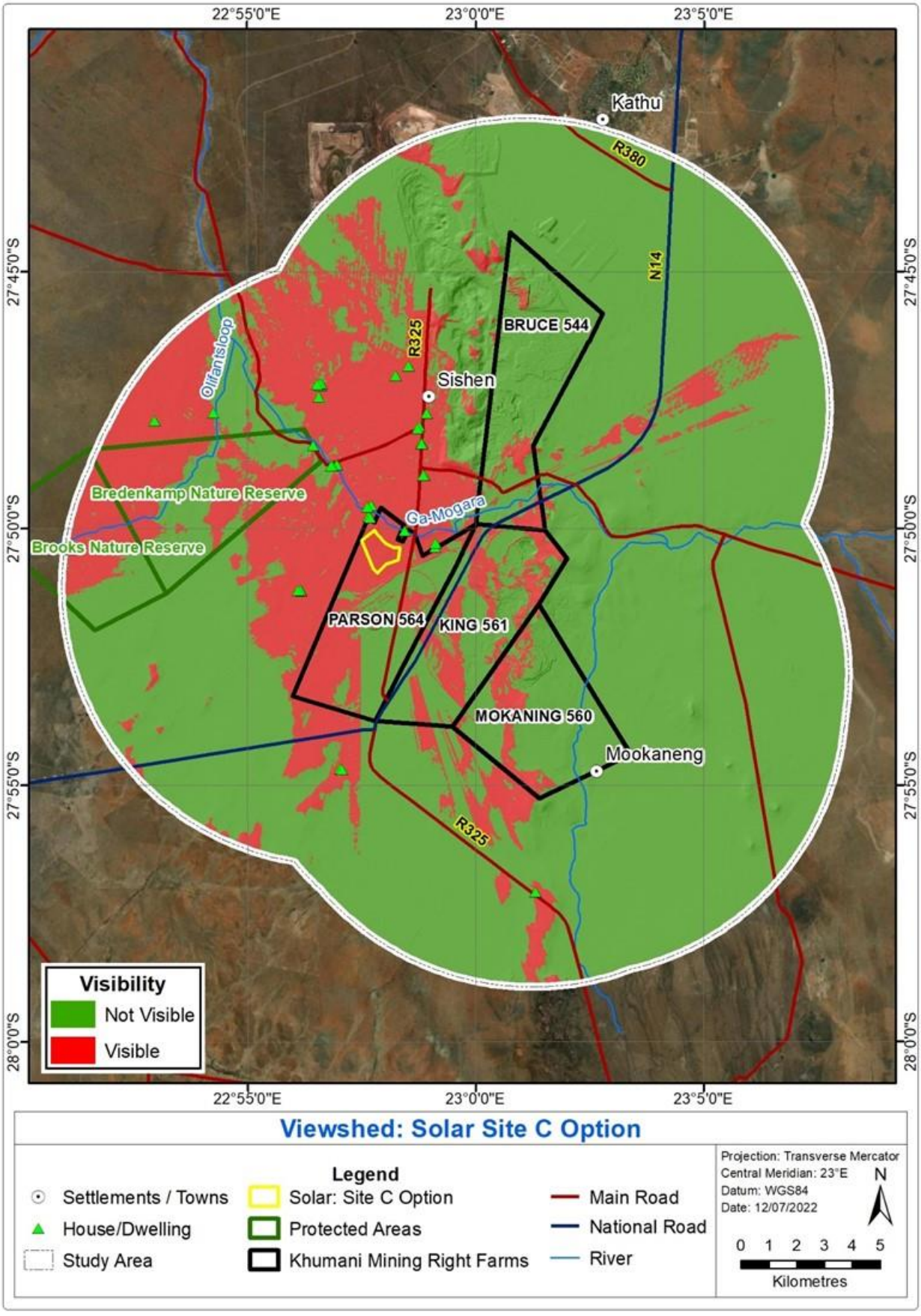


Figure 27: Visibility of Solar Site Option C

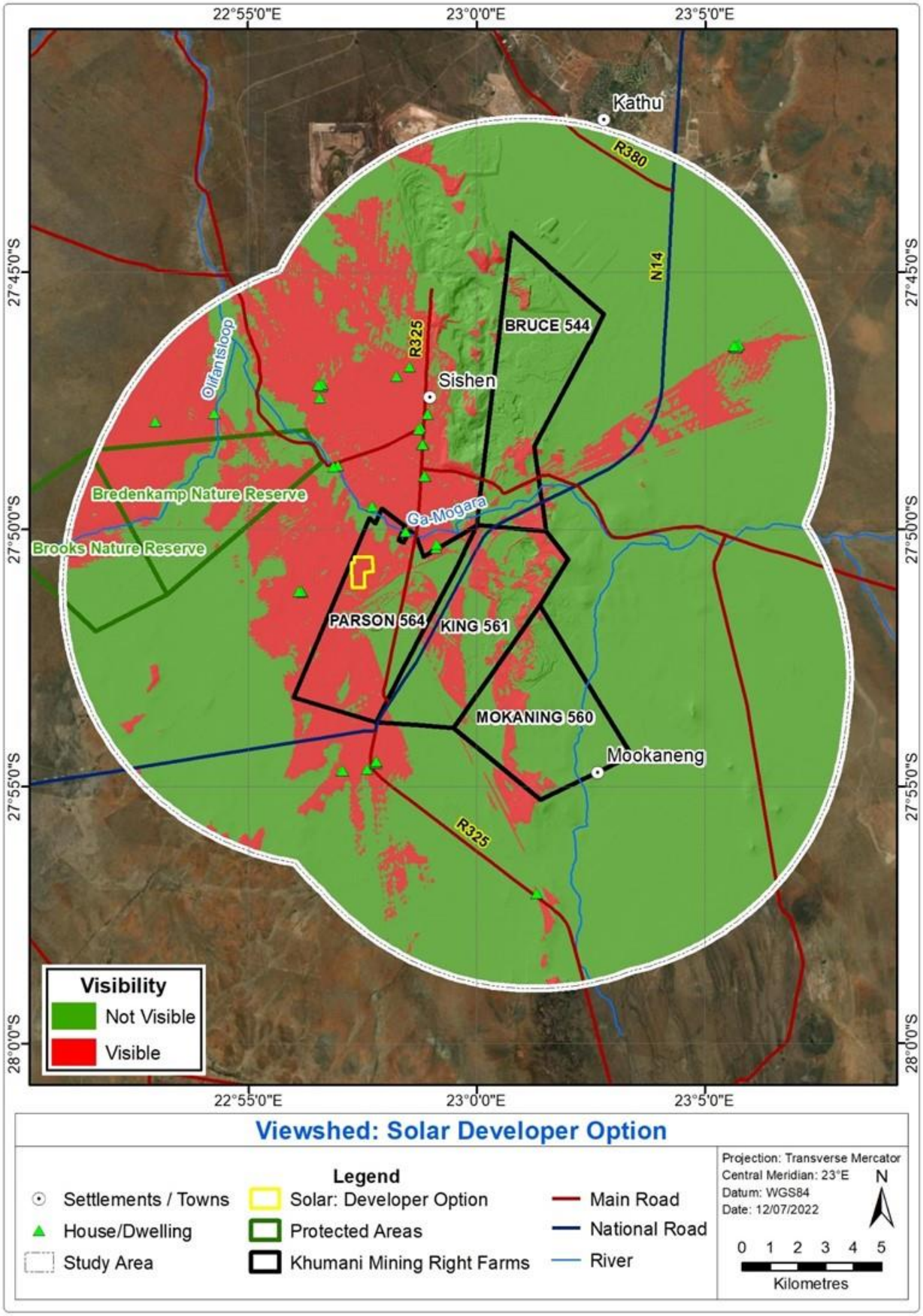


Figure 28: Visibility of the Preferred Option by Developer

1.f.iv.9.f Noise and Vibration Setting

When considering the noise and vibration associated with the proposed PV Solar Plant – specifically considering the transformers and inverters, no significant concern has been raised:

- The inverters contained within the MVPS' have a rating of 67dB at a 10m distance.
- The largest transformers to be used may be 40MVA therefore looking at around 45dB per transformer.

According to the International Standards, Guidelines and Requirements the recommended noise level for a noise sensitive area is 55.0dBA during the day and 45.0dBA during the night (World Bank, 2005).

Table 27: Summary of the outcome of the PV Solar Plant site selection – Noise and Vibration

PV Solar Site Option	Distance from Receptor (m)	Rank
Preferred Option by Developer	1 400 & 1 450	1
Option A	1340	2
Option B	720 & 1 400	3
Option C	480 & 640	4

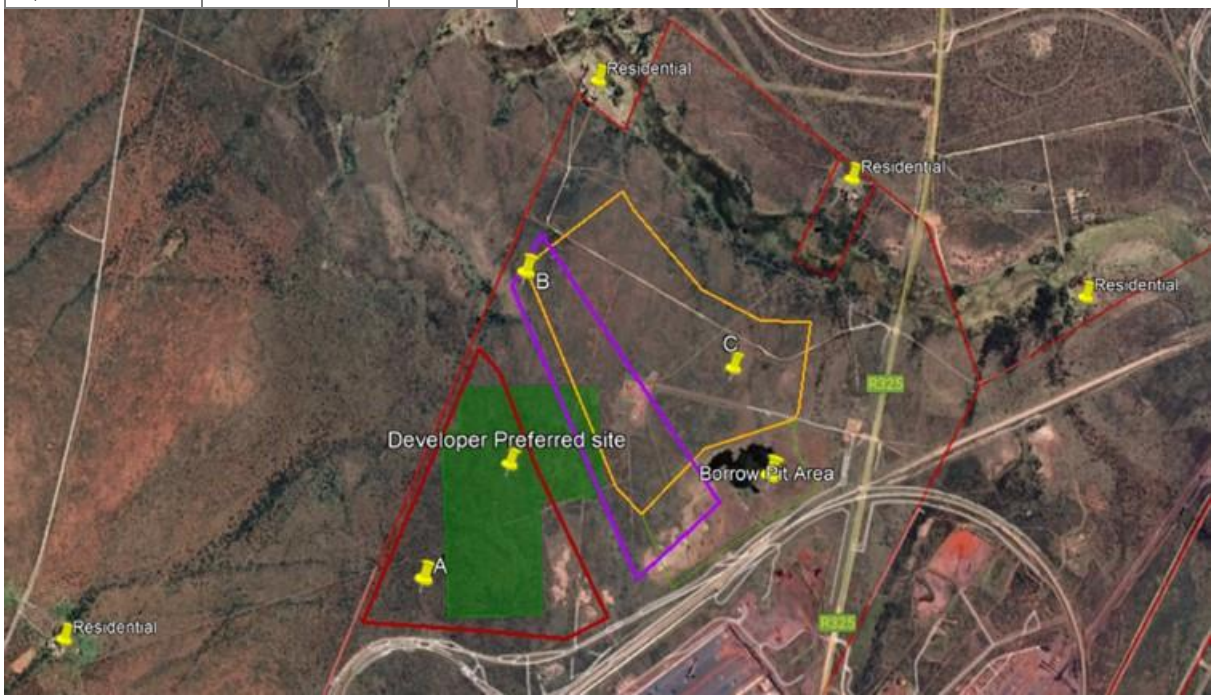


Figure 29: Site Options in relation to closest Residential Settings

1.f.iv.9.g Heritage Setting

Based on the Heritage ESR Study (See Section 1.f.vii.1.m), Option C of the alternatives is the least desirable from a heritage point of view but can still be mitigated to an acceptable level. Two (2) areas within PV Solar Site Option B & C with slightly higher artefact concentrations occur at K7 and K9 and might warrant further mitigation if impacted on.

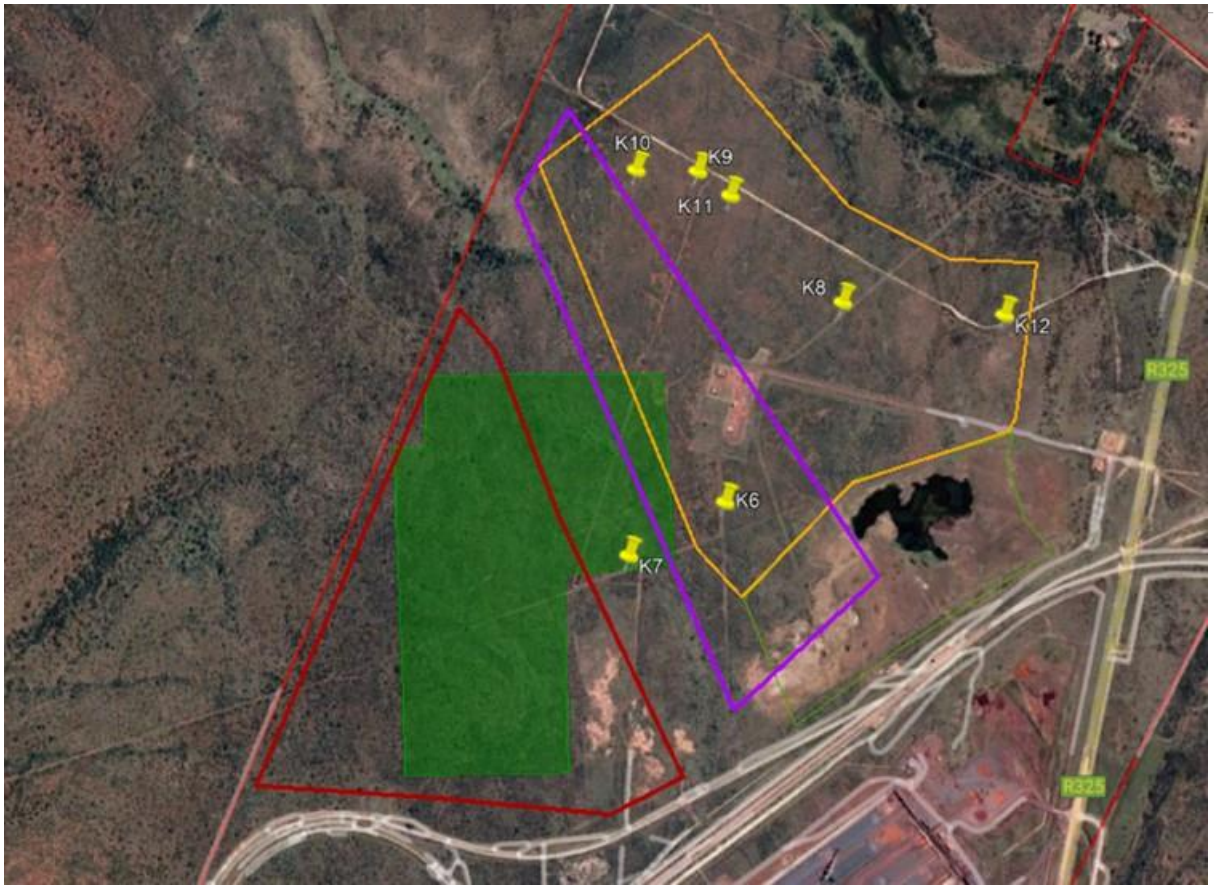


Figure 30: Location of Heritage Artefacts

Table 28: Summary of the outcome of the solar site selection - Heritage

Solar Site Option	# of Artifacts	Rank
Option A	-	2
Developer Preferred Site	1	1
Option B	1	3
Option C	6	4

1.f.iv.9.h Site Selection Conclusion

In terms of the specialist studies considered the following is concluded:

Table 29: Site Selection Outcomes

Environmental Consideration	Option A	Option B	Option C	Preferred Option by Developer	Key Concerns
Soil, Land Use and Land Capability	1	3	4	2	No to negligible concerns
Terrestrial Ecological Setting	2	1	3	4	Option A is associated with *Senegalia-Tarchonanthus* Bushveld, Non-watercourse habitat (within the Freshwater habitat), and Transformed Habitat. The Preferred PV Plant option is associated with habitats that provide favourable conditions for several SCC, *Senegalia-Tarchonanthus* Bushveld, Watercourse habitat (within the Freshwater habitat), and Transformed Habitat. The key concern is impacts on the watercourse.

Environmental Consideration	Option A	Option B	Option C	Preferred Option by Developer	Key Concerns
Freshwater Ecosystems	1	3	2	4	Form a Freshwater Ecosystem Setting, no watercourses were identified directly within Options A, B or C, however, an episodic drainage line is partially located within the preferred option, and the associated riparian zone marginally encroaches into Site B. In addition an episodic drainage line is within 21m of the northern border of Site C.
Hydrological Considerations	1	2	4	3	A site selection process was undertaken to determine the solar site option that would have the least disturbance from a surface water perspective.
Visual Considerations	2	4	1	3	The most favourable site was selected based on the least visual receptors followed by the smallest visible area.
Vibration Considerations	2	3	4	1	The most favourable site was selection based on the distance of receptors from the PV Solar Plant.
Heritage Considerations	2	3	4	1	Consideration of the presence of heritage artefacts.
Other considerations					
River Crossings (power lines)	Y	N	N	Y	-
River Crossings (existing roads)	Y	Y	Y	Y	-
Total	**11**	19	22	18	Option A – preferred option from an environmental perspective. The key considerations are to avoid the freshwater ecosystems/watercourses and high significance heritage resources.

Based on the above, and with the opportunity to further avoid sensitive environments associated with the preferred site, Option A, the following is recommended:

- New power line river crossings are avoided;
- Existing farm road river crossings must be applied for, if owned by the mine;
- Avoidance of the 100m river buffer;
- Avoidance of heritage artefacts.

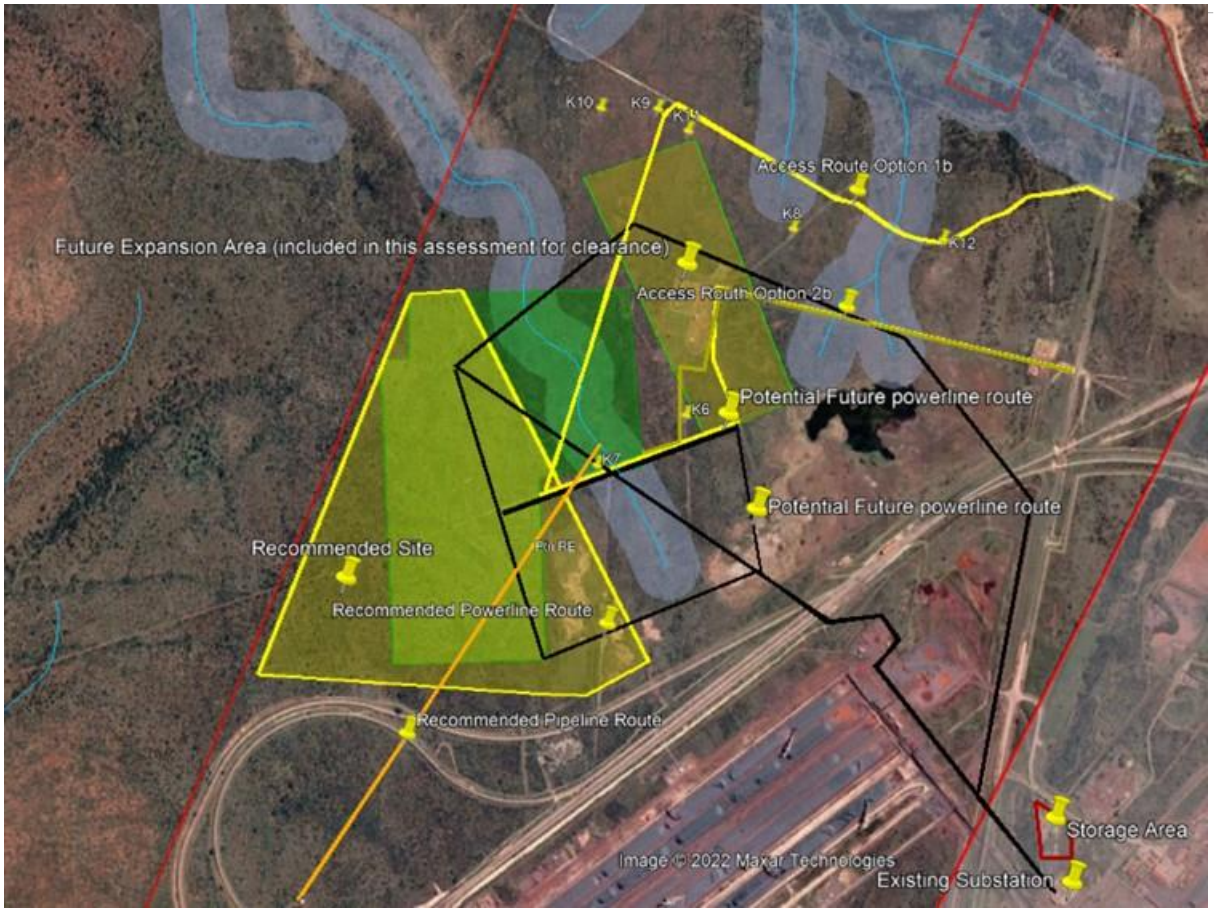


Figure 31: Recommended Site Location

As mentioned before, the site will be undertaken in phases (60-90ha facility). Initially an area of about 60-70 ha will be developed for the Solar Plant (Recommended Site), (detailed infrastructure layout will be available during the EIA reporting) whereafter in the near future the Solar Plant may be extended by a further 30ha, resulting in an area of about 90ha – this is into Block B, but will avoid the watercourses and heritage resources. To avoid a phased approach application, this EIA and Specialist studies, are considering both the recommended site, as well as the future expansion site for clearance. No designs or infrastructure layouts for this expansion will be available during the EIA Phase as yet. Should the design phases indicate that additional listed activities are triggered once the next phase becomes in place, the necessary amendments will be applied for. The following figure indicates the overall area, with the proposed future route locations of powerlines also indicated. It is important to note that for the purposes of this study, the potential future powerline over the identified watercourse will be assumed to be undertaken not to impede or alter a watercourse (i.e. pylons outside of watercourses) – should this not be possible a water uses licence may be triggered for this activity specifically.

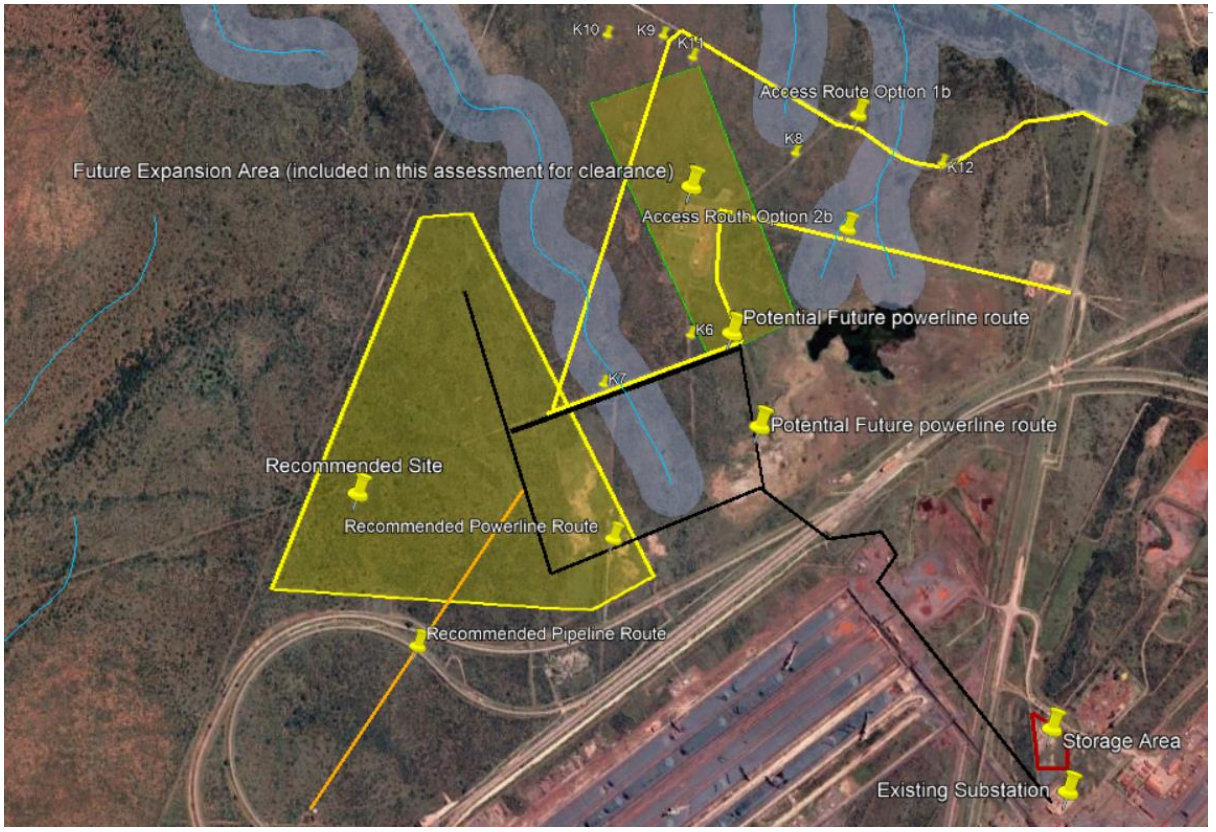


Figure 32: Recommended Site Location

1.f.v The option of not implementing the activity

The no-go alternative would not result in any environmental impacts on the site or surrounding area, it would also not bring any positive impact to the local area in terms of socio-economic benefits, job creation and skills development.

By not undertaking Projects 1 to 5, the mine will lose the opportunity to improve and optimally mine on site.

Specifically considering not implementing Project 2 (KM02 Mine Residue Stockpile Rehabilitation), will result in not meeting the objectives of the approved EMPr, 2009. It is a requirement and commitment by the mine to rehabilitate the Mine Residue Deposits and therefore this project is a legal requirement to be implemented.

Project 6 is the most greenfields project associated with this overall Environmental Authorisation Application. This project is considered a R1.25 billion rand capital investment. By not implementing this project, the mine loses the opportunity to fulfil and assist in the electricity needs, not only within the local setting but also in achieving the national grid objectives. The no-go alternative will not contribute to national renewable energy development targets and policy imperatives, as also stipulated in the Presidential Speech dated 25 July 2022. The implementation of Project 6 will contribute towards energy supply stability and security to the benefit of local residential electricity consumers as well as farmers and businesses, by reducing the mine's demand on the local electricity grid. In addition to this the project aims to employ approximately 200 employees during the Construction Phase at its peak, with 40 permanent employees during the Operational Phase.

Based on the evaluation of alternatives and specialists' assessment, it seems most likely that the overall positive impacts of the proposed activities would outweigh negative impacts if the proposed mitigation measures and management actions are implemented according to the specialist recommendations and EMPr, which will be developed for this project.

Environmental and Social risks and negative impacts would primarily arise at a local scale and site level and could be managed and controlled if the recommendations to be made in the EIA and EMPr are followed, as no fatal flaws have been identified at this phase of the investigations.

This project will further significantly reduce the Eskom Load Requirement from the mine. During the financial year 2021 and 2022 the mine used 200 799 039kWh. The mine had to work on a load reduction bases which required Black Rock Manganese Mine (also owned by Assmang) (Black Rock) to generate electricity through generators and supply to Eskom on behalf of the Assmang group. The electricity that Blackrock generated on

behalf of Khumani was 6 965KWh (2.4mil liter diesel). The Solar Farm Project will therefore result in a significant positive contribution by reducing the need for electricity generation by means of generators and in so reduce the diesel usage requirements, a strong Carbon Footprint benefit.

1.f.vi Details of the Public Participation Process Followed

Public participation is understood to be a series of inclusive and culturally appropriate interactions aimed at providing stakeholders with opportunities to express their views, so that these can be considered and incorporated into the Scoping and Environmental Impact Reporting (S&EIR) process. Effective public participation requires the prior disclosure of relevant and adequate project information to enable stakeholders to understand the risks, impacts, and opportunities of the proposed project.

The objectives of the public participation process can be summarised as follows:

- Identify relevant individuals, organisations and communities who may be interested in or affected by the Proposed Project;
- Clearly outline the scope of the Proposed Project, including the scale and nature of the existing and proposed activities;
- Identify viable proposed project alternatives that will assist the relevant authorities in making an informed decision;
- Identify shortcomings and gaps in existing information;
- Identify key concerns, raised by Stakeholders that should be addressed in the subsequent specialist studies;
- Highlight the potential for environmental impacts, whether positive or negative; and
- To inform and provide the public with information and an understanding of the proposed project, issues and solutions.
- In accordance with the NEMA, GNR 982, Chapter 6, the following activities have taken place or are proposed to take place within the Draft Environmental Scoping Report review period or beyond:

1.f.vi.1 Stakeholder Identification

The public participation process must include consultation with (1) the competent authority, (2) every state department that administers a law relating to the matter, (3) all organs of state which have jurisdiction in respect of the activity to which the application relates, (4) all potential, or, where relevant, registered interested and affected parties. In order to satisfy this requirement, the EAP will undertake the following consultations:

- Competent Authority - The DMRE is the competent authority related to this application. This submission of the application formed the first of the consultations with the DMRE. The EAP undertakes to engage in on-going communications with the DMRE (preferably directly with the allocated case officer).
- Departments that administer a law relating to the matter – The Department of Water Affairs (DWS) has been directly informed via email and telephonic conversations. DWS will be the competent authority due to a Water Use Licence Application (WULA) that needs to be submitted for the proposed project.
- All organs of state which have jurisdiction in respect of the activity to which the application relates:
- National Level: The Department of Forestry, Fisheries and Environment (DFFE) - Under the "One Environmental System" rolled out by Government on 8 December 2014, licensing processes for mining, environmental authorisations and water use have been streamlined. Under the One Environmental System, The Minister of Mineral Resources will issue environmental authorisations and Waste Management Licences (WMLs) in terms of the NEMA, and the NEMWA, respectively, for mining and related activities. However, note that under the One Environmental system, the Minister of Environmental Affairs will be the appeal authority for these authorisations to ensure complete independency to the competent authority.
- Provincial Level: Given that the activity is located within the Limpopo Province, the NCDAERL will form a primary commenting authority during the process. The provincial Heritage Resource authority has been informed about the proposed project.
- District Level and Local Level; The mine and study are falls within two Local and two District Municipalities. The farms Parson, Bruce and King are situated within the Gamagara Local Municipality (NC01B1), which forms part of the John Taolo Gaetsewe District Municipality (formerly known as the Kgalagadi District Municipality), while the farm Mokaning is situated within the Tsantsabane Local

Municipality (NC085), which forms part of the ZF Mgcawu District Municipality (formerly known as the Siyanda District Municipality).

- All potentially registered I&APs - The existing Khumani stakeholder database was used as a base starting point. The database was updated following any stakeholder request to be registered. The use of site notices, Notification Letters, Short Messaging Systems (SMS), email and fax were used as methods in which to reach potentially interested and affected parties.
- Affected Adjacent Landowners and Landowners – As far as possible, all affected adjacent property owners were contacted and informed of the proposed new project. All comments will also form part of the final scoping report.
- Property Owners: All farm portions are owned by the mine.

The latest stakeholder database is included within this report as Appendix 15.

All registered I&APs, which have a direct affect/effect on the proposed project or are directly or indirectly impacted by the proposed project, have the right to lodge a comment/question on the project (until such time that the appeals process comes to a close).

1.f.vi.2 Stakeholder Identification and Notification

Please refer to Annexure 15 for copies of these notifications. Proof of email submissions can be requested from the EAP.

1.f.vi.3 Site Notices

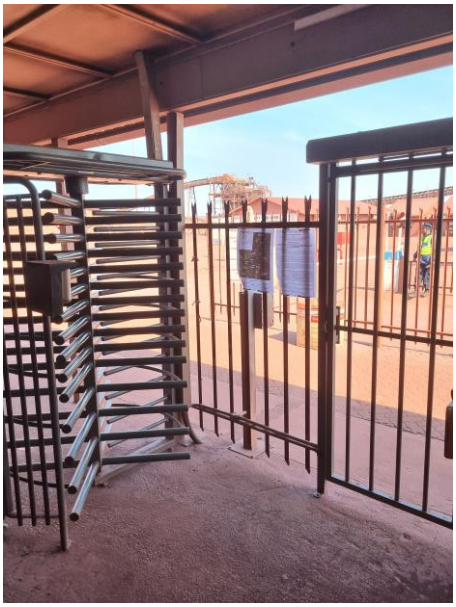
In accordance with GNR 982 Section 41(2)(a-b) a site notice was developed (see below, proof of placement) and placed at three locations, in order to inform surrounding communities and adjacent landowners of the proposed projects, the site was placed on 1 September 2022) and at visible locations close to the site. Site Notices were place at the following locations:

Gamagara Local Municipality Local Municipality

Parson Silo Entrance

Load Out Entrance

King Mine Entrance



Bruce Mine Entrance

Main Offices Entrance

1.f.vi.4 Background Information Documents

Key stakeholders, who included the following sectors, were directly informed of the proposed development by e-mail and fax through the submission of the Background Information Document (BID) and Registration Sheet:

- Authorities;
- Municipalities;
- Residential Associations;
- Non-governmental organisations;
- General Public;
- Parastatals / Service providers, and
- Adjacent Landowners.

Please refer to Appendix 15 for a copy of the BID.

1.f.vi.5 Advertisements

In accordance with GNR 982 41(2)(c) of Chapter 6 an advert was placed in

- The Kathu Gazette on 31 August 2022.

English is considered a universal language; therefore, the newspaper advert was placed in English only. The site notices were however translated into Sepedi. The proof of advert will be attached Appendix 4.

Should the EAP note an affected stakeholder and be made aware of his/her existence by the ward councillor, or traditional leader, efforts will be made to ensure his/her participation in the stakeholder engagement process [as required by Section 41(2) (e) of Chapter 6].

In addition to the minimum requirements outlined in GNR 982, the EAP has undertaken the following:

- Distribution of notification letters to stakeholders via email and fax (where contact details are available).

Any stakeholder who submits a comment along the course of the S&EIR process will automatically be registered on the project-specific stakeholder database.

Please refer to Appendix 15 for a copy of these adverts.

1.f.vi.6 Document Review

The Draft Scoping Report was placed on public review for a period of 30 days from **9 September 2022 to 10 October 2022** Printed copies were available at:

- Khumani Mine (Dirk Coetzee).

Electronic Copies were available from:

- Public Participation Office via Dropbox link.

and

- Contact Batho Earth to request a copy on flash drive.

Hard copies of the Draft Environmental Scoping Report were couriered to the following authorities:

- Department of Water and Sanitation (DWS),
- Department of Mineral Resources and Energy (DMRE);
- Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (NC CDAERL);
- Department of Forestry, Fisheries and the Environment (DFFE);
- Stakeholders (available at the mine).
- Gamagara Local Municipality; and
- Tsantsabane Local Municipality.
- The document was also uploaded on the South African Heritage Resources Agency (SAHRA) web-based platform).

1.f.vi.7 Stakeholder Meetings

A stakeholder meeting will be arranged once the ESR review period has been concluded should this be required by stakeholders.

1.f.vi.8 Summary of Issues raised by the I&APs

The Issues and Responses Register includes the comments received during the Stakeholder Consultation Process undertaken for the proposed projects. This includes responses to the advertisements, response sheets, individual discussions with key stakeholders, and any other comments received during the project timeframe up to 10 October 2022.

Comments reported within this Issues and Response Register were updated during the project. This document can therefore be considered as an active document up until the final reports are submitted. To date the following comments have been received.

Table 30: Stakeholder Comments received

No.	Theme: General Comments / Issues			
	Issue Raised	**Date and How Issue Was Raised**	**Commentator**	**Response**
1	Registration sheet included the following information and questions: • As farmer on property close to the mine any large project and the effect on the environment is of interest. • Environmental impact on areas around the mine • Information on listed projects	Registration sheet sent via email: dated 5 September 2022	Jaco Koorzen: Farmer	An e-mail response was sent on 5 September 2022 which read as follows: Thank you for the registration sheet. It was received. Additional information regarding the proposed projects will be provided as part of the draft Scoping Report which will be made available for a 30-day review period. You will be notified of the availability of the document.
2	Is this a Tender for Projects and Construction of a New Photovoltaic Solar Plant?? Are we Tendering?? Only Question I have.	E-mail sent: dated 5 September 2022	Tebogo Moemedi	The notification is for an Environmental Impact Assessment for Khumani Iron Ore Mine. An e-mail response was sent on 5 September 2022 which read as follows: ASSMANG (PTY) LTD: KHUMANI IRON ORE MINE: PROPOSED CAPITAL PROJECTS, NEAR KATHU, NORTHERN CAPE PROVINCE NOTICE OF AN ENVIRONMENTAL AUTHORISATION APPLICATION: PUBLIC PARTICIPATION PROCESS You are hereby notified of the commencement of the Environmental Impact Assessment Process and associated Public Participation Process for the proposed Khumani Iron Ore Mine: Capitals Project and proposed Photovoltaic Solar Plant. The proposed projects include the following: Project 1: King Mine Optimisation Project 2: King Mine KM02 Mine Residue Stockpile Rehabilitation Project 3: New Bruce Block A & B Off-Grade ROM Stockpile Project 4: Product Stockpile Formalisation Project 5: Discard Low Grade Stockpile Design Change Project 6: Khumani Photovoltaic Solar Plant Envirogistics (Pty) Ltd. has been appointed as the Environmental Assessment Practitioner to undertake the environmental authorisation process, and Batho Earth has been appointed to conduct the public participation process and stakeholder engagement. Find attached a Background Information Document (BID) and locality map with more detailed information. Please complete the included registration sheet and return to Batho Earth (ingrid@bathoearth.co.za and diana@bathoearth.co.za). Please also indicate any additional representatives of your organisation and/or Interested and Affected Parties that should become involved in the process. A Background Information Document was attached.
3	As landowner of farm Maxdale, I have the following concerns regarding the construction of the Project 6: Khumani Photovoltaic Solar Plant: Destruction of the current access road leading to homesteads on Maxdale and Fouriesville farms (specifically with regards to Option C) • Moving the access road will result in increased dust at homestead since current vegetated area serve as buffer. • Traffic levels have already increased since land adjacent to Maxdale is leased to tenants. • Increased traffic levels pose higher threat of livestock and associated theft.	Formal Letter send via e-mail on 10 October 2022.	Mr Attie Hoffman - Farm Maxdale	The comments have been forwarded to the project team for consideration. Note that the operation of the solar plant will not result in large increases in traffic on the road. Consideration of the access road will be given in the development of the project.
4	Destruction or partial destruction of vegetation buffer between Khumani mine and Maxdale • Increased vibrations from Khumani crushers. • Increased operational noise levels from Khumani Mine. • Increased visibility of mining and other infrastructure.	Formal Letter send via e-mail on 10 October 2022.	Mr Attie Hoffman - Farm Maxdale	This project will not result in any changes or increases in the existing plant area. The concerns regarding operational noise and visibility relating to this project have been forwarded to the relevant specialist for consideration.
5	Decline in natural wildlife • Pangolins, tortoises, nightjars, hedgehogs and snakes (Pofadders) frequent the area.	Formal Letter send via e-mail on 10 October 2022.	Mr Attie Hoffman - Farm Maxdale	A detailed ecological study will be undertaken as part of this project. The concerns have been forwarded to the appointed specialists.

No.	Theme: General Comments / Issues			
	Issue Raised	**Date and How Issue Was Raised**	**Commentator**	**Response**
6	Damage to river system • Hazardous spillages run-off will contaminate river system. • Increased alien species (Prosopis).	Formal Letter send via e-mail on 10 October 2022.	Mr Attie Hoffman - Farm Maxdale	No releases to watercourses are planned as part of the project. No activities relating to hazardous substances will be undertaken within the 1:100 year floodline of the Gamagara. A detailed ecological study will be undertaken as part of this project. The concerns have been forwarded to the appointed specialists.
7	I would like to lodge our concerns with regards to the construction of Project 6: Khumani Photovoltaic Solar Plant.	Formal Letter send via e-mail on 10 October 2022	Mr Jaap Hoffman - Farm Fouriesville	Comment Noted. The comments received from Mr J Hoffman – owner Farm Fouriesville on 10 October 2022 was included into the final Scoping report. The final scoping report will be submitted to the DMRE for review, including the concerns raised.
8	The construction of said solar plant will result in bush clearing of the current buffer zone between the homesteads on both Fouriesville and Maxdale, which will result in increased noise and dust levels from Khumani mine. Solar panels and associated infrastructure further negatively impact the visual aesthetic of an area, and the clearance of natural vegetation poses the threat of increased alien flora species such as Prosopis sp. already present upstream of said farms on Khumani landholding.	Formal Letter send via e-mail on 10 October 2022	Mr Jaap Hoffman - Farm Fouriesville	A detailed ecological study will be undertaken as part of this project. The concerns have been forwarded to the appointed specialists.
9	Option C slopes towards the river buffer area and sedimentation and/or other hazardous spillage (construction related hazardous substances and/or herbicides applied) run-off may detrimentally affect the river system. The perennial Gamagara river system currently contains standing water and several water-associated bird species have been observed breeding between the sedges. Herpetofauna species are also present.	Formal Letter send via e-mail on 10 October 2022	Mr Jaap Hoffman - Farm Fouriesville	No activities relating to hazardous substances will be undertaken within the 1:100 year floodline of the Gamagara.
10	Option C will further result in the demolition of the current access road to both Fouriesville and Maxdale and would require an alternative access road to be identified and constructed.	Formal Letter send via e-mail on 10 October 2022	Mr Jaap Hoffman - Farm Fouriesville	Consideration of the access road will be given in the development of the project. It is currently not foreseen that any demolition of access roads will be undertaken as part of this project.
11	Observances of Ground Pangolin (Smutsia temminckii) along the current access road towards these homesteads can be confirmed for 2022. Despite the destruction of their current home range, electric fencing usually associated with these developments threatens their survival. Secretary birds (Sagittarius serpentarius) have also been observed along the river edges and Puff adder (Bitis arietans) and Nightjars along the access route to homesteads in the past.	Formal Letter send via e-mail on 10 October 2022	Mr Jaap Hoffman - Farm Fouriesville	A detailed ecological study will be undertaken as part of this project. The concerns have been forwarded to the appointed specialists.

1.f.vii The Environmental Attributes associated with the Project

1.f.vii.1 Baseline Information

1.f.vii.1.a Geology

The majority of the Khumani Mine is underlain by tillite, with the remaining south-eastern portion dominated by dolomite.

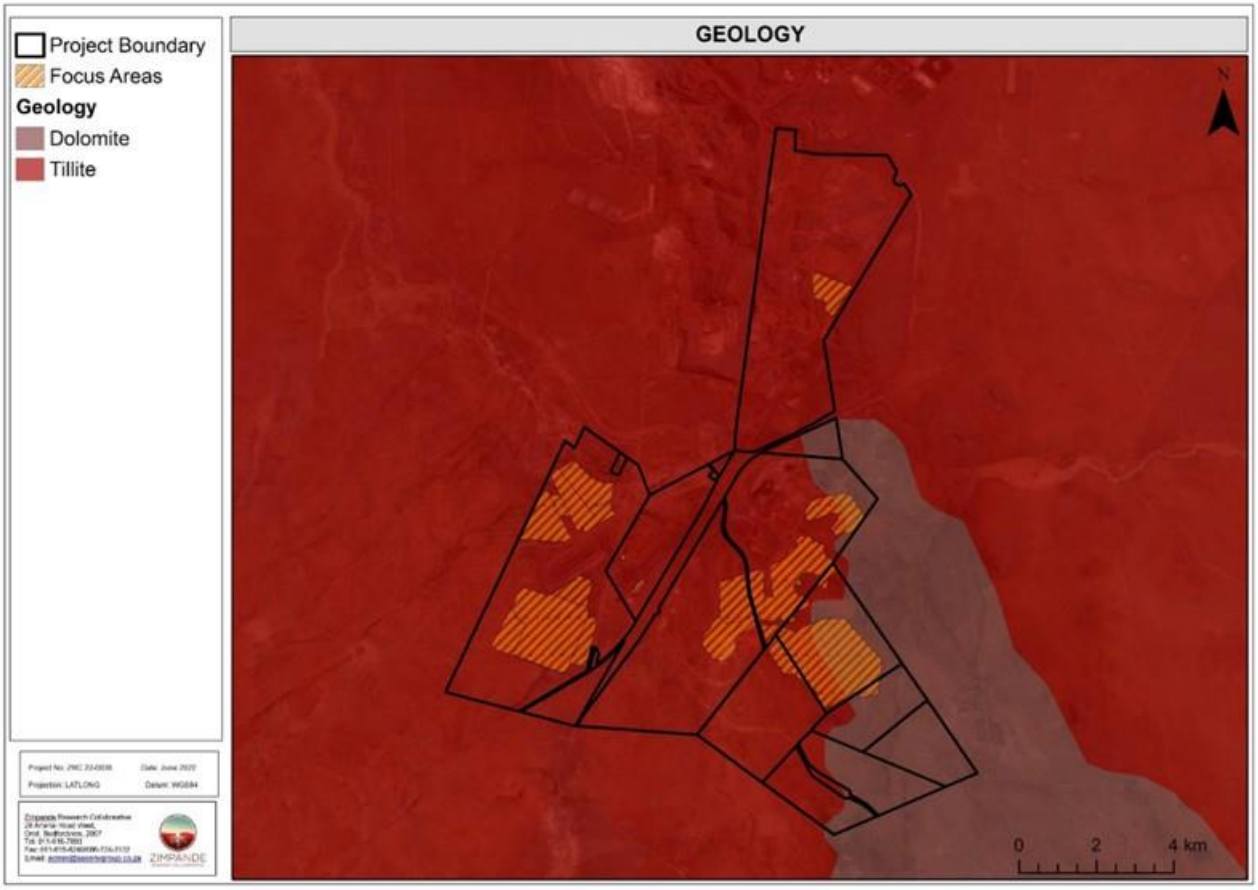


Figure 33: Geology

A map based on the surface geology mapped by the Council for Geoscience (CGS) is illustrated in Figure 33. Based on this map, the central part of the mine consists of the Campbellrand Subgroup (Ghaap Group) and represents the Maremane Anticline (Dome). East of the dome is the Asbestos Hills Subgroup (Kuruman Iron-Formation) in the form of a large, easterly arching syncline, the Dimoteng Syncline. The Ongeluk Formation (andesitic lavas) represents the cover rocks in the syncline, deposited on an unconformity. The western boundary of the Ghaap Group lies on a regional thrust fault system overlain by quartzite and shales of the Mapedi and Gamagara Formations.

The regional geology of the mine comprises of sedimentary and extrusive rocks of three Supergroup sequences, spanning a significant geological time span (between 2680 and 358 Ma). These sequences are partially covered by Tertiary-Quaternary sediments of the Kalahari Group and windblown sands of the Gordonia Formation.

The rock formations of the pre-Karoo Group are located close to the western margin of the Kaapvaal Craton. This margin has been subjected to intensive, structural deformation due to tectonism ~2400 – 1700 Ma (i.e. the Kheis Orogeny: folding, thrusting and faulting).

A thick succession of dolomites, viz. the Campbell Rand Subgroup represents the central part of the Maremane Dome (or anticline) and consists of alternating layers of oolitic and stromatolitic dolomite with thin interbedded layers of shale and quartzite (Golder, 2014). This succession is believed to be several thousand metres thick, based on the stratigraphic core borehole just north of Sishen during the 1990's. During the Kheis Orogeny, the basal units of the dolomite were exposed to palaeo-erosion and subsequent karstification of the dolomites. This process has played a major role in the

enrichment (i.e. leaching of silica from the overlying BIF) of hematite and subsequently forming the vast amounts of iron ore occurrences in the study area.

The Asbestos hills Subgroup lies conformably on the Campbellrand Subgroup and consists of typical banded ironstones of various thicknesses. The “blinkklip breccia”, a basal layer of banded iron stone, lies on the Campbell Rand Formation in the Maremane Anticline and serves as a marker in the regional geological sequences in the area.

The Postmasburg Group (Makganyane diamictite formation and the overlying Ongeluk lava formation) in the western part of the Maremane Dome, unconformable overlies the Ghaap Group (i.e. Campbellrand and Asbestos Hills Formations) and underlies the Gamagara Formation (Olifantshoek Group) with an unconformity– representing a local thrust fault package from the west which sits between the Asbestos hills Subgroup (lower) and the Makganyene diamictite and Ongeluk lava.

The Ongeluk Formation (andesite lava) forms the upper part of the Transvaal Supergroup and overlies the Makganyene Group. Andesitic lava belonging to this formation crops out in the Dimoten Syncline and southeast of the Maremane Anticline and disappears under the Kalahari sand cover further north.

The Gamagara Formation was deposited on the Maremane Anticline; this contact zone represents an unconformity overlying the dolomite and banded iron formations of the underlying formation.

When considering the Tertiary to Quaternary Deposits, the bedrock geology in the study area is partially concealed by sediments of the Kalahari Group. In the eastern parts of the study area the cover becomes thin and patchy and large areas of bedrock are exposed. The Kalahari Group consists primarily of calcrete, gravel and clay beds. It is subdivided into five formations, i.e. Wessels Gravel Formation, overlain by the Budin Clay Formation and the Eden Sandstone Formation, followed by the Mokalanen Limestone Formation (mainly calcrete) with the Gordonia aeolian Sand Formation at the top. Kalahari Group sediments with roughly a northeast to southwest strike direction varies in thickness from a few millimetres to over a hundred meters and covers the northern middle part of the study area. The thickness of the Kalahari sediments was controlled by the glacial erosional valleys developed in the underlying bedrock.

The geology associated with the mine is relatively deformed, and intense fracturing has occurred in the hard rock units. This fracturing is associated with the development of faults and in many cases dyke intrusions. Intrusive dolerite/diabase dykes are a common feature in the study area but seldom outcrops. Dolerite dykes are typically observed as major linear structures and intersect the geological formations perpendicular. These dykes are subjective to both positive and negative weathering, depending on the specific hydrological environment and their geochemical characteristics.

Chemical weathering is responsible for the deposition of secondary calcite on top of the dykes, with the intensive materializing of clayey decomposed dolerite at depth. These dykes naturally appear as ridges with depressions formed by the solution of the country rocks within the contact zone alongside the dykes.

Most of the surface water drainage channels are restricted to these features. These dolerite dykes with low permeability compartmentalize the dolomite aquifer.

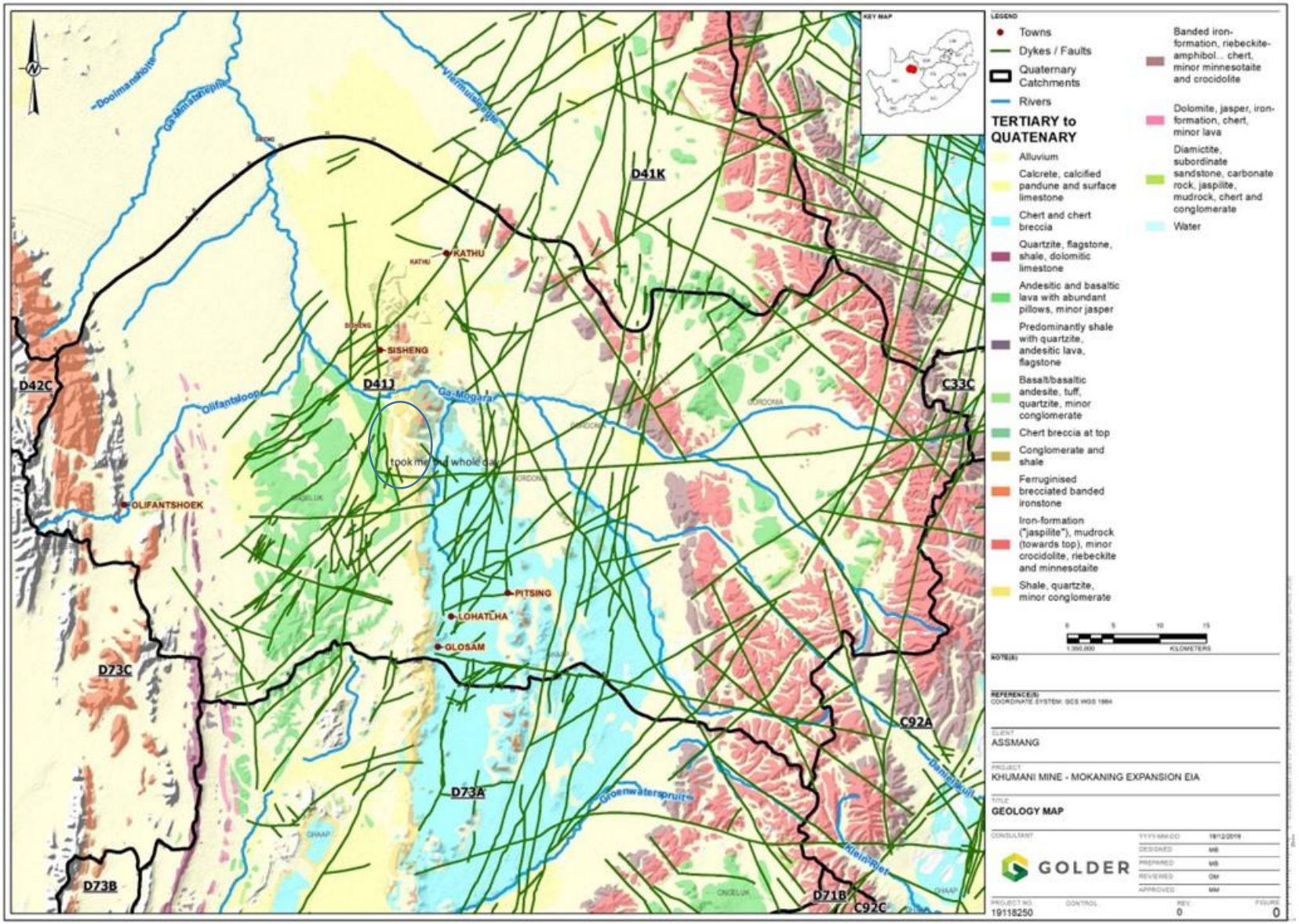


Figure 34: Geology Map

1.f.vii.1.b Climate

WSP Environmental (Pty) Ltd was appointed to undertake the Air Quality impact assessment.

According to the Köppen-Geiger Classification, the Kathu area is defined as having a hot, arid climate. Meteorological data, including hourly temperature, rainfall, humidity, wind speed and wind direction, were obtained from the nearest station operated by the South African Weather Service (SAWS) and analysed for the period January 2019 - December 2021 (i.e. three calendar years as required by the Modelling Regulations). The Kathu meteorological station is located approximately 7.5km north of Khumani's Bruce Mine. Although this surface station is at distance from the mine, the local topography is not complex and thus the data is considered representative of regional weather conditions that would prevail across the mining rights area (Refer to Appendix 8 for the Air Quality Assessment).

1.f.vii.1.b.1 Temperature, Rainfall and Humidity

The following figure presents the average monthly temperature range and average monthly rainfall as recorded at the Kathu station. Higher rainfall occurs during the hot, summer months (December, January and February) with very dry conditions during the cooler, winter months (June, July and August). Summer temperatures for the region average at 25.0°C while winter temperatures average at 12.2°C. Average humidity ranges between 47% in summer and 37% in winter. Kathu received on average 527 mm per annum, with approximately 61% of that during the summer months and only 1% during the winter months.

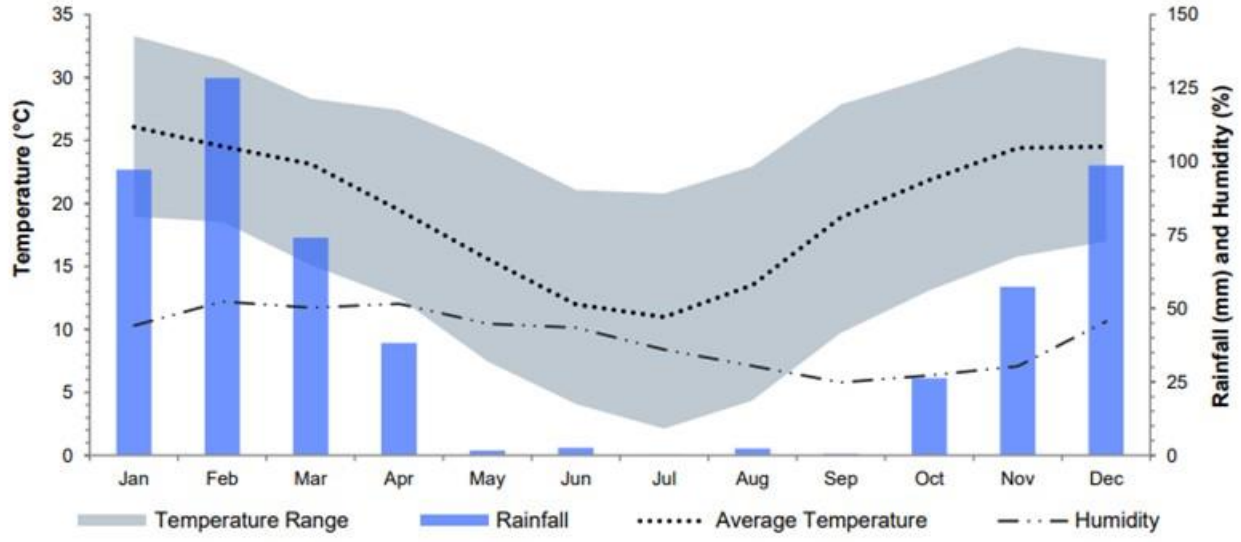


Figure 35: Meteorological summary for Kathu (January 2019 - December 2021) (WSP, 2022)

1.f.vii.1.b.2 Evaporation

Rainfall and evaporation are highest over the summer months of November to April, and lowest over the cooler winter months. Evaporation far exceeds rainfall, and the climate of the area can be described as arid. According to the WR2012 study, Khumani is located in an endoreic catchment, meaning that rainfall is lost to evapotranspiration and infiltration, with no runoff flowing out of the catchment to the ocean.

Table 31: Mean monthly rainfall and evaporation (HydroSpatial, 2022)

Month	Khumani Rainfall: 2012-2020 (mm)	S-Pan Evaporation (mm)
January	55	277
February	64	210
March	40	193
April	41	144
May	9	115
June	5	91
July	3	106
August	3	154
September	3	213
October	9	270

Month	Khumani Rainfall: 2012-2020 (mm)	S-Pan Evaporation (mm)
November	33	284
December	53	295
Total	**319**	**2 352**

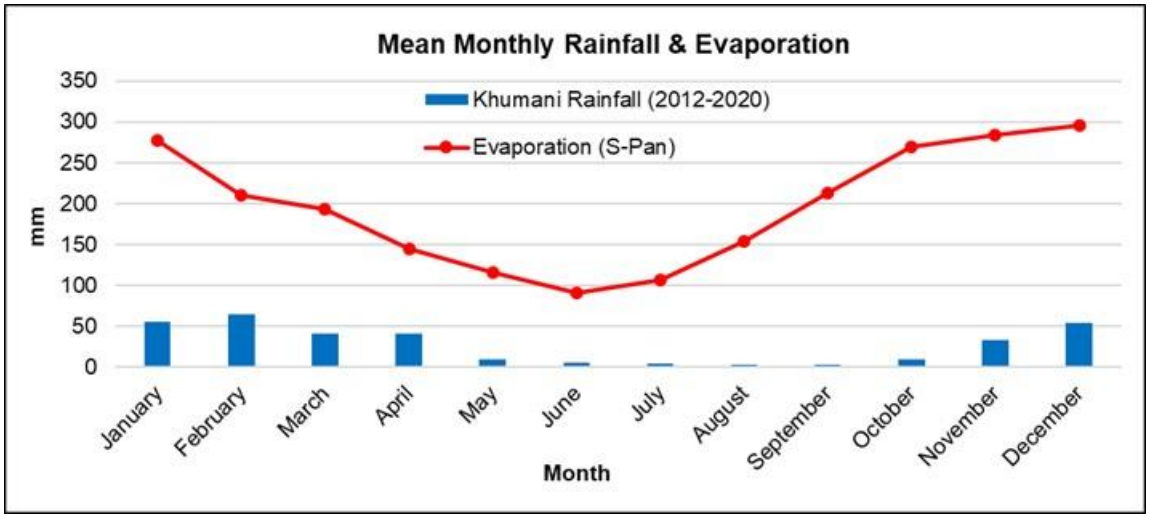


Figure 36: Mean monthly rainfall and evaporation (HydroSpatial, 2022)

1.f.vii.1.b.3 Wind

Wind roses (refer to the following figure) summarize wind speed and directional frequency at a location. Each directional branch on a wind rose represents wind originating from that direction. Each directional branch is divided into segments of colour, representative of different wind speeds. Calm conditions are defined as wind speeds less than 1.0 m/s (i.e. based on the sensitivity of the wind sensor installed at SAWS stations). Wind roses were developed using Lakes Environmental WRPlot Freeware (Version 7.0.0) for the full period (January 2019 – December 2021); diurnally for early morning (00h00 – 06h00), morning (06h00 – 12h00), afternoon (12h00 – 18h00) and night (18h00 – 00h00); and seasonally for summer (December, January and February), autumn (March, April and May), winter (June, July and August) and spring (September, October and November):

For the assessment period, calm conditions (wind speeds <1m/s) occurred 3.33% of the time.

Wind speeds ranged from light (1-1.5m/s) to strong breeze (10.7-13.8m/s) along a prevailing northerly/south-south-easterly trajectory.

Peak (13m/s) wind speeds occurred from the northwest and the highest average (4.1m/s) winds speeds occurred from the west-northwest.

Prevailing northerly and south-south-easterly winds are noted throughout the year.

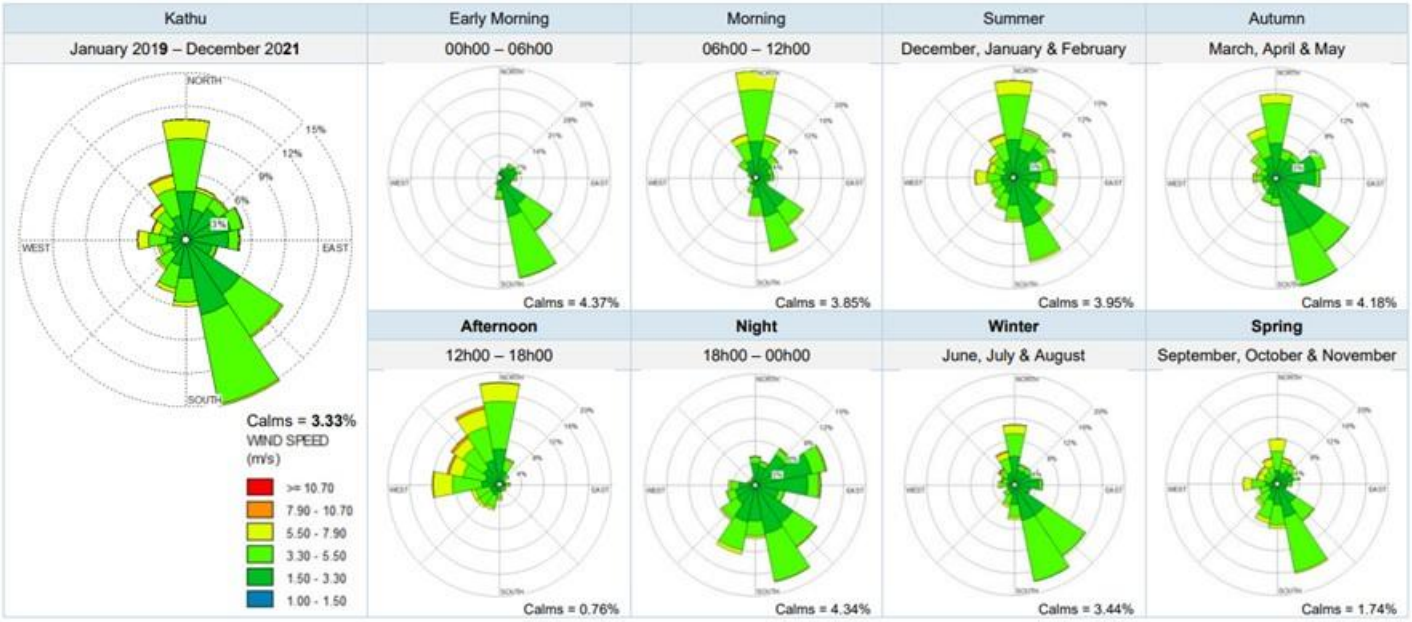


Figure 37: Local wind conditions at Kathu

1.f.vii.1.c Topography

The mining complex lies at an approximate elevation of 1,250 – 1,300m above mean seal level (mamsl). Elevations within the surrounding landscape gently undulate within 100m and, as such, the local topography is considered flat.

The general topography of the region can be described as flat. Steep slopes occur along the sides of the mine dumps and pits. A north-south aligned ridge runs through the middle of the Mokaning farm and is the prominent topographical feature in the area. The King/Mokaning Low Grade ROM Stockpile is located within a saddle of this ridge.

The topography of the solar site options dips gradually in a northerly direction towards the Gamagara River. The elevation varies from 1,200 mamsl in the southern extent of Option A, to 1,180 mamsl in the north along the banks of the Gamagara River. The topography has been altered at the existing borrow pits, due to material that has been removed for construction purposes of the mine. The borrow pit has an approximate depth of 4 m and is currently filled with water.

The topography of the current Discard Low Grade Stockpile footprint is flat, barring the area in the northern extent of the new Discard Low Grade Stockpile footprint, where a borrow pit has altered the topography and reaches a depth of approximately 4 m. Seasonal depressions (pans) are present to the south and west of the Discard Low Grade Stockpile footprint.

The KM01 Opencast Pit Expansion is located in a shallow south-north running valley. A river diversion has been constructed upstream to the south. No presence of drainage channels was noted in this area on the site visit.

The King/Mokaning Low-Grade ROM Stockpile is located within a saddle of a north-south running ridge. The ridge reaches a maximum height of approximately 1 340 mamsl to the east of the KM01 Opencast Pit. The King/Mokaning Low Grade ROM Stockpile is 70m high at a height of approximately 1 305 mamsl. Steep slopes in excess of 30 % occur along sides of the benches.

The Bruce Block A & B Off-grade ROM Stockpile is proposed to be located in a shallow valley that gradually dips in a north-easterly direction. Elevation at the site varies from 1,260 to 1,220 mamsl. No presence of drainage channels was noted in this area on the site visit.

The proposed BESS Storage Area and Plant Stockpile are located on disturbed flat topography.

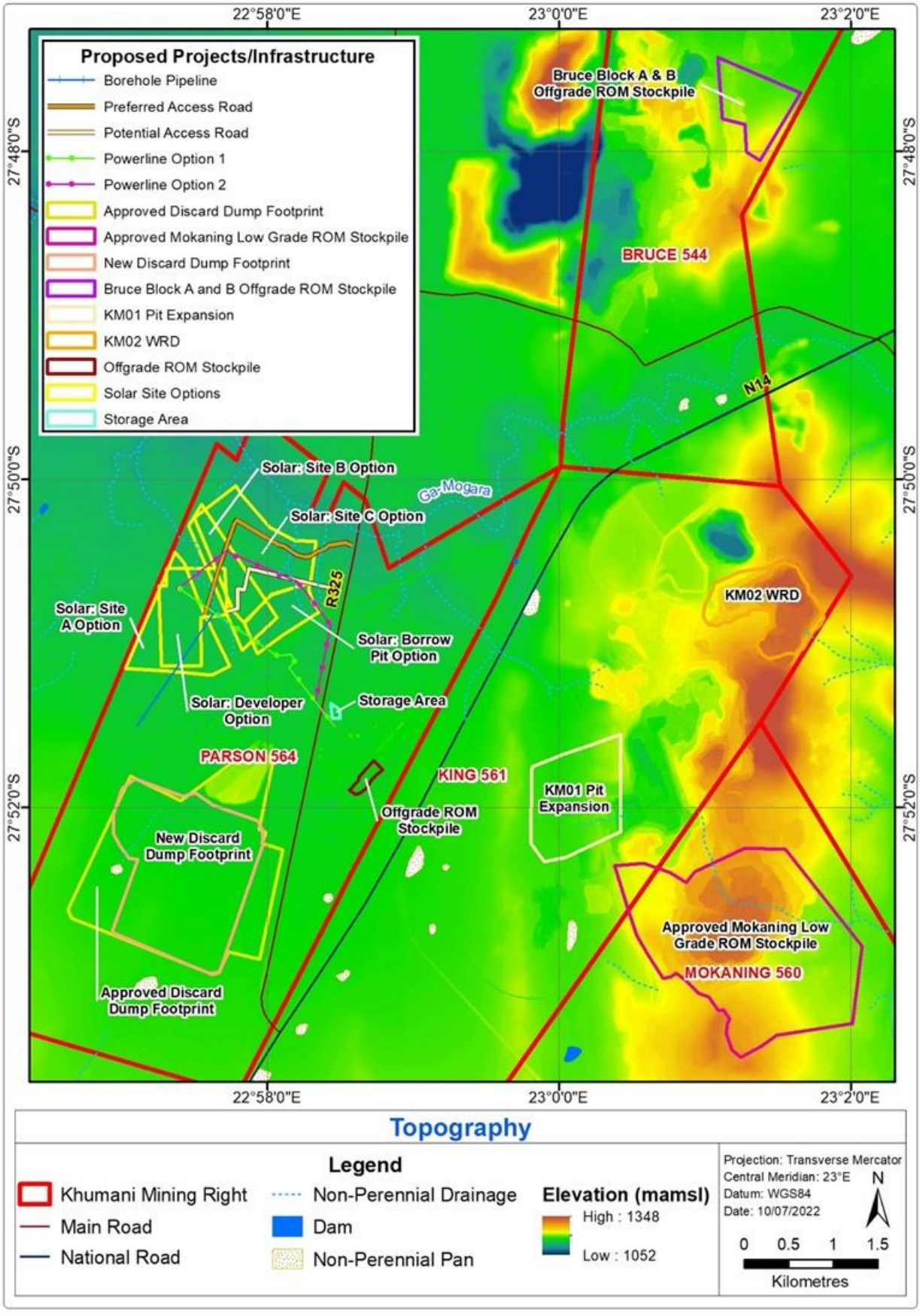


Figure 38: Topography (HydroSpatial, 2022)

1.f.vii.1.d Soils and Land Capability

The Soils, Land Use and Land Capability Assessment is undertaken by Zimpande Research Collaborative (Appendix 9).

1.f.vii.1.d.1 Soils

According to the Soil and Terrain (SOTER) database, the dominant soils associated with the project areas are Rhodic Cambisols, Rubic Arenosols and Calcic Solonchacks.

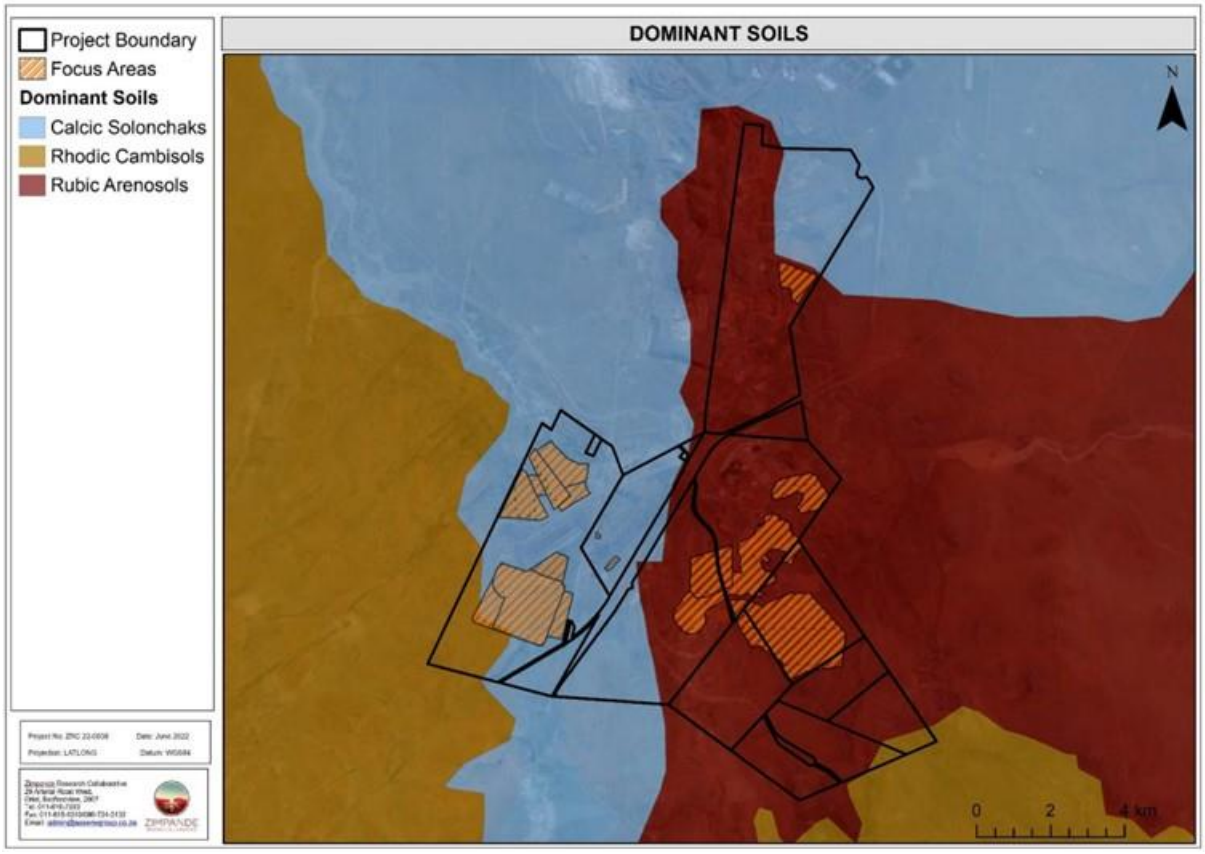


Figure 39: Dominant Soils (Zimpande, 2022)

The Rhodic Cambisols and Rubic Arenosols share similar soil properties under the Oxidic soil classification. These soils are characterised by uniformly coloured B horizons with red and/or yellow oxides of iron. Clay illuviation can be observed in some cases and thus reducing the drainage capacity lower in the soil profile and possibly resulting in redoximorphic properties or calcrete layers. The rhodic soils are characterised by a subsurface horizon with a Munsell hue of 3.5YR or redder in all parts and the Rubic soils are characterised by a subsurface horizon with a Munsell hue redder than 10YR. Given these soils excessive permeability, they typically lack sufficient nutrients and thus agricultural use of these soils requires careful management. The soils identified during the site assessment include the Hutton/Plooysburg which are associated with both the Rhodic Cambisols and Rubic Arenosols.

Calcic Solonchacks occur when the saline groundwater comes near the surface and the salts (calcium and or gypsum) from the water accumulate in the soil through precipitation. These soils typically occur in seasonally or permanently saturated topographic locations and areas where evapotranspiration is greater than the annual precipitation. Soils identified during the site assessment include the Coega/Knersvlakte which are associated with the calcic solonchacks. These soils are typically shallow to allow enough rooting depth for the majority of cultivated crops.

The Lithic Leptosols such as the Mispah/Glenrosa forms, although not identified by the SOTER database, were identified during the site assessment. These soils are characterised as shallow soils underlain by hard rock, weathering rock or hard calcrete layer. The dominant feature of the lithic soils is their clear affinity to the underlying parent rock and typically dominate in regions with steep slopes prone to erosion.

Anthropogenic soils were also identified within the project boundary. These soils have been subjected to physical disturbance because of mining and other related activities. These activities include opencast mining, transportation and deposition of the earth material containing soil (including waste rock material). The soils where excavation and disturbance has occurred where classified as Cullinan and Witbank soil forms respectively. The Cullinan and Witbank soil forms were considered unusable for agricultural cultivation as they typically require significant rehabilitation to be productively used. The project boundary is dominated by mining and related activities and thus majority of the soils have been subjected to physical disturbance.

1.f.vii.1.d.2 Land Capability

The land capability ratings associated with the project boundary are Grazing (VII) and Wilderness (Class VIII) based on a review of available databases (Figure 40). However, the dominant land capability class within the project boundary is Grazing (Class VII). The grazing capacity for the mine is presented in Figure 41 with the average pf 11 to 13 LSU/ha. The agricultural potential associated with the project boundary is Low (Figure 42) and this can be attributed to the prevailing climatic conditions associated with the project boundary due to low rainfall (between 201 and 400 mm per annum) and high evaporation demand (between 2,201 and 2,400 mm per annum) without any supplementary irrigation.

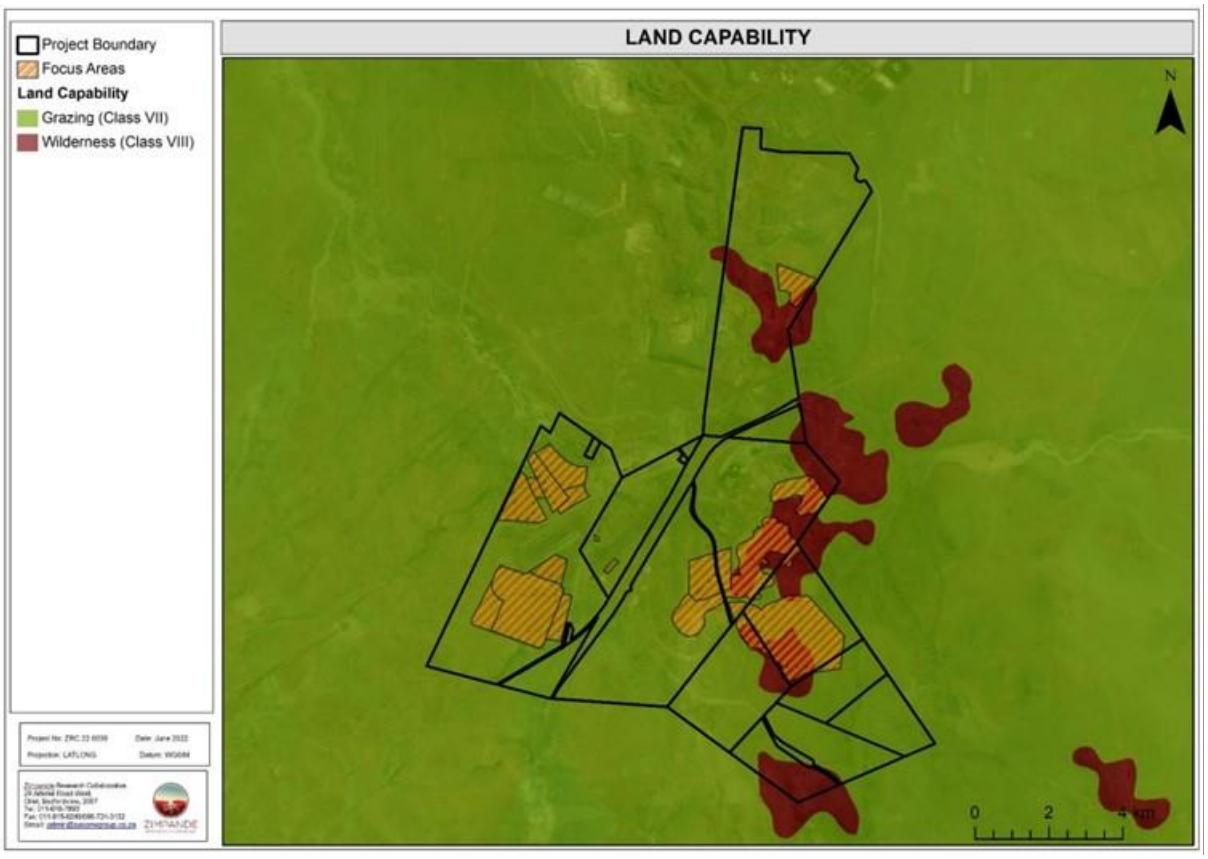


Figure 40: Land Capability (Zimpande, 2022)

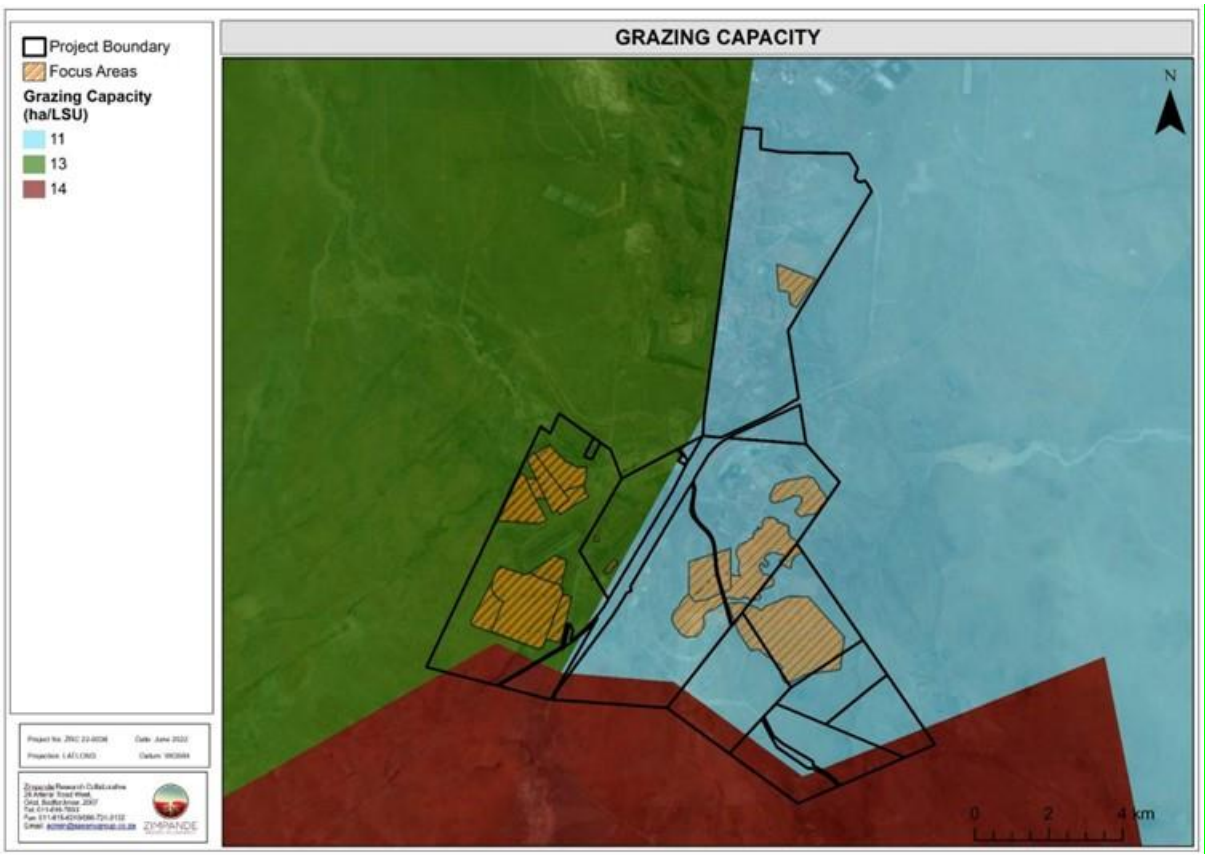


Figure 41: Grazing Capacity (Zimpande, 2022)

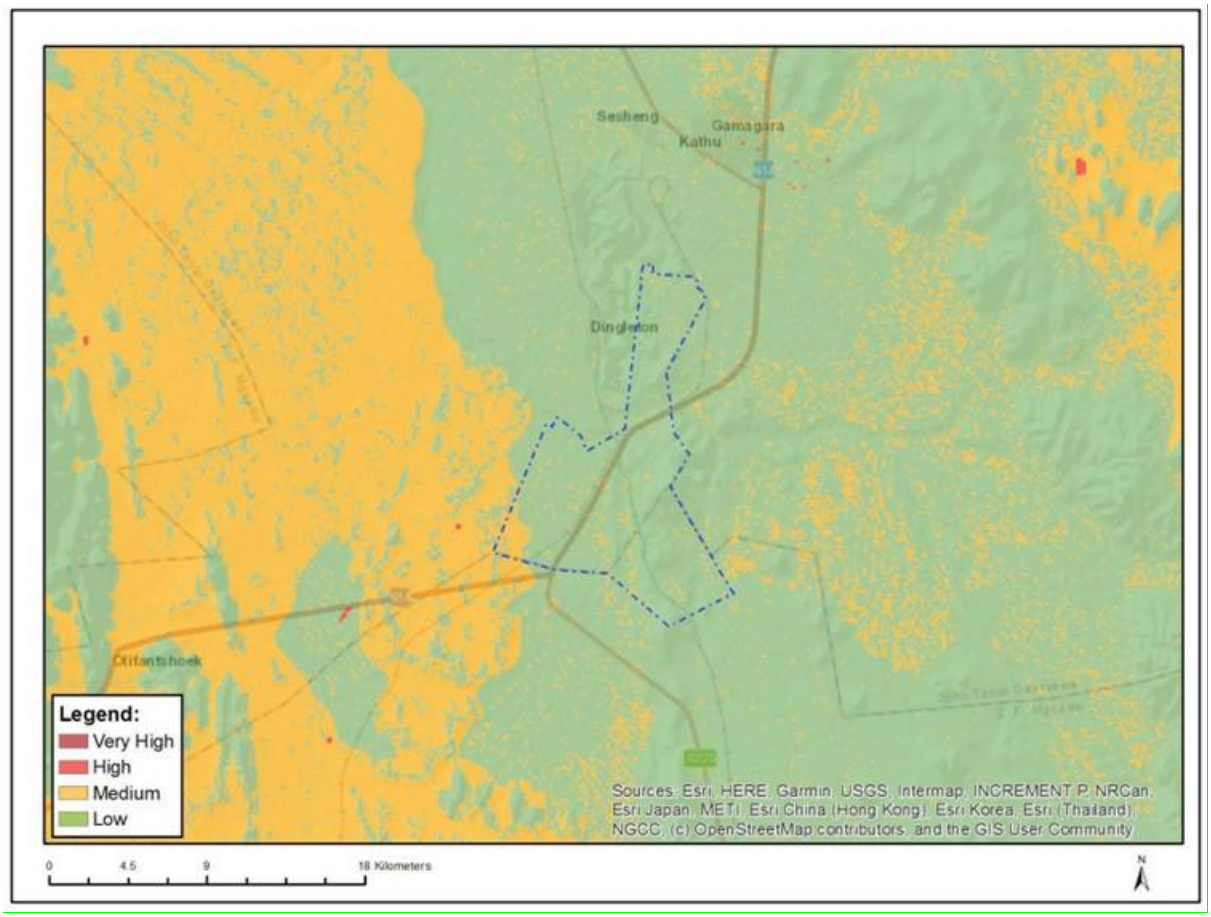


Figure 42: Agricultural Sensitivity (Screening Tool) (Zimpande, 2022)

1.f.vii.1.e Ecological Footprint

Scientific Terrestrial Services was appointed to conduct the Ecological Assessment.

The project areas (focus area) are situated within the Savanna Biome, which is located in the Eastern Kalahari Bushveld Bioregion. The four (4) vegetation types found in this area are the:

- Kathu Bushveld (SVk 12) western portion of the focus area;
- Olifantshoek Plains Thornveld Western portion of Project 6;
- Kuruman Mountain Bushveld (Svk 10) northern and eastern portion of focus area; and
- Kuruman Thornveld (Svk 9) central portion of focus area.

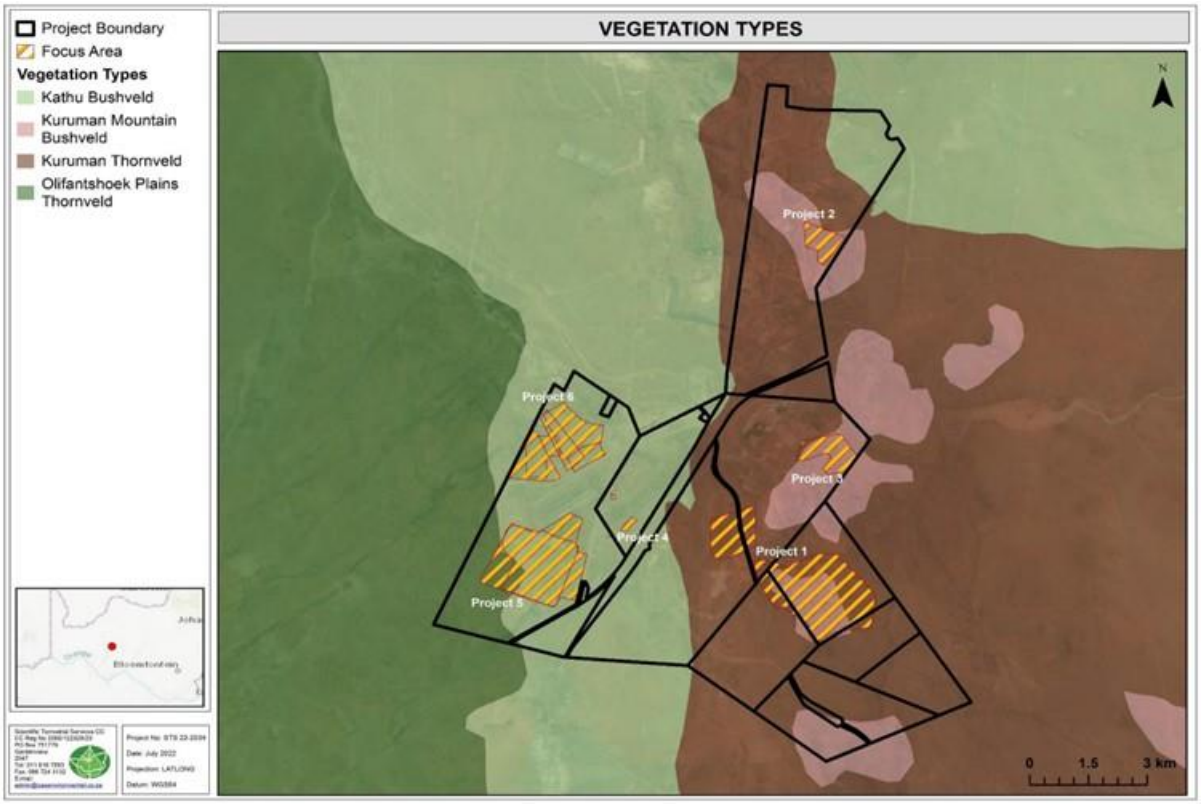


Figure 43: Vegetation Types

The Kathu Bushveld vegetation type is classified as Least Threatened, with a conservation target of 16%. None conserved in statutory conservation areas. More than 1% already transformed, including the iron ore mining locality at Sishen, one of the biggest open-cast mines in the world. Erosion is very low. The vegetation and landscape features include shrub layer generally most important with, for example, *Senegalia mellifera*, *Diospyros lycioides* and *Lycium hirsutum*. The grass layer is variable in cover.

The Olifantshoek Plains Thornveld is also classified as Least Threatened, with a conservation target of 16%. Only 0.3% statutorily conserved in the Witsand Nature Reserve. Only about 1% of the area has been transformed and erosion is very low. A very wide and diverse unit on plains with usually open tree and shrub layers with, for example, *Vachellia luederitzii*, *Boscia albitrunca* and *Searsia tenuinervis* and with a usually sparse grass layer.

The Kuruman Mountain Bushveld is classified as Least Threatened, with a conservation target of 16%. None conserved in statutory conservation areas. Very little transformed. It is characterised by rolling hills with generally gentle to moderate slopes and hill pediment areas with an open shrubveld with *Calobota cuspidosa* (formerly *Lebeckia macrantha*) prominent in places. The grass layer is well developed.

The Kuruman Thornveld is classified as Least threatened, with a conservation target of 16%. None conserved in statutory conservation areas. Only 2% already transformed. It is characterised by flat rocky plains and some sloping hills with very well-developed, closed shrub layer and well-developed open tree stratum consisting of *Vachellia erioloba* (formerly *Acacia erioloba*).

The focus area falls within the Kathu Bushveld and Olifantshoek Plains Thornveld (in the west) which is considered Least Concerned (LC) and Poorly Protected (PP) and within the Kuruman Thornveld and Kuruman Mountain Bushveld (in the east) which is considered to be of Least Concern (LC) and Not Protected (NP). The National Biodiversity Assessment (NBA, 2018) is the primary tool for monitoring and reporting on the state of biodiversity in South Africa. Two headline indicators that are applied to both ecosystems and species are used in the NBA: threat status and protection level.

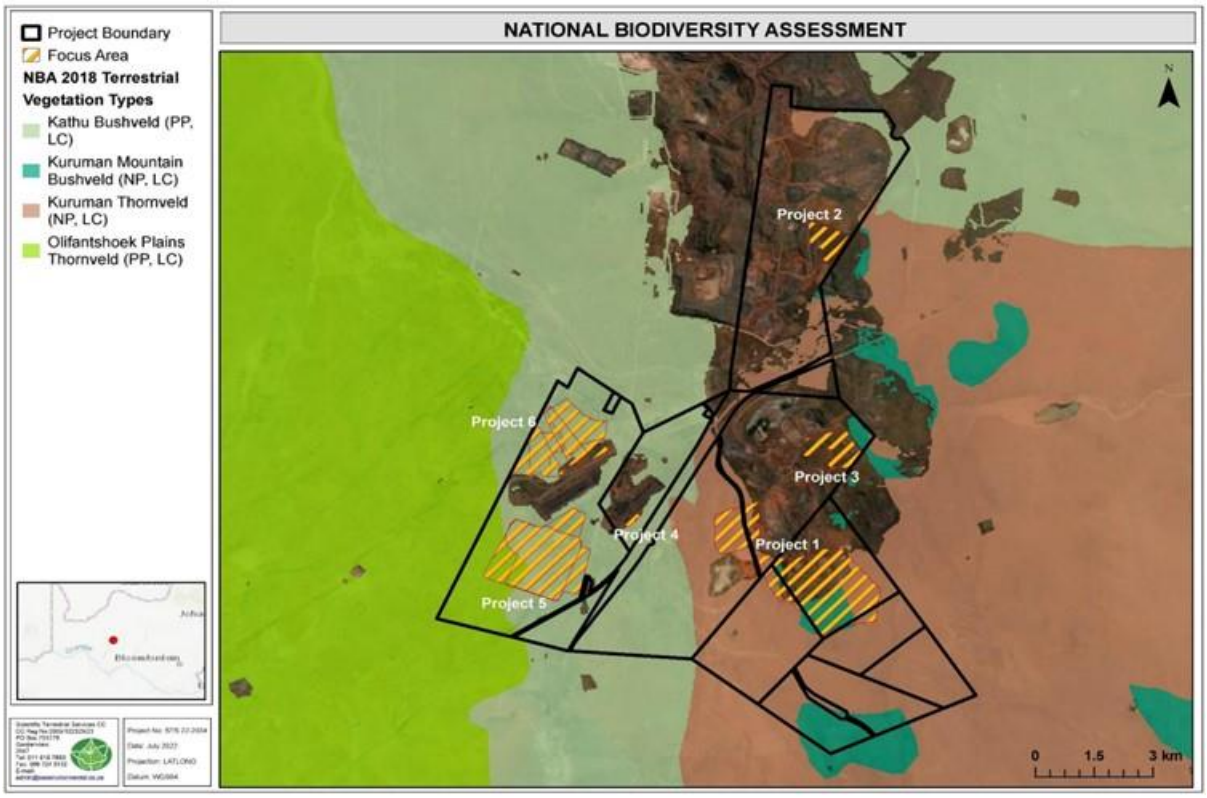


Figure 44: Remaining Extent of the vegetation types associated with the focus area as identified by the National Biodiversity Assessment (NBA; 2018)

The focus area is not located within a 10km radius of an Important Bird Area (IBA, 2015).

According to the National web Based Environmental Screening Tool (2021) the following are concluded:

The Animal Species Theme for the focus area was an overarching Medium Sensitivity (i.e. the focus area has low and medium sensitivity area, however the higher sensitivity give the overall sensitivity of the focus area) The with trigger species included the *Gyps africanus* (White-backed vulture, Critically Endangered (CR)) and *Aquila rapax* (Tawny Eagle, Endangered (EN)). The following four (4) figures indicate the Animal Themed Sensitivity of the various projects that have more than one sensitivity.

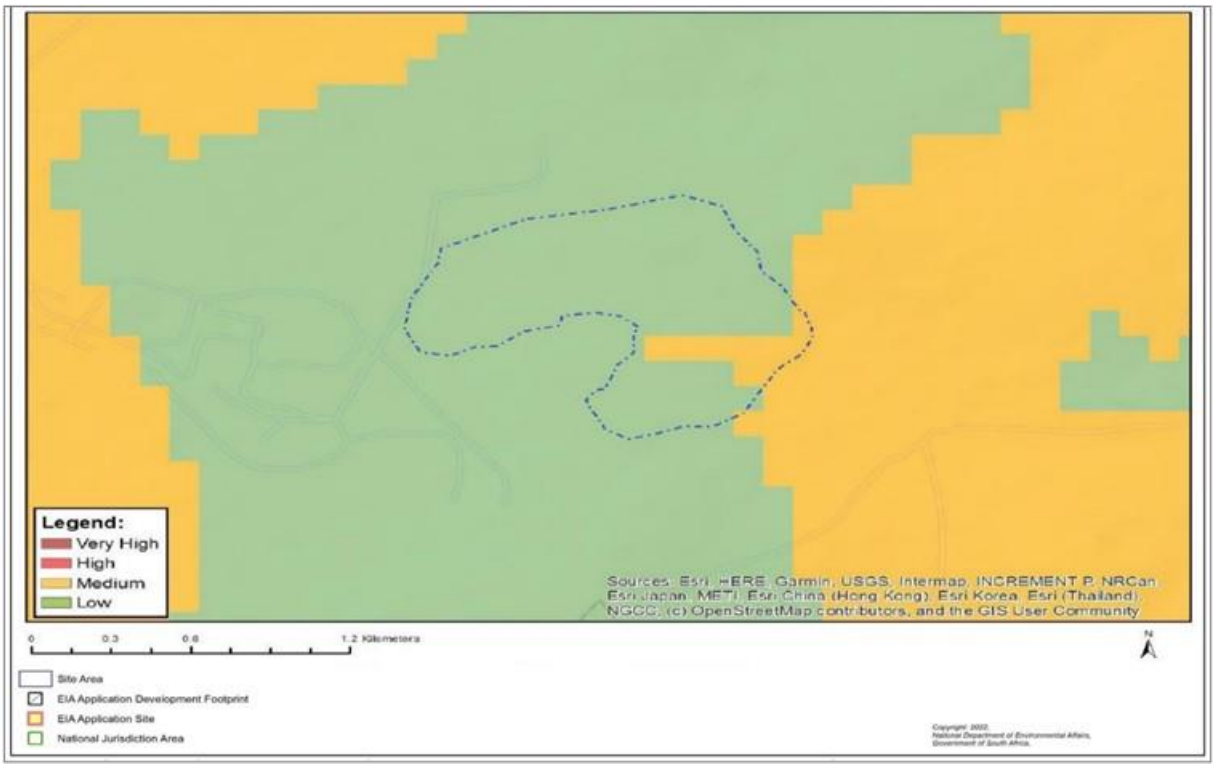


Figure 45: Outcome of the Animal Theme for the Project 2 according to the National Web Based Screening Tool, as retrieved in 2022.

Figure 46: Outcome of the Animal Theme for the Project 3 according to the National Web Based Screening Tool, as retrieved in 2022

Figure 47: Outcome of the Animal Theme for the Project 5 according to the National Web Based Screening Tool, as retrieved in 2022

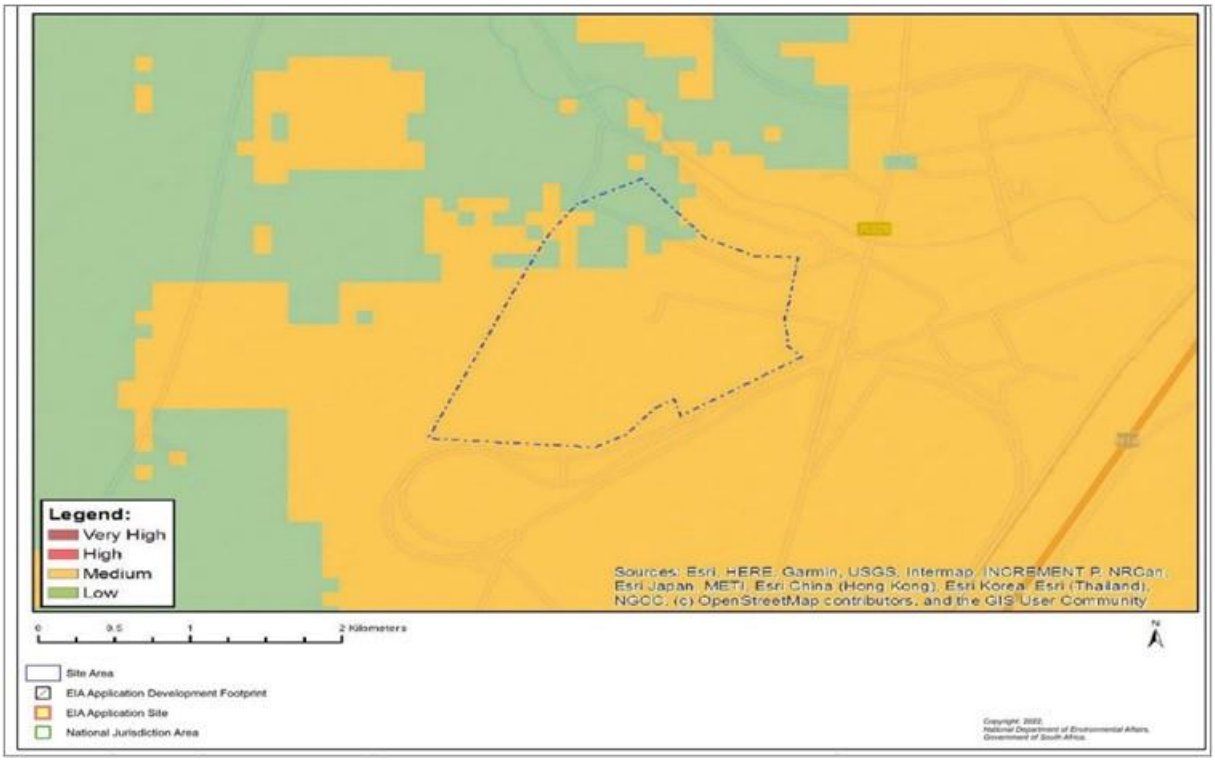


Figure 48: Outcome of the Animal Theme for the Project 6 according to the National Web Based Screening Tool, as retrieved in 2022

For the Terrestrial Biodiversity Theme, the overarching sensitivity of Projects 1 and 6 is very high due to portions of the area being classed as Ecological Support Area (ESA). The remaining portions of Projects 1 and 6 have a low sensitivity (see the following 2 projects). Projects 2 to 5 have an overall low sensitivity.

Figure 49: Outcome of the Terrestrial Theme for the Project 1 according to the National Web Based Screening Tool, as retrieved in 2022

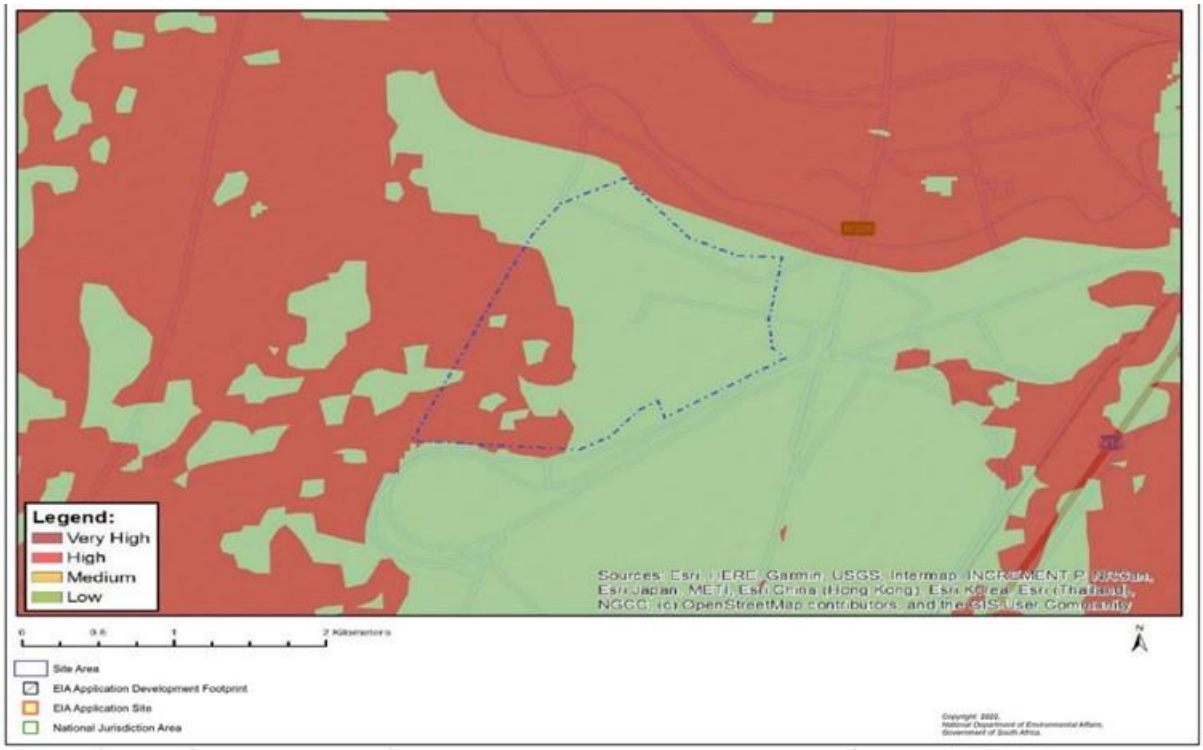


Figure 50: Outcome of the Terrestrial Theme for the Project 6 according to the National Web Based Screening Tool, as retrieved in 2022

The Plant Species Theme for the focus area was identified to be of low sensitivity, overall.

The focus area is not situated within a threatened ecosystem, according to the National Threatened Ecosystem Database (2011).

According to SAPAD (2022) the Bredenkamp Nature Reserve is located approximately 2.8km west of the focus area and the Brooks Nature Reserve is located approximately 6km to the west of the focus area. Both of these

areas are newly proclaimed areas (2018). The SACAD (2022) and NPAES Databases (2018) do not indicate any other protected or conservation areas or NPAES Focus Areas within a 10km radius (figure 51).

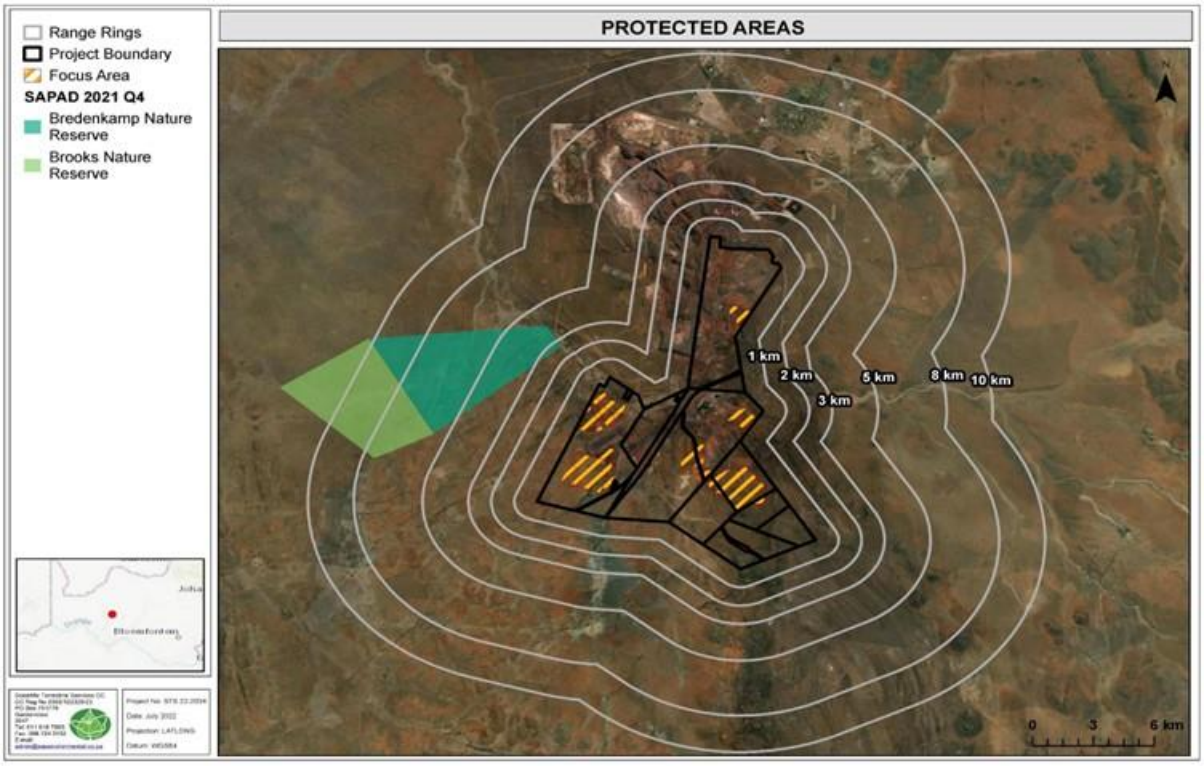


Figure 51: National protected areas within a 10 km radius of the focus area, according to SAPAD (2021)

The mine is not located within a Critical Biodiversity Area (CBA), but is located within areas indicated as ESAs and ONAs.

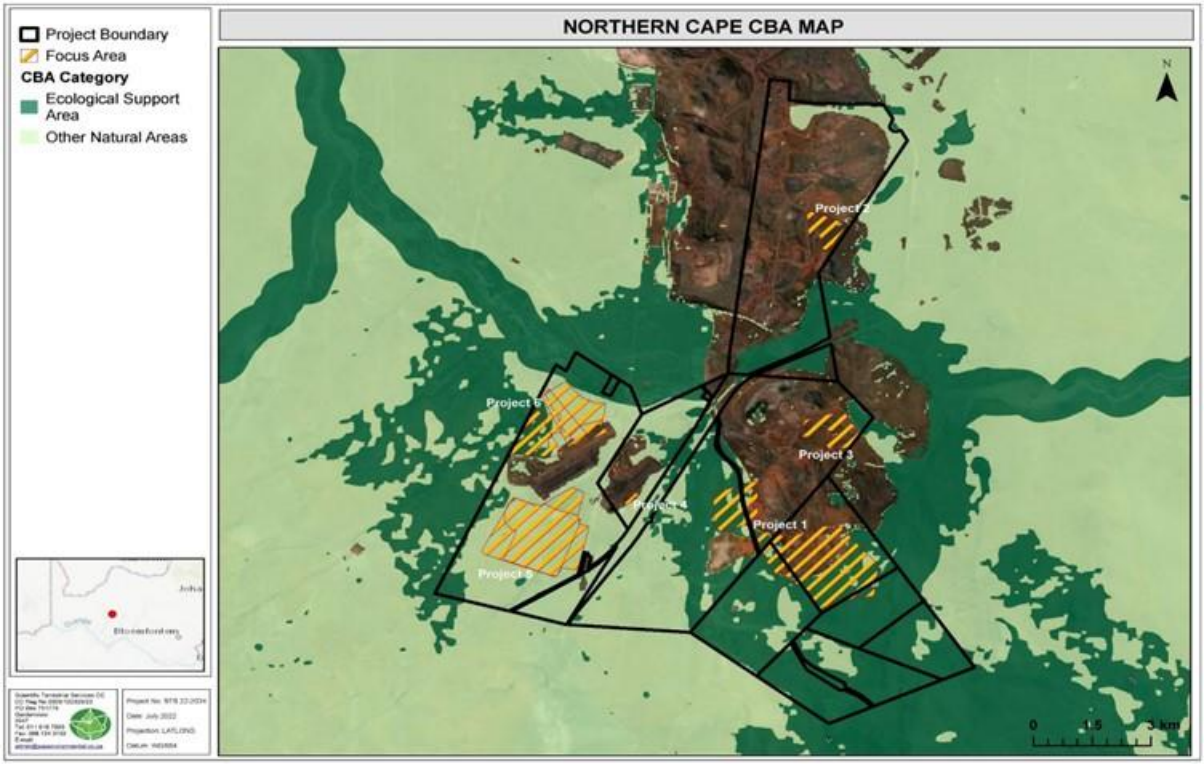


Figure 52: Importance of the focus area in relation to the Northern Cape Critical Biodiversity Areas Database (2016)

The focus area also falls within the Gamagara development corridor that focuses on the mining of iron and manganese. The Gamagara corridor comprises the mining belt of the John Taolo Gaetsewe and Siyanda districts

and runs from Lime Acres and Danielskuil to Hotazel in the north. According to the Mining and Biodiversity Guidelines Database (2013) no areas associated with the focus area are identified to be of importance.

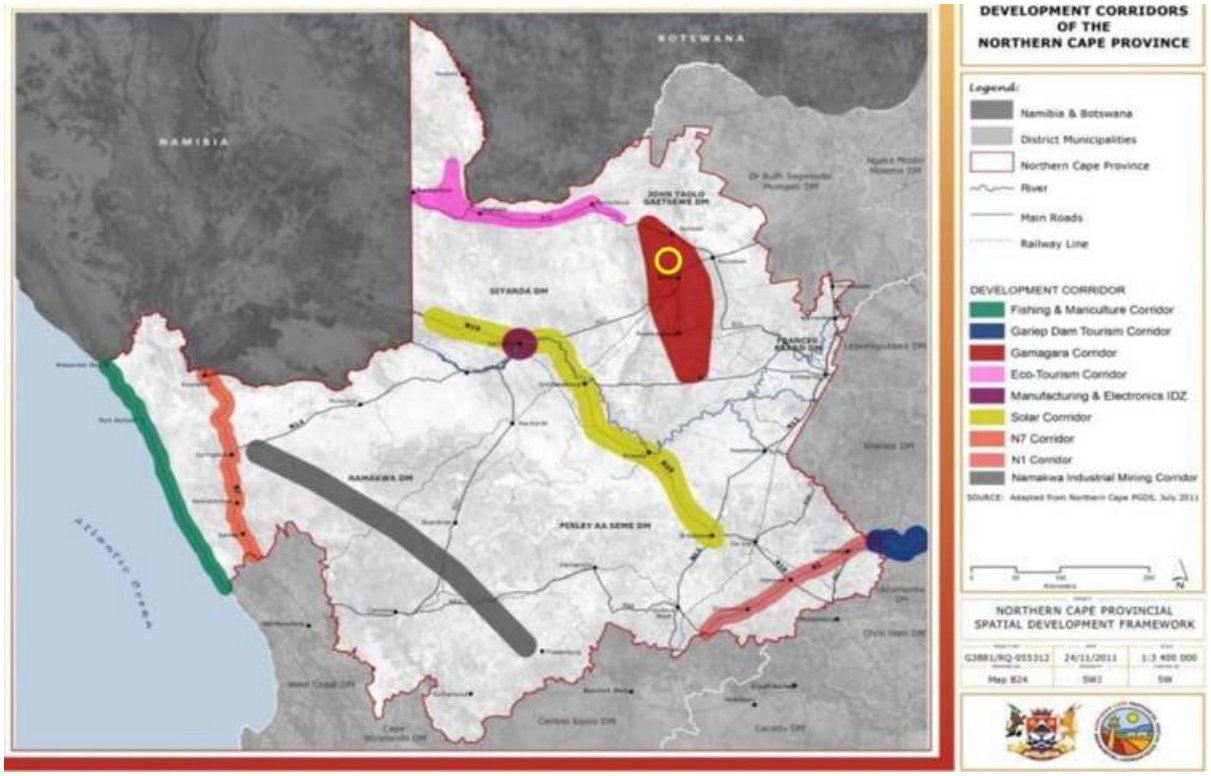


Figure 53: Development Corridors of the Northern Cape Province: the focus area indicated by the yellow circle (NPSDF, 2012)

The focus area is situated within the Griqualand West Centre of Plant Endemism. This semi-arid region is broadly described as savanna, forming part of the eastern Kalahari Bushveld Bioregion. Studies investigating the endemism of the centre report at least 23 plant species that have restricted distributions (Frisby et al. 2019).

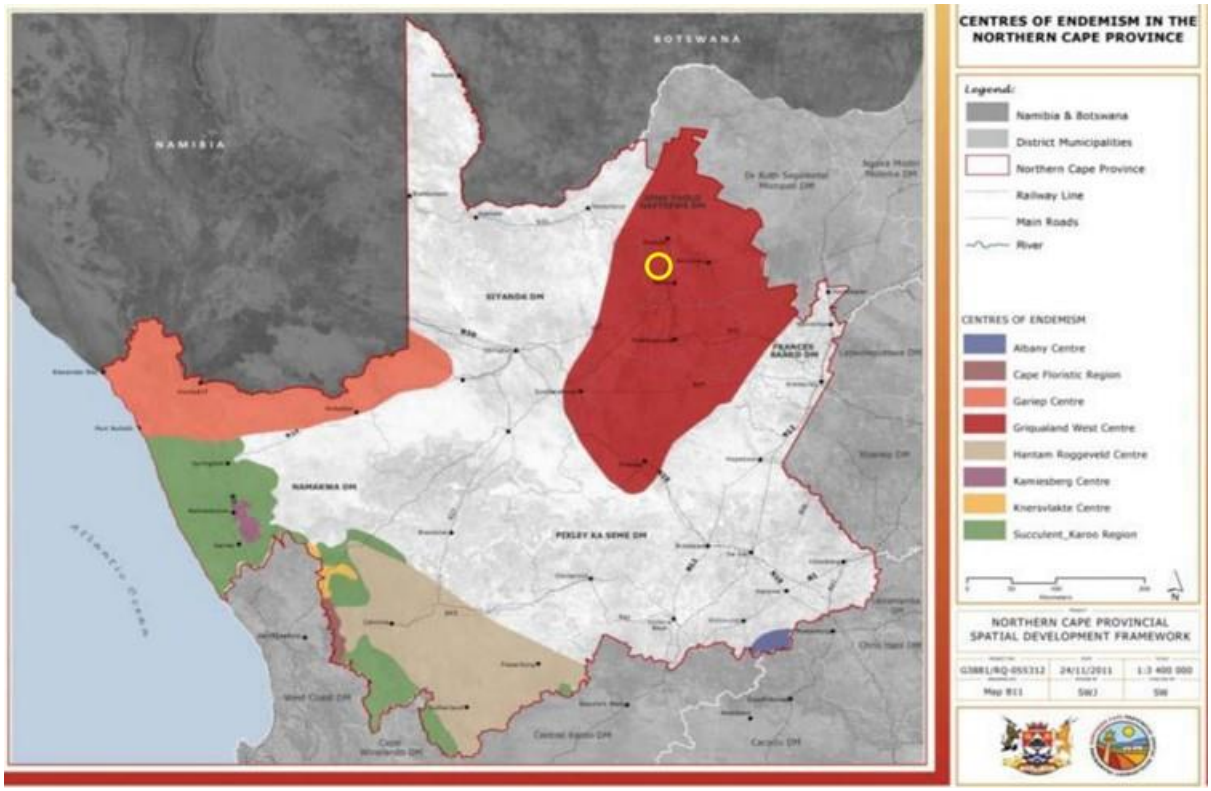


Figure 54: Centres of endemism of the Northern Cape Province: the focus area indicated by the yellow circle (NPSDF, 2012)

1.f.vii.1.f Freshwater Ecosystem Setting

The Freshwater Ecosystem Setting study was undertaken by Scientific Aquatic Services.

The focus area and investigation area fall within an Upstream Management Area (FEPACODE 4). These are sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream river Freshwater Ecosystem Priority Areas (FEPAs) and Fish Support Areas. Upstream Management Areas do not include management areas for wetland FEPAs, which need to be determined at a finer scale.

According to the NFEPA database, there are numerous natural wetland features within the project boundary which include depression and unchanneled valley bottom wetlands. Two (2) depression wetlands are also located in the south western portion of the investigation area. The depression wetlands are indicated to be in a natural ecological condition (Category A/B).

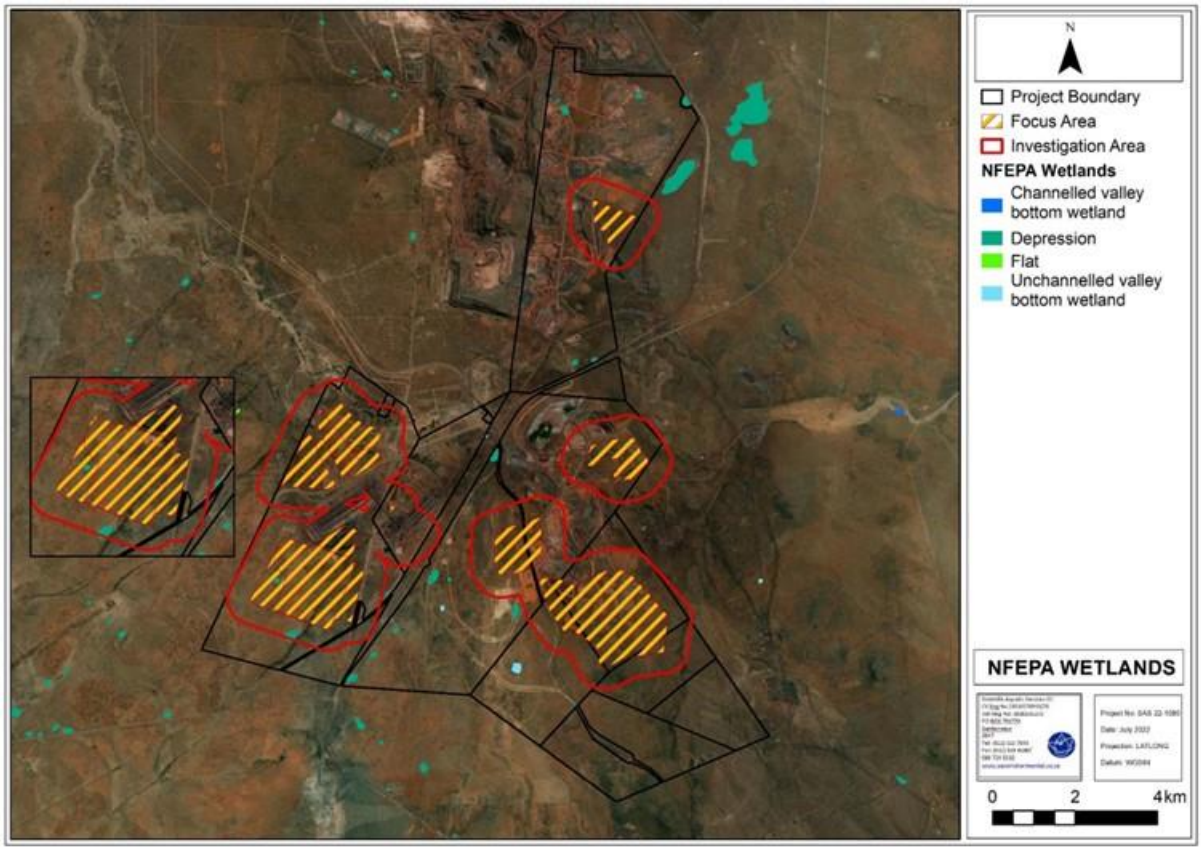


Figure 55: Wetlands associated with the focus and investigation areas according to the NFEPA database (2011)

According to the NFEPA database, no rivers are located within the focus or investigation areas. An unnamed tributary of the Soutloop River is located adjacent to the eastern portion of the investigation area. The tributary is indicated to be largely natural (Class B) according to the NFEPA Database and PES 1999 Classification. The Gamagara River is located adjacent to the northern portion of the investigation area. The Gamagara River is indicated to be in a largely natural (Category B) ecological condition according to the NFEPA Database and Present Ecological State (PES) 1999 Classification.

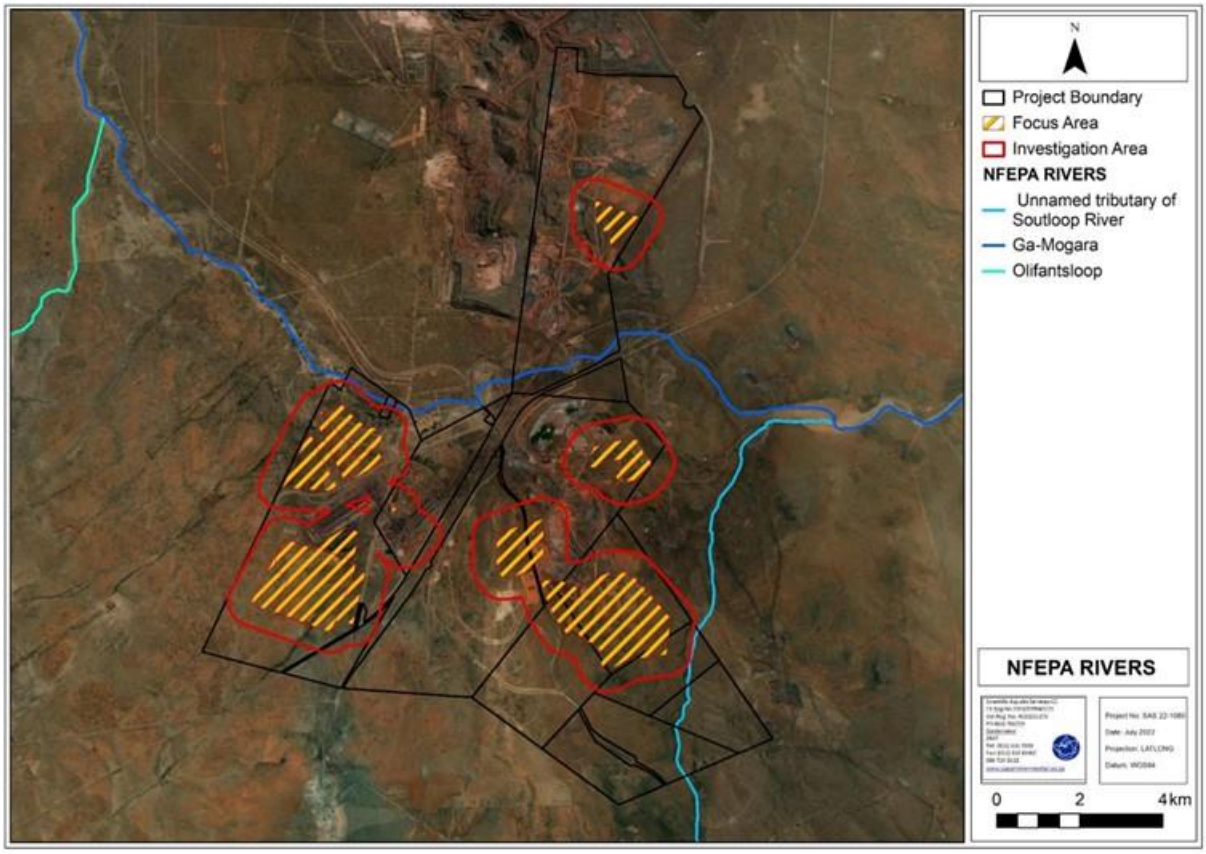


Figure 56: River associated with the focus and investigation areas according to the NFEPA database (2011)

According to the NBA 2018: South African Inventory of Inland Aquatic Ecosystems (SAIIAE) database, numerous depression wetlands are located within the focus and investigation areas. . Two depression wetlands are located in the south western portion of the investigation area. These wetlands correspond to the wetlands identified by the NFEPA (2011) database. The two depression wetlands are indicated to be in a natural ecological condition (Category A/B). The ecosystem threat status (ETS) of these wetlands are classified as Least Concern (LC) and the Ecosystem Protection Level (EPL) is classified as Poorly Protected (PP). According to the NBA Dataset, an unnamed River runs through the project boundary area and is within the northern and eastern portions of the investigation area. The river has not been assessed and as such the ecological condition, EPL and ETS are not available.

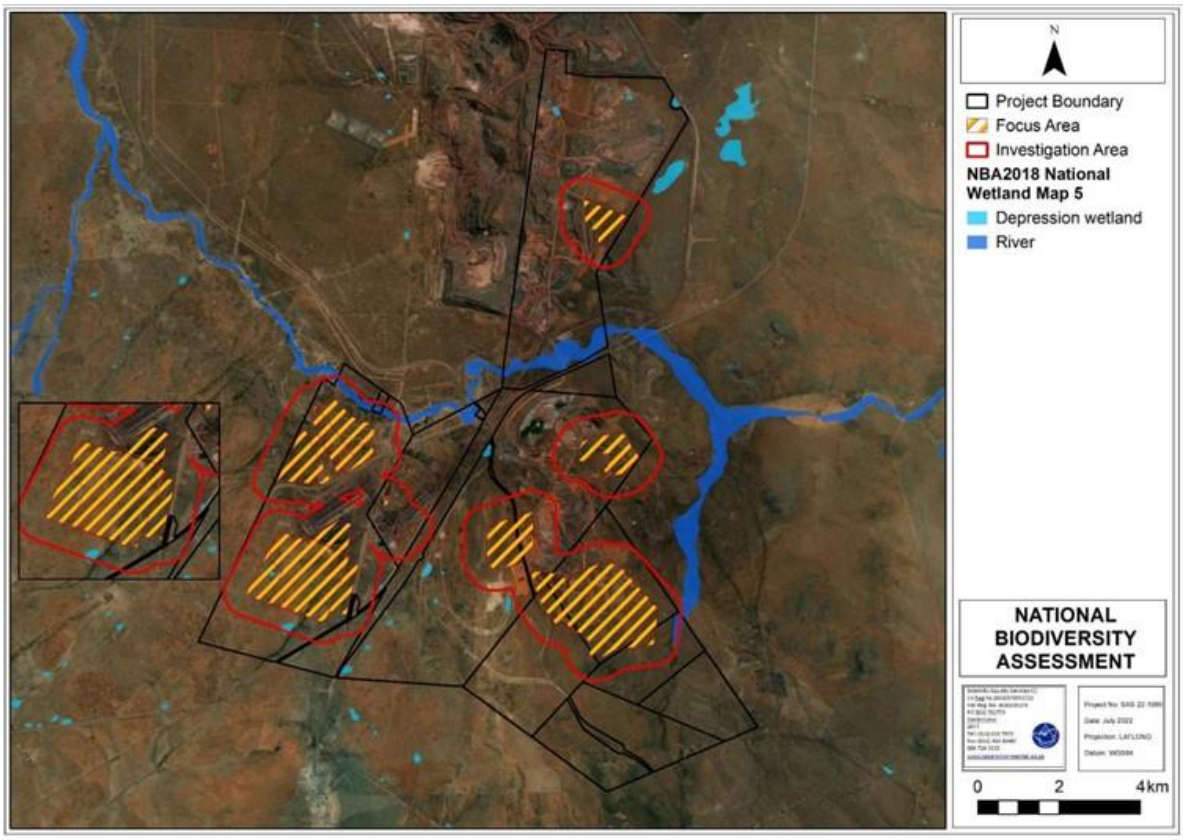


Figure 57: Wetlands associated with the focus and investigation areas, according to the National Biodiversity Assessment: South African Inventory of Inland Aquatic Ecosystems (NBA: SAIIAE, 2018) Wetland Map 5

No CBAs are present in this area.

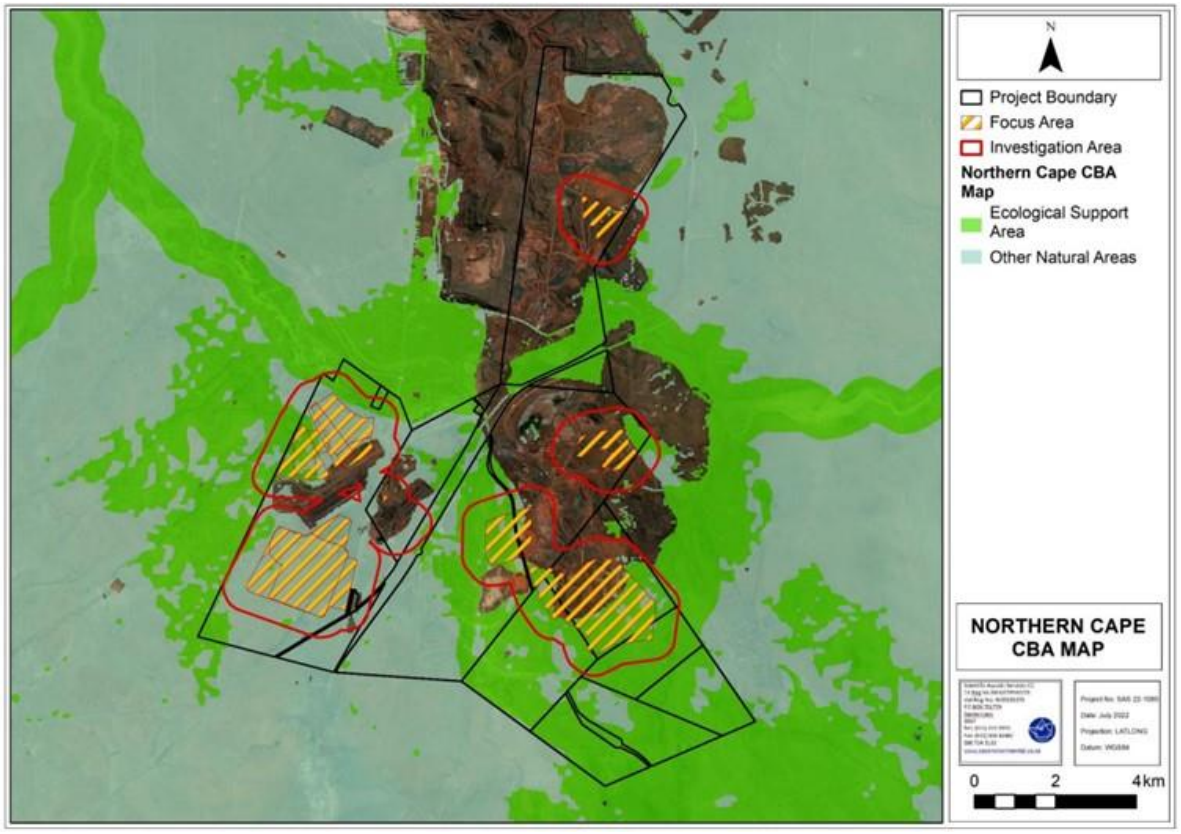


Figure 58: Ecological Support Areas and other important areas associated with the focus and investigation areas according to the Northern Cape Critical Biodiversity Area database (2016)

The focus area has an overall very high sensitivity for aquatic biodiversity, due to the presence of wetlands, as identified by the various datasets.

The following table presents a summary of the Ecological Status:

Table 32: Summary of the ecological status of the sub-quaternary catchment (SQ) reaches associated with the various assessment areas based on the DWS RQS PES/EIS database

	D41J-02554 (unnamed tributary)	D41J-02464 (Ga-Mogara)
Synopsis		
PES Category Median	-	Moderately Modified (Class C)
Mean EI class	Moderate	Moderate
Mean ES class	-	Very Low
Length	21.07	21.28
Stream order	1	3
Default EC[4]	-	C (Moderate)
PES Details		
Instream habitat continuity MOD	None	None
RIP/wetland zone continuity MOD	Moderate	Moderate
Potential instream habitat MOD activities	None	None
Riparian/wetland zone MOD	Moderate	Moderate
Potential flow MOD activities	None	Small
Potential physico-chemical MOD activities	None	Small
EI Details		
Fish spp/SQ	-	-
Fish average confidence	-	-
Fish representivity per secondary class	-	-
Fish rarity per secondary class	-	-
Invertebrate taxa/SQ	-	-
Invertebrate average confidence	-	-
Invertebrate representivity per secondary class	-	-
Invertebrate rarity per secondary class	-	-
EI importance: riparian-wetland-instream vertebrates (excluding fish) rating	Low	Low
Habitat diversity class	Low	Very Low
Habitat size (length) class	Very Low	Very Low
Instream migration link class	-	-
Riparian-wetland zone migration link	High	High
Riparian-wetland zone habitat integrity class	High	High
Instream habitat integrity class	-	-
Riparian-wetland natural vegetation rating based on percentage natural vegetation in 500m	Very High	Very High
Riparian-wetland natural vegetation rating based on expert rating	-	Very Low
ES Details		
Fish physical-chemical sensitivity description	-	-
Fish no-flow sensitivity	-	-
Invertebrates physical-chemical sensitivity description	-	-
Invertebrates velocity sensitivity	-	-
Riparian-wetland-instream vertebrates (excluding fish) intolerance water level/flow changes description	Very Low	Very Low
Stream size sensitivity to modified flow/water level changes description	-	Low
Riparian-wetland vegetation intolerance to water level changes description	-	Very Low

PES = Present Ecological State; confirmed in database that assessments were performed by expert assessors;
EI = Ecological Importance;
ES = Ecological Sensitivity.

The Freshwater Ecosystem has identified the following:

- The Gamagara River is adjacent to the northern portion of the investigation area (Project 6) (Figure 61);
- A tributary of the Gamagara River runs adjacent to the eastern portion of the investigation area (Project 1) – note this is an approved footprint and has a Section 21 (c) & (i) approval in terms of the WUL, 2008 and subsequent WUL, 2013 (Figure 59);

- Two Episodic Drainage Lines (EDLs) and associated riparian vegetation occur in the north-western portion of the investigation area. One of the EDLs and associated riparian vegetation also occurs within the focus area (Project 6) (Figure 61);
- A river diversion has taken place within the western portion of the investigation area (Project 1) – note this is an approved footprint and has a Section 21 (c) & (i) approval in terms of the WUL, 2008 and subsequent WUL, 2013 (Figure 59);
- A "cryptic" wetland occurs in the southern portion of the investigation area (Project 5) – note the purpose of this project is to reduce the footprint of the Discard Dump to avoid the destruction of this wetland. The new design ensures that the facility will remain at least 100m from the wetland. The Discard Low Grade Stockpile is downgradient of this wetland system (Figure 60); and
- A depression wetland occurs in the southern portion of the investigation area (Project 5) – note the purpose of this project is to reduce the footprint of the Discard Low Grade Stockpile to avoid the destruction of this wetland. The new design ensures that the facility will remain at least 100m from the wetland. The Discard Low Grade Stockpile is located down-gradient of this wetland system.

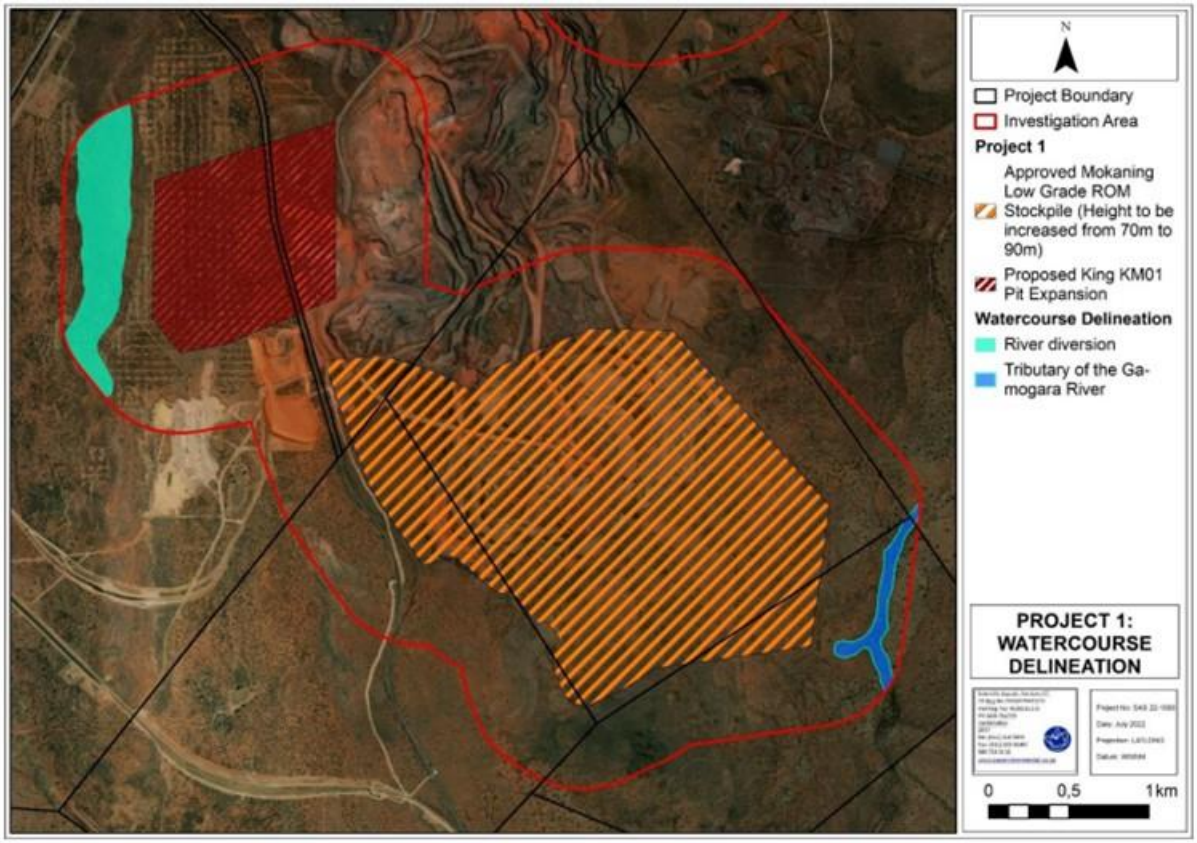


Figure 59: Watercourse delineations (desktop basis) associated with the proposed Project 1 components and 500m investigation area

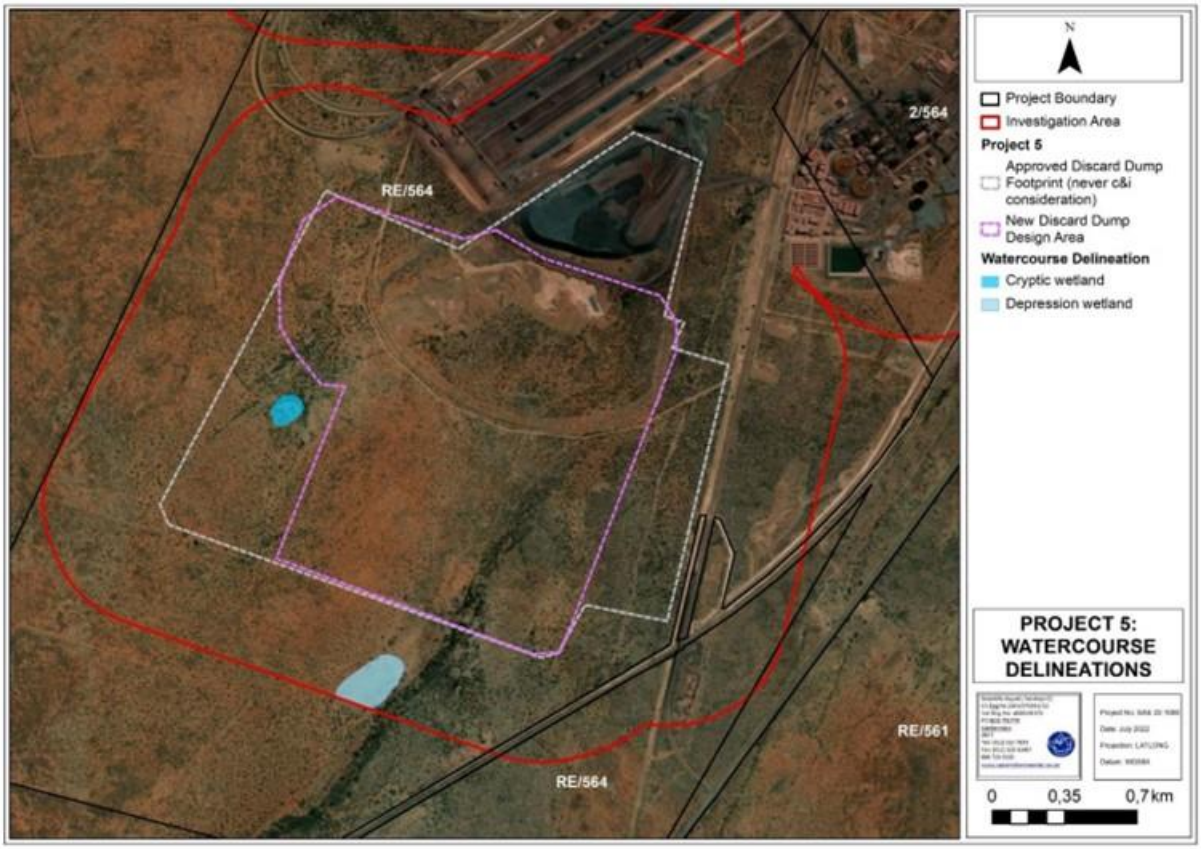


Figure 60: Watercourse delineations (desktop basis) associated with the proposed Project 5 components and 500m investigation area.

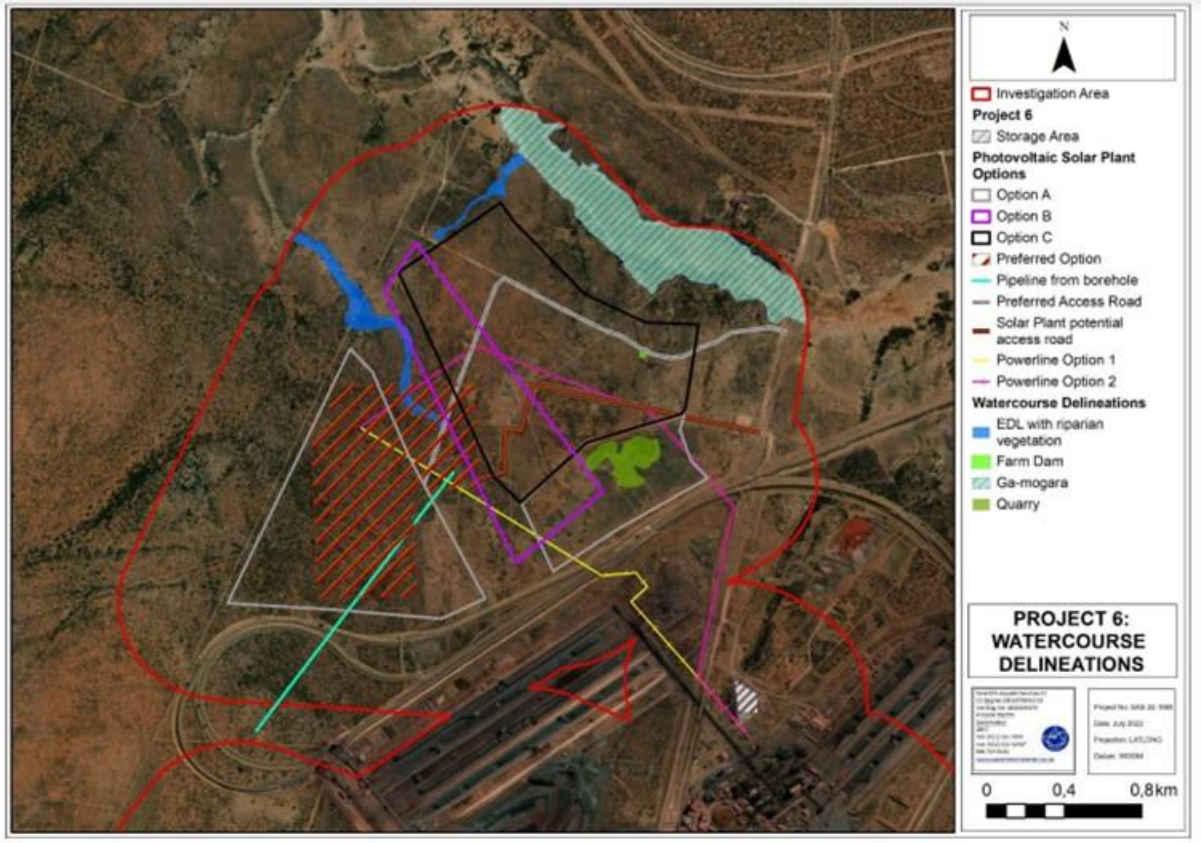


Figure 61: Watercourse delineations (desktop basis) associated with the proposed Project 6 components and 500m investigation area

1.f.vii.1.g Zones of Regulation – Aquatic Assessment

As part of the freshwater ecological scoping phase assessment, a preliminary sensitivity map was developed incorporating all relevant legislative requirements applicable to the watercourse desktop delineations associated with the focus and investigation areas.

A regulated zone is a legally stipulated area around the delineated watercourses that: a) may be considered a 'high sensitivity' area, as deemed necessary by the specialist; and/or b) would require authorisation by the relevant authorities for any activities (both construction and operation) within the identified zone.

In accordance with the NEMA and NWA, the fowling Zones of Regulation (ZoR) are applicable:

- a 32m ZoR in accordance with NEMA was applied to all watercourses,
- A 100m ZoR in accordance with GN509 and GN704 of the NWA was applied to the EDLs and associated riparian vegetation (in the absence of a defined 1 in 100-year floodline),
- A 1 in 100-year floodline in accordance with GN509 and GN704 of the NWA was made available by the EAP for the Gamagara River, tributary of the Gamagara River, and the river diversion; and
- A 500m ZoR in accordance with the GN509 of the NWA was applied to the depression and cryptic wetlands.

The respective ZoRs in terms of Regulations GN509 and GN704 as they both relate to the NEMA and NWA, are depicted in the figures below.

It is important to note that for Project 1, the ZoR are no longer relevant as the necessary WULs and Environmental Authorisations have been received during the initial authorisation of the mine – for this reason these are not included into the ESR.

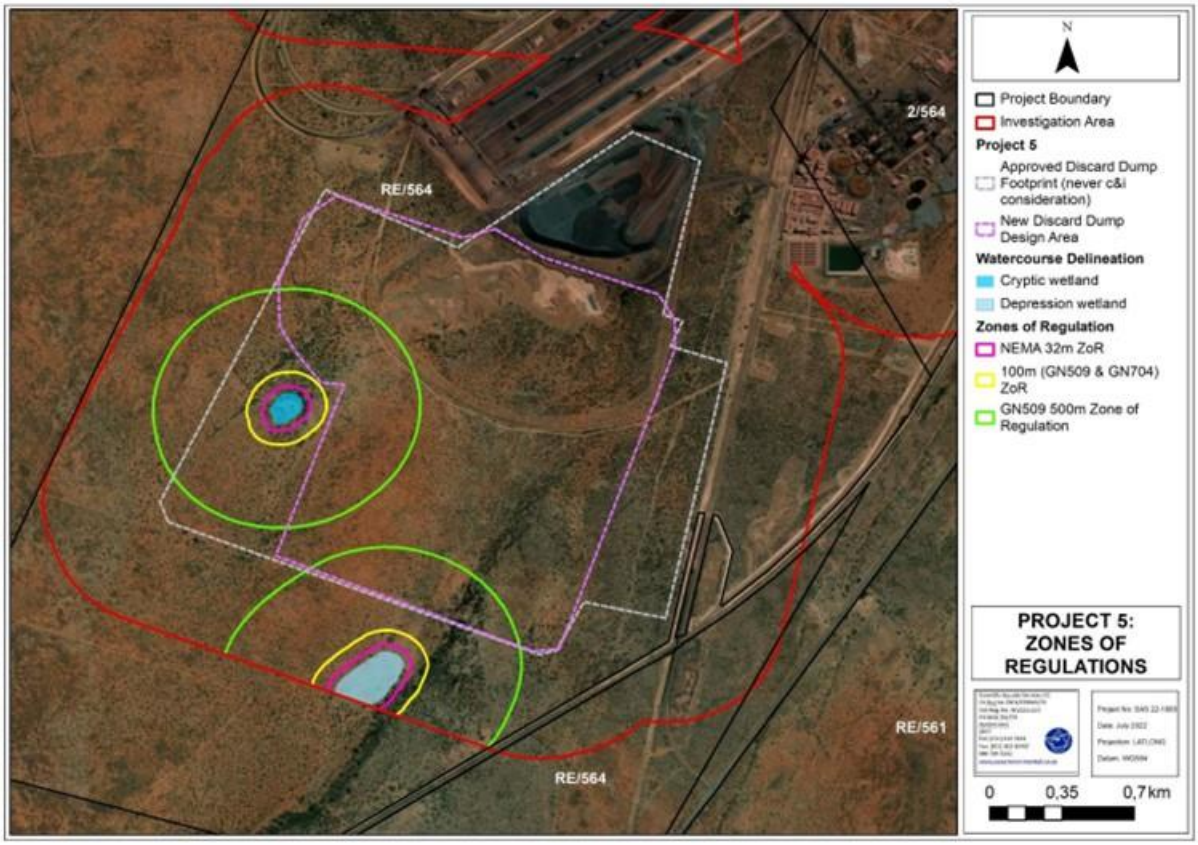


Figure 62: Conceptual illustration of the potentially applicable Zones of Regulation (ZoR) related to Project 5 according to the GN509, GN704 and the NEMA

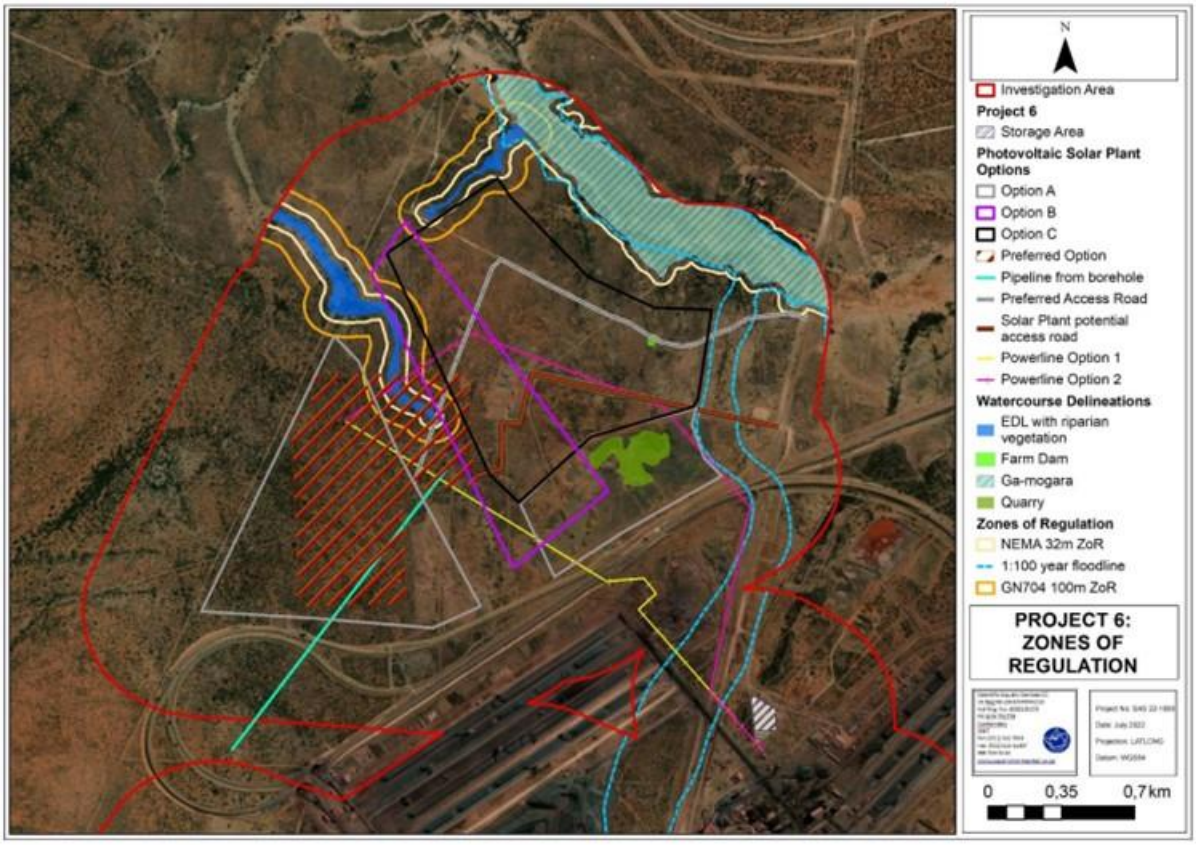


Figure 63: Conceptual illustration of the potentially applicable Zones of Regulation (ZoR) related to Project 5 according to the GN 509, GN 704 and the NEMA.

1.f.vii.1.h Hydrological Setting

HydroSpatial has been appointed to undertake the Visual Impact Assessment and the Hydrological Assessment (Appendix 12)

The mine is located in the Quaternary Catchment D41J.

All of the proposed projects/infrastructure drain towards the Gamagara River, barring the Bruce Block A & B Off-Grade ROM Stockpile, which drains in a north-easterly direction towards a low-lying area. The non-perennial channels draining the project area are generally shallow and poorly defined (please see figure below).

Figure 64: Typical non-perennial drainage channel found in the area at Khumani Mine

These drainage channels are ephemeral in nature, flowing briefly, only after high rainfall is received. The Gamagara River, which is the main river into which all the drainage channels in the area flow, rarely ever flows. As previously mentioned, Khumani is located in an endoreic catchment, with all rainfall lost to evapotranspiration and infiltration. Seasonal pans occur in the area and are present to the west, south and east of the Discard Low Grade Stockpile footprint.

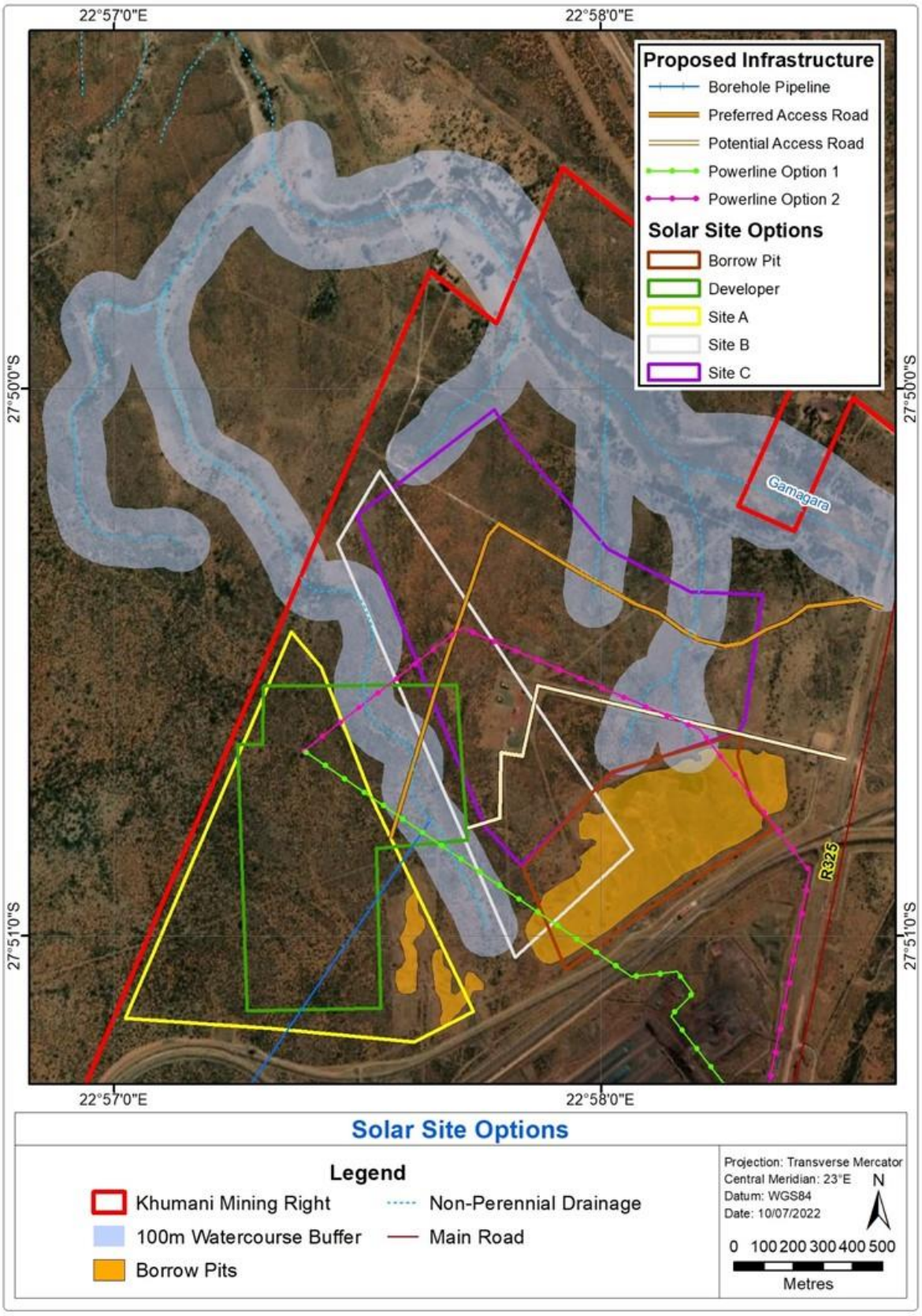


Figure 65: Watercourses in the vicinity of the PV Solar Plant (HydroSpatial, 2022)

1.f.vii.1.i Hydrogeological Setting

Golder and Associates have been appointed to conduct the hydrogeological assessment for this project. A Scoping Report was not compiled for the purposes of this ESR, however the information for the purposes of the ESR was sourced from the Draft Hydrogeological Scoping Report that the specialist conducted during January 2020 for the initial project development. This assessment did not include the PV Solar Plant.

Groundwater resources occur throughout the D41J catchment. Aquifer characteristic are highly variable in the study area due to the nature of the different rock formations and topographical effects. Intergranular, weathered and fractured BIF and dolomite aquifers are present in the various geological formations.

Six hydrogeological zones have been established by previous authors (Meyer 2009, Golder 2014; Ages 2012) has led to significant understanding of the groundwater condition proximal to the mine sites. These units are described as:

Zone 1: Kalahari sediments – The Kalahari sediments, in places, give rise to a primary porosity, unconfined aquifer. Where significant gravels are deposited and form the base of the succession, high yielding boreholes in the order of 5 l/s are encountered. The Kalahari aquifer are separated from the deep aquifer system, in some cases, by the deposition of clays and diamictite. However, in areas where deposition of diamictite and clay was not prevalent, the Kalahari sediment aquifer is in connection with deeper fractured aquifer.

Zone 2: Alluvial and sedimentary sand and clay lens deposits along the Gamagara River. The alluvial sediments have served as an important local aquifer for water users situated along the Gamagara River.

Zone 3: Deep hard rock formations such as the Andesitic Lava and Dwyka Diamictite are poor aquifers and are classed as aquitards. These units play an important role in controlling groundwater flow. As described above, the diamictite units result in limited connection between an upper aquifer and the deeper fractured aquifer in the northern portions of catchment. While the lava, which is present west of the Khumani and Sishen mines, has limited flow potential where solid and non-fractured.

Zone 4: Weathered and highly fractured hard rock formations such as the banded iron formations (BIF), chert breccia and the Karstic dolomite formations are highly permeable aquifers. While the hydraulic conductivity of these units is variable, transmissivities exceeding 1000 m2 /d have been obtained. The fractured BIF strata of the Asbestos hill formation which flanks the eastern extent of the catchment are regarded as a major recharge zone to the remainder of the catchment.

Zone 5: Intrusive dolerite or diabase dykes of both a north-south and east-west strike cross-cut the compartment. The dykes have been found to be of low permeability and compartmentalize the dolomitic aquifers in the central portion of the domain.

Zone 6: Major Fault zones. The north-south trending fault zones throughout the catchment acts as a preferential flow paths for groundwater flow and interlinks the dolomite aquifer which is compartmentalized by dolerite/diabase dykes.

Aquifer Parameter

Aquifer parameters are derived from previous work by van Tonder (1993) and are presented in the table below. While the presented values correspond with Sishen mine, the similarity in geology at Khumani Mine allows for estimated parameters at Sishen to be relevant to the Khumani area.

Table 33: Aquifer parameters from previous works

Aquifer Reference	Transmissivity (m2/d)	Storativity (%)	Author & Date
Ghaap Plateau Dolomite			Smit, Water Balance,1970
Sishen Mine		1.1 – 1.4	Dziembowski – 1978
Sishen Mine		1.07	Gilding – 1979
Sishen Mine	100 – 3000	1.0	Lynch – 1982
Sishen Mine	350 – 614	0.39 – 0.73 0.6	Van Tonder, Dynamic Flow – 1993 Van Tonder, Equal Volume Method

Golder (2008, 2011 and 2016) undertook 31 aquifer tests in boreholes proximal to the Sishen and Khumani mine areas. Seven additional tests were undertaken by SRK and GPT. The major lithology intersected in each of the

tested boreholes was identified and is used to evaluate the variations in transmissivity based on lithology, which is presented in the figure below:

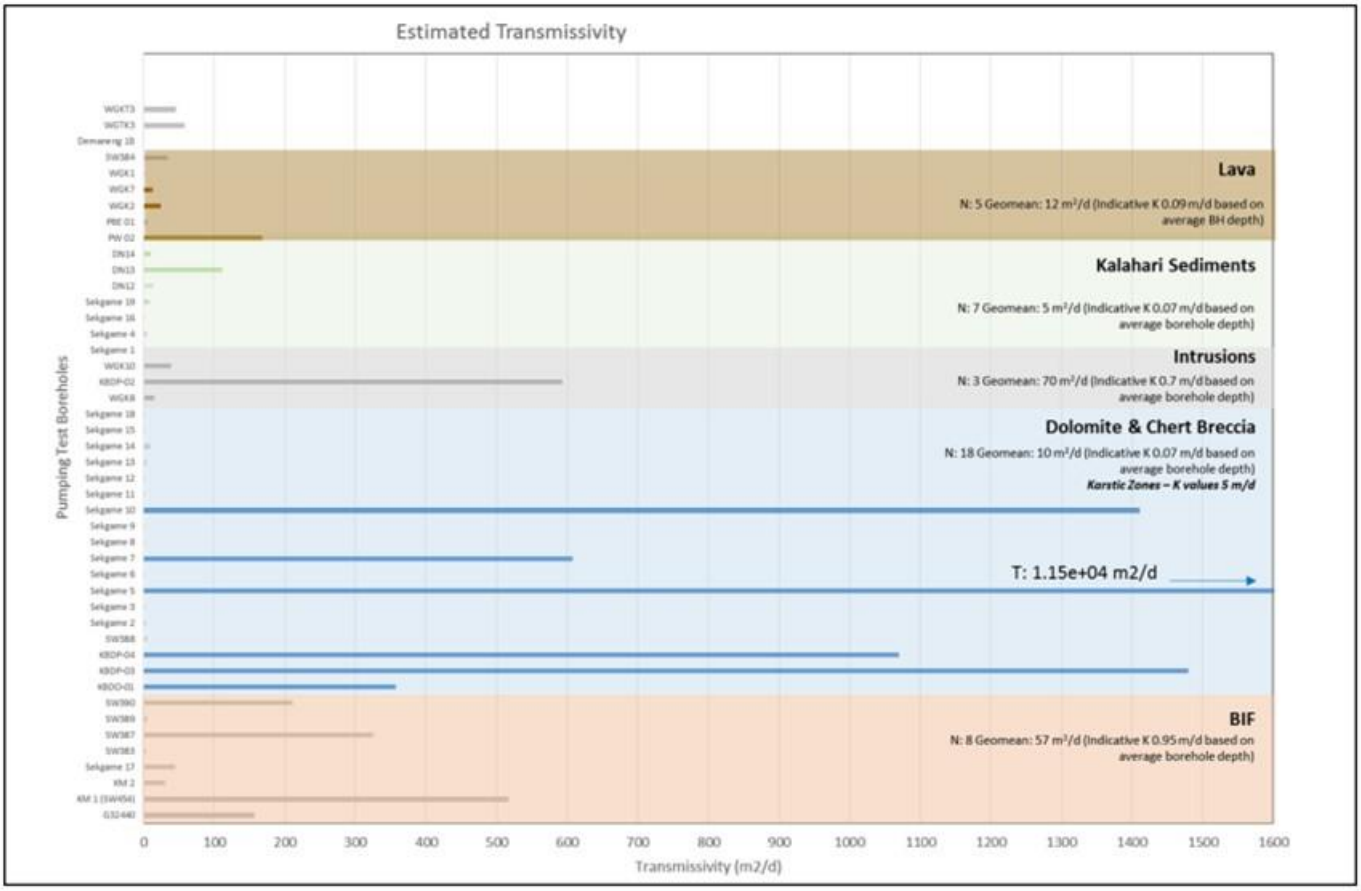


Figure 66: Estimated Aquifer Properties

- Lava. Five boreholes intersected the Ongeluk Lava which outcrop west of the Khumani mine. Transmissivity values range between 1.4 and 168m^2 /d. The maximum transmissivity value corresponds with a borehole known to intersect a major fracture. The estimated hydraulic conductivity for the lava units are estimated to be in the order of 0.02m/d – 0.09m/d.
- Dolomites. The boreholes drilled east of the mines intersecting the dolomites are typically of low transmissivity (less than 2m^2/d). However, within the mine area a high transmissivity zone within the dolomites is evident based on testing conducted. In these zones' transmissivity values exceed 500m^2/d and hydraulic conductivity exceeds 1m/d. The area is folded and faulted and consequently it is assumed that the vertical hydraulic conductivity is equal in amplitude the estimated horizontal hydraulic conductivity.
- The Kalahari sediments have variable transmissivity values ranging between 0.1 and 111m^2/d. It is estimated that a representative hydraulic conductivity value is in the order of 0.07 m/d. Due to the clay horizons present within the sediments the vertical hydraulic conductivity is assumed to be an order of magnitude smaller than the horizontal estimates.
- The boreholes intersecting the banded iron formation strata, typically have moderate to high transmissivity values and the estimated representative hydraulic conductivity is in the order of 0.95 m/d. Previous investigations in the study area yielded storage values ranging between 1.4 - 0.7%. The dolomite and BIF formations were assumed to be in the order of 0.6%.

Sources and Sinks

The sources and sinks refer to the contribution of groundwater to the aquifers within the groundwater catchment considered and the sinks refer to the outflows from the aquifers. The primary source of groundwater is via vertical recharge associated with rainfall. While, the major sinks within the catchment include the contribution of baseflow to the Gamagara river system and abstraction for water supply and mine dewatering proximal to Sishen Mine.

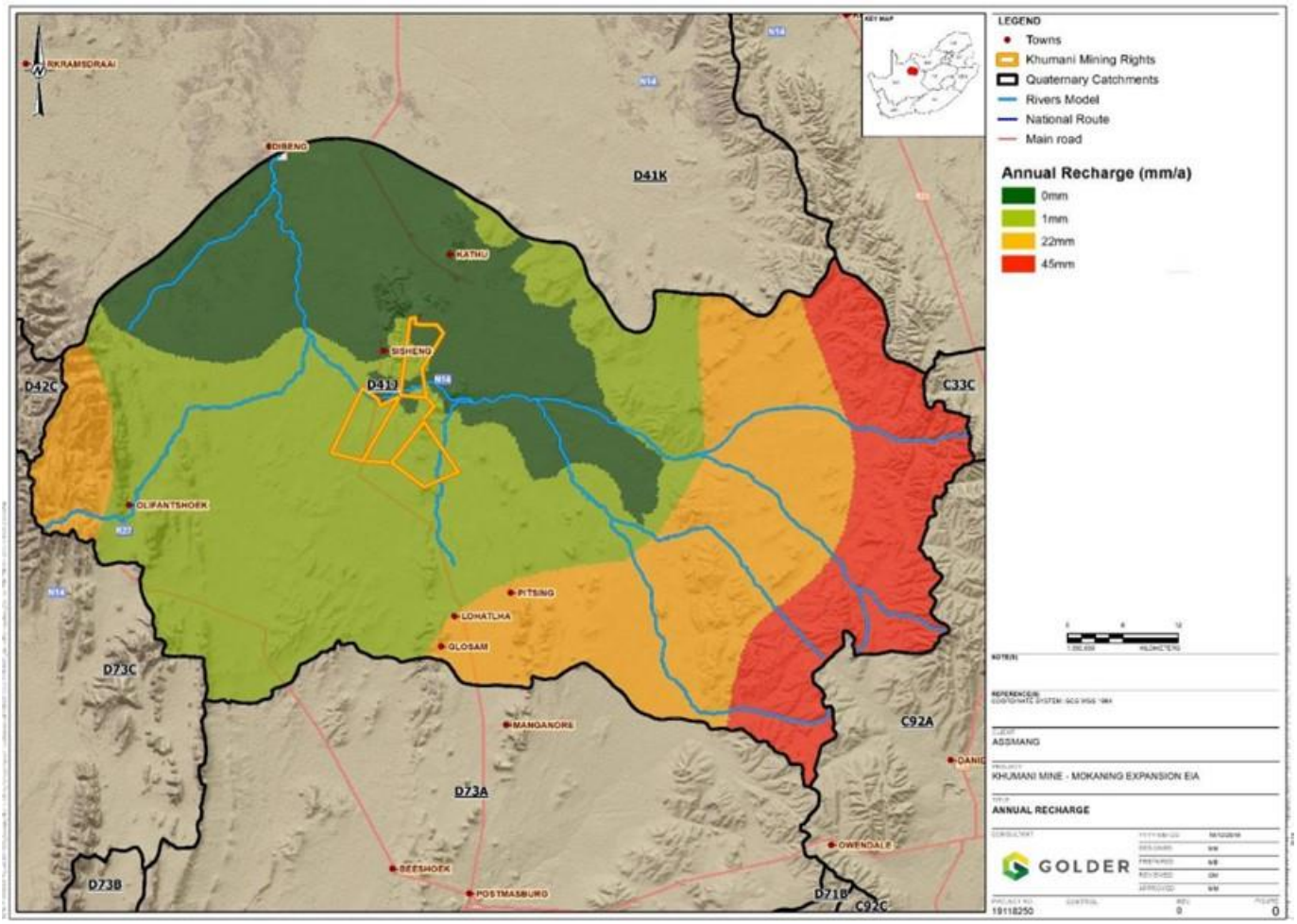


Figure 67: Recharge distribution in quaternary catchment D41J

Recharge

Utilising mean annual precipitation and groundwater chloride values; recharge estimates were made at subgroundwater management unit scale. The eastern groundwater units comprising the Kuruman hills displayed estimated recharge values in the order of 30 to 45mm/a. The Korannaberg Hills and the catchment areas east of the mines were estimated to have recharge in the order of 22mm/a (refer to the figure above). In the lowland areas (proximal to the mines) recharge was estimated to be 1mm/a owing to the presence of the Kalahari sediments.

Groundwater Abstraction

Abstraction for mine dewatering purposes was initiated in the 1970s at the Sishen Mine (north and west of Khumani). The average pumping rate between 1976 and December 2016 is approximately 400 l/s. Abstraction has not gradually increased over time, rather the dewatering requirement has remained within the same magnitude over the past 40 years, with the exception of the period between 2000 and 2004 where abstraction rates were reduced to below 315 l/s. Due to the presence of the dolerite/diabase dykes dewatering is compartmentalised.

Currently Khumani Mine does not intersect the water table at its various operations and as such does not require any dewatering. In addition, to date, all water supplied to the mine is via the Sedibeng network and hence groundwater has not to date been relied upon. The previous modelling has forecast dewatering will be required to begin from 2034 at Khumani Bruce Opencast Pit and 2024 in King Opencast Pit.

Groundwater Levels

Understanding the extent of dewatering in the Sishen and Khumani Mine compartments has been an on-going point of investigation since the early 2000s. Golder initiated this work in 2003 and undertook several phases to understand the control of the dykes and the extent of dewatering.

The groundwater piezometric surface is illustrated in the following figure and conceptually represents the elevation of the historic and 2014 groundwater table in metres above mean sea level (mamsl) in the D41J QC. The demarcated Groundwater Management Units (GMUs) of the study area are shown as well. The piezometric surface contours are shown in 10 m intervals.

The piezometric map displays the following aspects of the water table elevation in the study area:

- Based on the colour coding used to display the surface, a gradual decline occurs from the eastern highlands (i.e. the Kuruman Hills) towards the west which indicates this area as the main recharge area in the study area.
- The piezometric surface decreases form ~1 500 mamsl in the Kuruman Hills towards the northwest (Dibeng) and southwest (Matsap) with elevations at ~1 000 mamsl.
- The magnitude of boundary effects cause by the dolerite dykes systems and subsequently forming individual dolomite compartments in the study area were used to delineate groundwater management units in the study area.
- The piezometric surface in the Sishen and Khumani Mine areas is impacted by high groundwater abstractions in the D41J-G6 GMU.

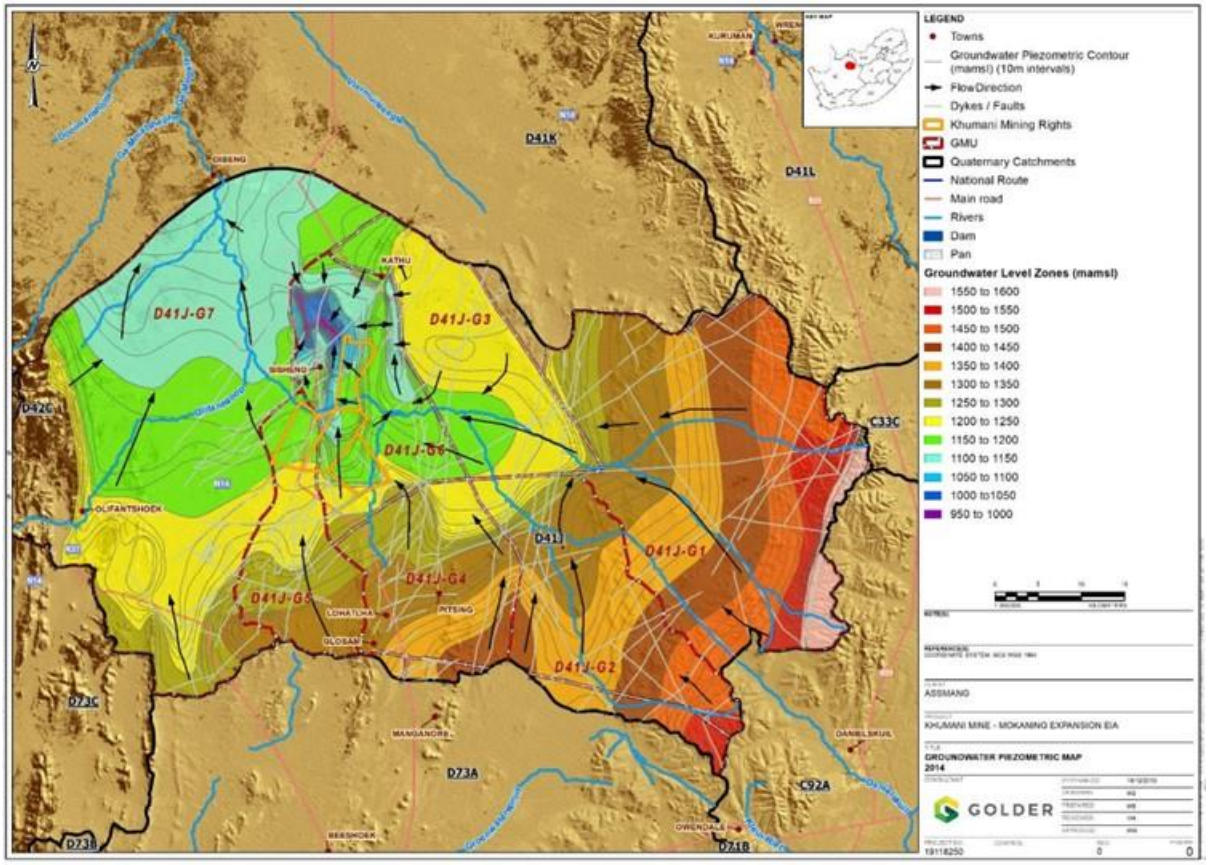


Figure 68: Groundwater piezometric surface – 2014

The water level drawdown distributions and the interpreted impact area is indicated in the following figure. Based on the comparisons in hydraulic head between the 2014 water level data and the Smit (1972) piezometric data, it is inferred that the Sishen mine impact area expands toward the Gamagara River. Hence, compared with the cone delineated by Meyer (2009) there is inferred additional drawdown to the west. The extent of drawdown in the north, south and east is comparable to that interpreted by Meyer (2009).

When considering the figure below, all Projects, with the exception of Projects 5 and 6 are located within the impacted area.

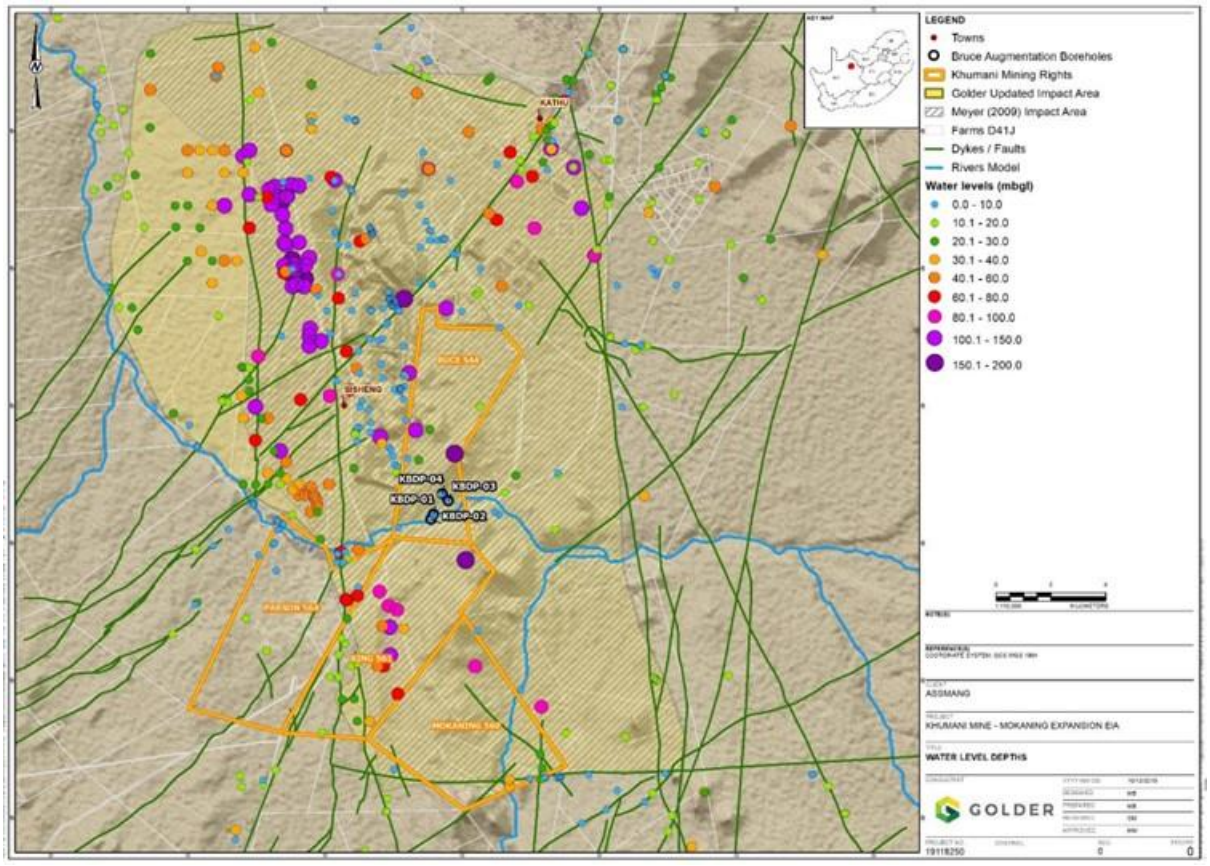


Figure 69: Water level (mbgl) distribution

1.f.vii.1.j Visual Character

The Visual Assessment for the ESR has been undertaken by HydroSpatial (Appendix 13).

The general topography of the region can be described as flat. Steep slopes in excess of 30% slope occur along the sides of some of the mine dumps and opencast pits in the area. A north- south aligned ridge runs through the middle of the Mokaning farm, and is the prominent topographical feature in the study area along with the Khumani and Sishen Mine dumps. The King/Mokaning Low Grade ROM Stockpile is approximately 70m high, at a height of 1,305 metres above mean sea level (mamsl), and is located within a saddle of this ridge (refer to the following photos). The ridge reaches a maximum height of approximately 1,340 mamsl to the east of the KM01 Opencast Pit.

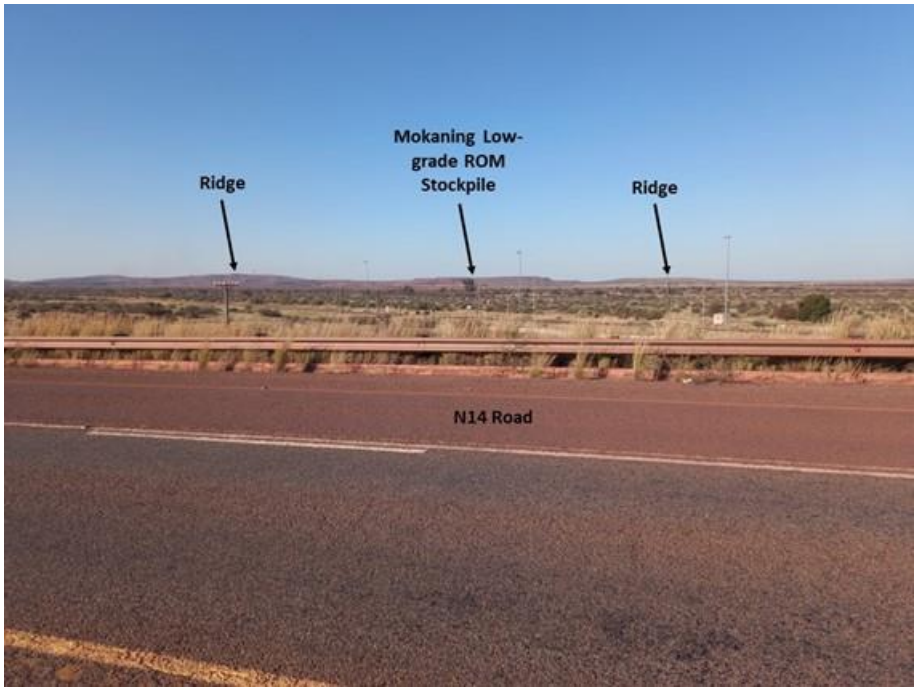


Figure 70: View of the King/Mokaning Low-grade ROM Stockpile from the N14 road looking in a north-easterly direction

The topography of the PV Solar Plant site options is mostly flat, with gradual northerly orientated shallow valleys occurring along the non-perennial drainage lines. A gentle dip in the topography occurs in a northerly direction towards the Gamagara River, with the elevation varying from 1,200 mamsl in the southern extent of the PV Solar Plant Site Option A, to 1,180 mamsl in the north along the banks of the Gamagara River. The topography has been altered at the Borrow Pit north of the railway line, due to material that has been removed for construction purposes. The borrow pit has an approximate depth of 4m and is currently filled with water.

Figure 71: View from the Preferred Access Road looking in a westerly direction over the proposed Solar Site Option C and B

The Bruce Block A & B Off-grade ROM Stockpile is proposed to be located in a shallow valley that dips gradually in a north-easterly direction (see the figure below). Elevation at the proposed site varies from 1,260 mamsl along the side of a ridge in the south, to 1,220 mamsl in the northeast.

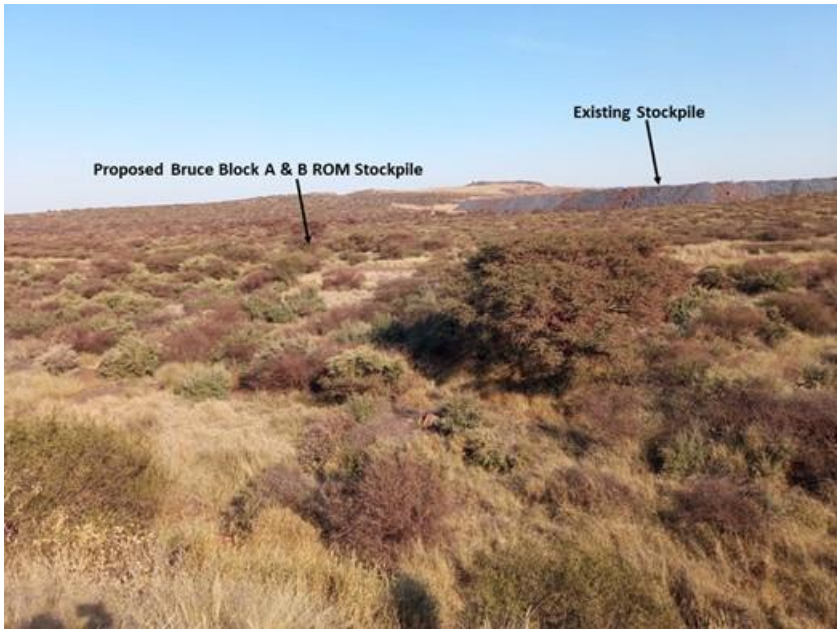


Figure 72: View of the proposed Bruce Block A & B ROM Stockpile looking in a southerly direction

The landscape of the region can be broadly divided into three main categories:

- Natural areas – consisting of undisturbed bushveld, shrubland and grassland vegetation. These areas are mostly used for livestock and game farming;
- Mining areas – consisting of disturbed areas in the form of mine dumps, bare areas, open pits and mine infrastructure; and
- Residential areas – Kathu and its immediate surrounding area in the far north of the study area.

Sense of place is the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. According to Lynch (1992), sense of place is "the extent to which a person can recognise or recall a place as being distinct from other places – as having a vivid, unique, or at least particular, character of its own".

Mining activities, primarily from two large iron ore mines in the study area, namely, Sishen and Khumani Mine, largely characterise the landscape. Their large mine dumps have been constructed in a region that has flat topography, surrounded by short vegetation. Mining dominates the landscape in the centre, northern and far southern sections of the study area (Figure 88 and Figure 89), and the sense of place has been altered from an open bushveld type of landscape to one associated with mining.

Natural areas, which occur at the Bredenkamp and Brooks Nature Reserves, as well as to the south and east of the study area, still evoke a tranquil open bushveld sense of place.

The town of Kathu in the far north of the study area, is largely dependent on mining activities in the surrounding area.

The following visual receptors have been identified within the study area and are indicated on the figure overleaf**Error! Reference source not found.**:

- Farmhouses/dwellings;
- Motorists travelling on roads within the study area;
- Visitors to the Bredenkamp and Brooks Nature Reserves; and
- Residents in the southern suburbs of Kathu.

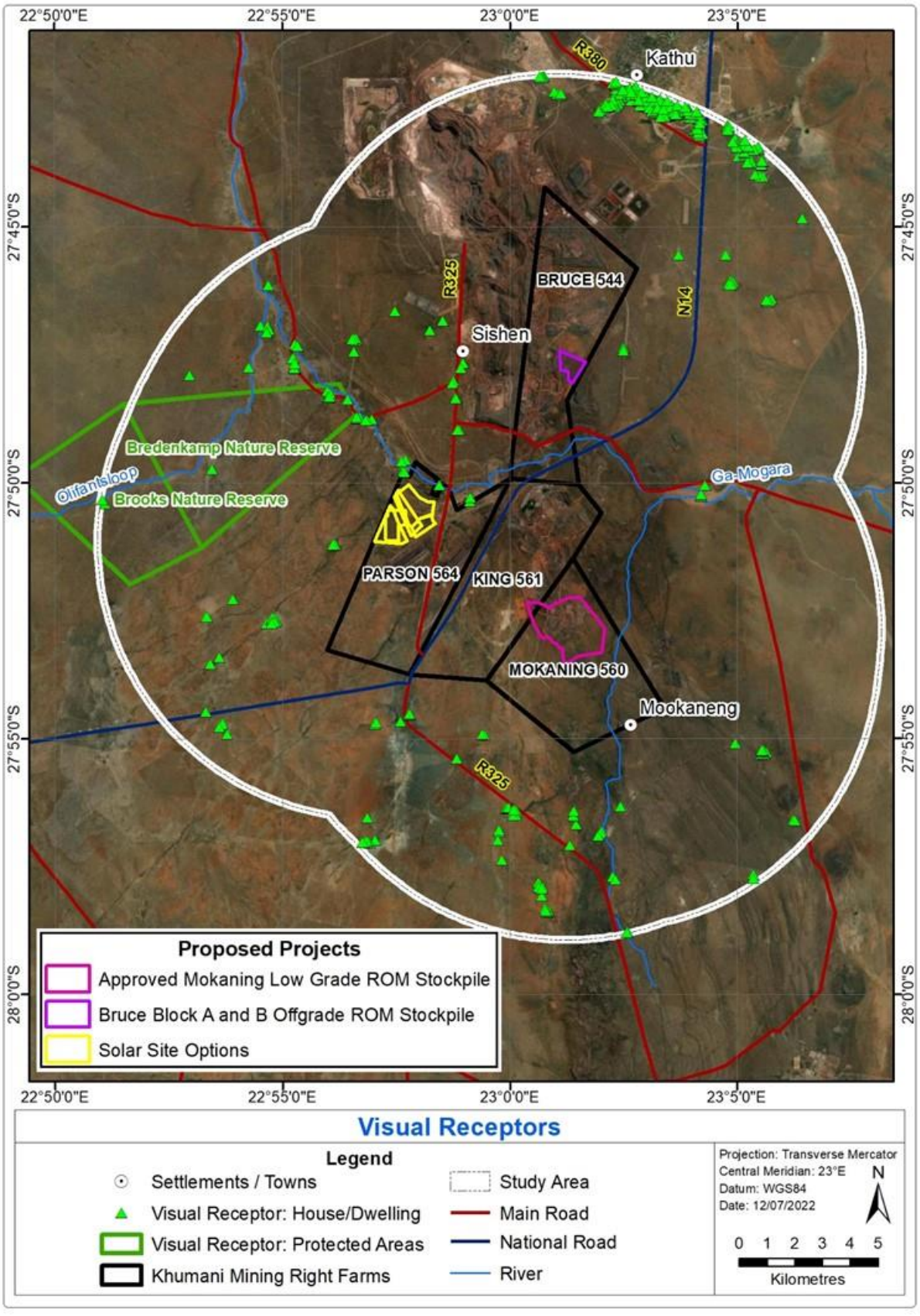


Figure 73: Visual receptors

The heights of the proposed infrastructure are provided in the following table**Error! Reference source not found.**. The degree of visibility of the proposed projects will be assessed in detail during the EIA phase of the project through viewshed modelling. Viewshed modelling was however undertaken as part of the PV Solar Plant site selection process as previously discussed.

Table 34: Heights of proposed infrastructure

Proposed Infrastructure	Description	Current Height (m)	Proposed Height (m)
Mokaning Low-grade ROM Stockpile height increase	No footprint expansion planned. Height to be increased from 70 m to 90 m	70	90
Bruce Block A and B Off-grade ROM Stockpile	Footprint of approximately 55 ha. Height unknown at this stage	-	-
Solar Project	Solar panels	-	2.2
	Lighting	-	8
	Power lines	-	30

1.f.vii.1.k Air Quality

WSP Environmental (Pty) Ltd was appointed to undertake the Air Quality Impact Assessment (Appendix 8).

The Khumani Dust Fallout (DFO) monitoring network comprises eleven non-directional and four multi-directional monitoring units across the four farm sections. SANS does not make provision for the assessment of multi-directional Dust Fallout units, and therefore only non-directional monitoring units (refer to the following figure) are considered further in this assessment. Result available at the time of the ESR were only up until 2019. More recent information will be utilised in the EIA studies.

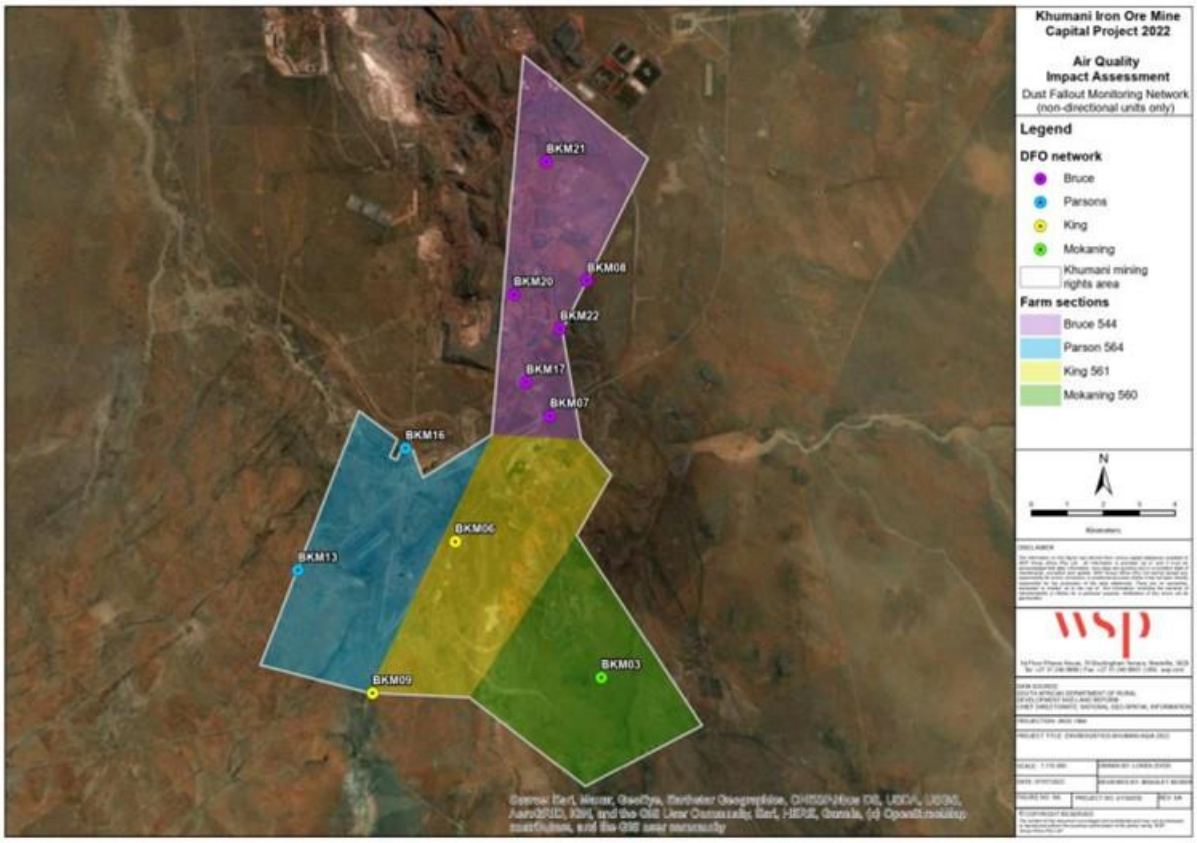


Figure 74: Dust Fallout monitoring network (WSP, 2022)

Key findings are as follows:

- BKM17 (located at the Bruce Crusher) exceeds the NEMAQA National Dust Control Regulations (NDCR) standard for non-residential areas in seven sequential months (December 2018 – June 2019) and is thus not compliant with the NDCR.
- All remaining sites show compliance with NDCR standards for non-residential areas:
- DFO rates measured at BKM21 exceed the NDCR standards for non-residential areas in June 2019 and September 2019. Two, non-sequential exceedances per site within a 12-month period are permitted and thus BKM21 remains compliant with the NCDR.

Khumani operate three PM10 monitoring stations. Data was provided as monthly average concentrations for the period January 2009 – December 2019.

Measured PM10 concentrations across all stations exceed the annual PM10 National Ambient Air Quality Standards (NAAQS) (40 µg/m^3) for 2013 – 2019. The annual average recorded by the Khumani station for 2009 also exceeds the annual NAAQS.

Figure 75: PM10 monitoring stations (WSP, 2022)

The key receptors identified during the ESR study includes the following:

Table 35: Discrete sensitive receptors for the assessment (WSP, 2022)

ID	Receptor name	Receptor type	Latitude (°S)	Longitude (°E)
1	Residence 1	Residential	-27.881243°	22.957539°
2	Residence 2	Residential	-27.891502°	22.999774°
3	Residence 3	Residential	-27.853509°	22.935322°
4	Residence 4	Residential	-27.813072°	22.947342°
5	Residence 5	Residential	-27.816328°	22.981109°
6	Pako Seboko Clinic	Medical	-27.699467°	23.010009°
7	Kathu Primary	School	-27.703691°	23.045757°
8	Residence 6	Residential	-27.770608°	23.079503°
9	Residence 7	Residential	-27.837676°	23.069848°
10	Residence 8	Residential	-27.908919°	22.963421°
11	Residence 9	Residential	-27.839445°	22.985348°

Figure 76: Discrete sensitive receptors for assessment (WSP, 2022)

1.f.vii.1.l Noise and Vibration

The Noise and Vibration ESR was undertaken by dBAcoustics (Appendix 14).

The environmental noise and vibration study area will include the abutting noise receptors, boundaries of the study area and any other areas which may be influenced by the proposed mining activities. The location of the farm houses are illustrated in the figure overleaf.

There are other mining activities in the vicinity of the proposed project area. The existing noise levels of Khumani Mine, noise from the abutting mining areas, train noise and traffic noise will contribute to the prevailing ambient noise levels of the study area.

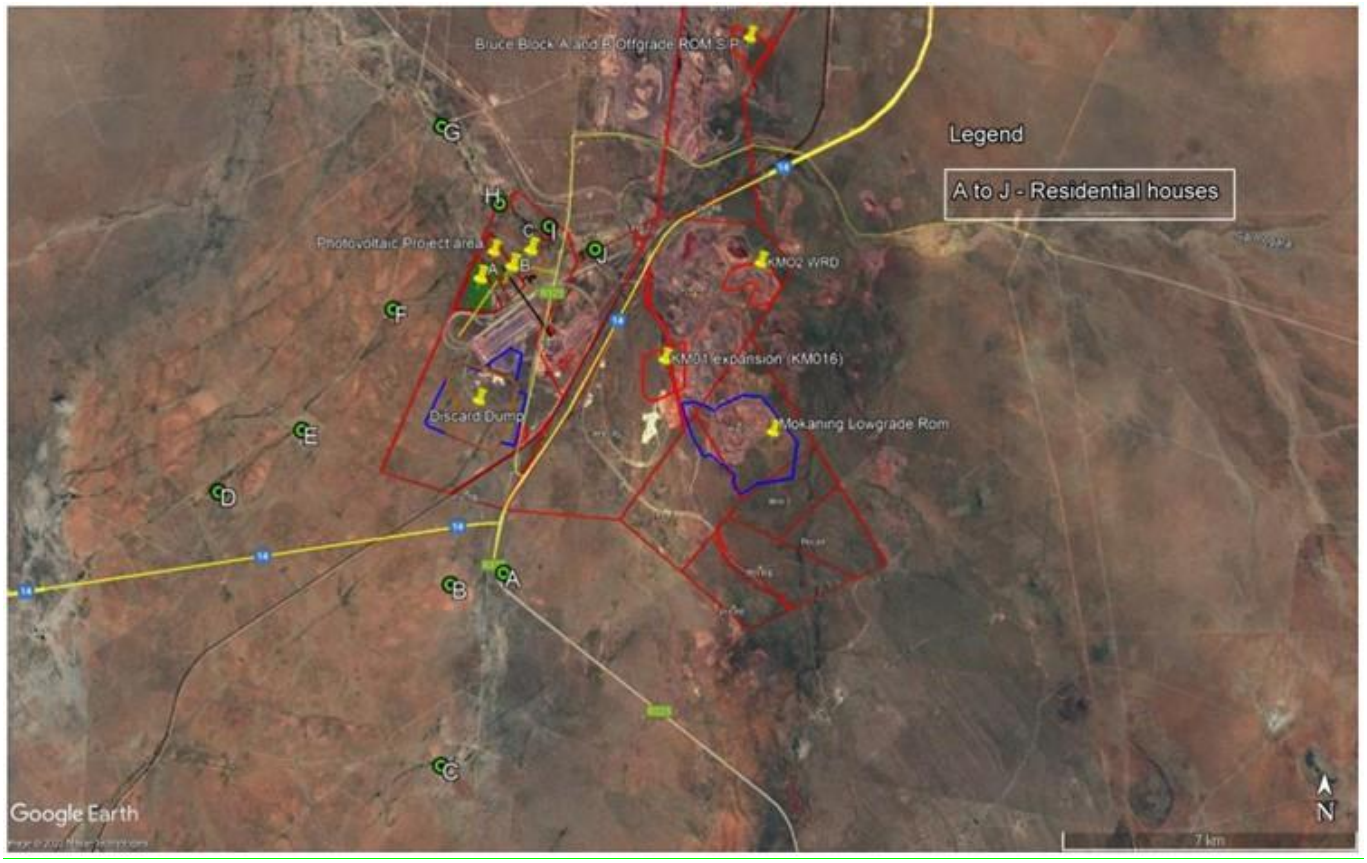


Figure 77: Residential houses in the vicinity of the proposed mining activities

1.f.vii.1.m Cultural and Heritage Setting

The Heritage and Paleontological Study was undertaken by Beyond Heritage (Appendix 15).

1.f.vii.1.m.1 Literature Review

A brief survey of available literature was conducted to extract data and information on the area in question to provide general heritage context into which the development would be set. This literature search included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS).

Table 36: Studies consulted for this report.

Author	Year	Project	Findings
Van der Walt, J.	2019	Heritage Impact Assessment for the proposed Khumani Iron Ore Mine New Water Return Dam (WRD), pipelines and water containment facility, Sishen, Northern Cape	No sites of significance were identified. Stone Age occurrences were recorded.
Van der Walt, J.	2017	Heritage Impact Assessment Khumani Mine	No sites of significance were identified but Stone Age occurrences were recorded.
Kruger, N.	2015	Sishen Iron Ore Company (SIOC): Proposed Lyleveld North Waste Rock Dump Expansion and Lyleveld South Haul Road Extension Project, Sishen Mine, Northern Cape Province	2 Stone Age occurrences and 1 site attributed to mechanical weathering.
Morris, D.	2005	Archaeological Impact assessment of mining areas on the farms Bruce, King, Mokaning and Parson between Postmasburg and Kathu in the Northern Cape.	4 Cemeteries and Stone Age sites were identified.
Beaumont, P.	2005	Heritage Assessment for an EMPR amendment relating to a proposed crusher at Sishen Iron Ore Mine near Kathu in the Northern Cape province.	No sites were identified.

1.f.vii.1.m.2 Archaeological Background to the study area.

A brief summary of archaeological and historical events in South Africa is included in the following abstract and the background to the study area is discussed below.

South Africa: A short chronology

Early Stone Age: 2 million - 250 000 BP. Hominins producing core and pebble tools, later stages includes handaxes and blades.

Middle Stone Age: 250 000 - 40 000 / 25 000 BP. *Homo Sapiens*. Prepared core techniques, formal tools, points, scrapers and backed artefacts. Occasionally includes bone points and ostrich eggshell fragments and grindstones.

Later Stone Age: 40 000 - 100 BP. Wide range of formal microlithic tools. Ostrich eggshell fragments, beads, rock art.

Ceramic Final Later Stone Age: 2000 BP. Wide range of formal microlithic tools, with thin-walled pottery, with some sites having faunal remains of ovicaprids.

Early Iron Age: 200 - 900 CE. Arrival of Bantu-speaking farmers who lived in sedentary settlements often located next to rivers. They kept livestock, cultivated sorghum, beans and cowpeas. Introduced metallurgy to the region and manufactured thick-walled pottery.

Middle Iron Age: 900 - 1300 CE. Confined to the modern-day Limpopo Province, and associated with early state formation, such as Mapungubwe and associated sites.

Late Iron Age: 1300 - 1840 CE. Marks the arrival of ancestral Eastern Bantu-speaking Nguni and Sotho-Tswana communities. Settlements are often located on or near hilltops for defensive purposes. The Iron Age as an archaeological period ends with the Mfecane, 1820s to 1840s CE. An event that caused major socio-political upheavel.

Historic events

1652: Dutch East India Company establishes refreshment station at modern-day Cape Town.

1658: First slave ships arrive at Table Bay.

1660 - 1793: Various armed conflicts between Khoisan and Europeans, several frontier wars between Europeans, Khoisan and Xhosa communities.

1795 - 1807: First British occupation of the Cape, the Dutch East India Company collapses, and slave trade is abolished.

1808 - 1820: Several frontier wars and first British Settlers arrive.

1820 - 1840: Onset of the Mfecane, abolishment of slavery and slaves are freed at the Cape. Dutch farmers started to migrate towards the interior of South Africa, what will become known as the 'Great Trek'.

1860 - 1880: Discovery of mineral wealth, diamons and gold. Establishment of the Zuid-Afrikaansche Republiek (ZAR).

1899 - 1902: The South African War.

1910 - 1945: Unifaction of South Africa, formation of the ANC, World War I and World War II.

BP - Before Present
CE - Common Era

The archaeological record for the greater study area consists of the Stone Age and Iron Age.

1.f.vii.1.m.3 Stone Age

South Africa has a long and complex Stone Age sequence of more than 2 million years. The broad sequence includes the Later Stone Age, the Middle Stone Age and the Earlier Stone Age. Each of these phases contains sub-phases or industrial complexes, and within these we can expect regional variation regarding characteristics and time ranges. For Cultural Resources Management (CRM) purposes it is often only expected/ possible to identify the presence of the three main phases. Yet sometimes the recognition of cultural groups, affinities or trends in technology and/or subsistence practices, as represented by the sub-phases or industrial complexes, is achievable (Lombard 2011). The three main phases can be divided as follows;

- Later Stone Age; associated with Khoi and San societies and their immediate predecessors. Recently to ~30 thousand years ago.
- Middle Stone Age; associated with Homo sapiens and archaic modern humans. 30-300 thousand years ago.
  Earlier Stone Age; associated with early Homo groups such as Homo habilis and Homo erectus. 400 000 - > 2 million years ago.

The larger study area has a wealth of pre-colonial archaeological sites (Morris & Beaumont 2004). Famous sites in the region include the world renowned Wonderwerk Cave to the north of the study area. Closer to Kuruman two shelters on the northern and southern faces of GaMohaan (in the Kuruman Hills northwest of the town)

contain Later Stone Age remains and rock paintings. Rock art is known to occur at Danielskuil to the northeast and on Carter Block (Morris 2008). Middle Stone Age material is on record around the study area.

Archaeological surveys have shown rocky outcrops and hills, drainage lines, riverbanks and confluences to be prime localities for archaeological finds and specifically Stone Age sites, as these areas were utilized for settlement of base camps close to water and hunting ranges.

According to Morris (2005) in the immediate area to the north of the study area, the Earlier Stone Age is represented by eleven (11) known sites (Bruce, Kathu, Uitkoms, Sishen, Demaneng, Lylyveld and Mashwening); the Middle Stone Age by five (5) sites (all in the vicinity of Kathu); and the Later Stone Age by ten (10) sites (one [1] on King, one [1] at Mashwening and eight [8] at Kathu) Rock engravings have been identified from Sishen and Bruce (the Bruce site was salvaged and recorded by Fock & Fock 1984), as well as Beeshoek to the south (Fock & Fock 1984; Morris 1992; Beaumont 1998). Specularite sources are known on Demaneng and Lylyveld, and were mined in Stone Age times at a site on Doornfontein to the south (Beaumont 1973; Beaumont & Boshier 1974) and at Tsantsabane to the east of Postmasburg (Beaumont 1973; Thackeray et al. 1983): numerous other specularite workings have also been recorded (Beaumont 1973). Stone Age artefacts are often recorded at industrial sites similar to the Khumani Mine operations and the effects of heavy-duty earth moving machinery on the formation of lithic debitáge at open-air Stone Age/Palaeolithic sites was examined by Bradfield and Van der Walt (2018) at a site close to Kathu. The experiment with heavy-duty machinery produced only one pseudo-formal tool, most of the debitáge produced mimics that occasioned by knapping and this could attribute to some of the debitage/ artefacts identified on industrial sites.

1.f.vii.1.m.4 Iron Age

Iron Age expansion southwards past Kuruman into the Ghaap plato and towards Postmasburg dates to the 1600's (Humphreys, 1976 and Thackeray, 1983). Definite dates for Tswana presence in the Postmasburg area are around 1805 when Lichtenstein visited the area and noted the mining activities of the Tswana (probably the Thlaping) tribes in the area. The Thlaro and Thlaping settled the area from Campbell in the east to Postmasburg and towards the Langeberg close to Olifantshoek in the north west before 1770 (Snyman, 1988). The Korana expansion after 1770 started to drive the Thlaro and Thlaping further north towards Kuruman (Shillington, 1985); Morris (2005) indicated that 3 Iron Age sites close to the study area are on record (Demaneng, Lylyveld and Kathu).

1.f.vii.1.m.5 Anglo-Boer War

There are no battlefields or concentration camp sites close to the study area.

1.f.vii.1.m.6 Genealogical Society and Google Earth Monuments

No graves are indicated for the proposed development area.

1.f.vii.1.m.7 Heritage Resources

In line with the results from Morris (2005) that also assessed the study area, heritage finds are limited to Stone Age (mostly Middle Stone Age with some Later Stone Age elements) find spots that can be attributed to background scatter as defined by Orton (2016). These findspots are of no significance and will not require further mitigation and are not discussed further here. The Stone Age artefacts date to the Middle Stone Age and Later Stone Age and are made from fine grained material like chert and cryptocrystalline silica (CCS) and is exposed on rocky outcrops and cleared areas. No formal tools that can be attributed to an industry level were noted and artefacts consist of flakes without retouch, Middle Stone Age blades and radial cores. One Middle Stone Age side scraper were noted. Two (2) areas within PV Solar Plant site options B and C with slightly higher artefact concentrations occur at K7 and K9 and might warrant further mitigation if impacted on.

Other sites of significance that were recorded consist of the known cemetery (K12) previously recorded by Morris (2005) as well as a structure (K5) and stone cairn (K11). These features, if impacted on, will require mitigation as a second phase of study. Recorded heritage features were labelled numerically with the prefix K for Khumani and are briefly discussed below. Site locations are included in the table below and selected artefacts are illustrated in Figure 78 and Figure 79.

Table 37: Recorded observations in the study area.

Label	Longitude	Latitude	Description	Significance
K 1	22° 59' 51.8605" E	27° 51' 47.4264" S	Flake on CCS	Low Significance GP C
K 2	22° 59' 57.8867" E	27° 52' 00.9731" S	Blade LSA on black CCS	Low Significance GP C
K 3	22° 58' 07.2371" E	27° 51' 52.8011" S	Isolated MSA artefacts	Low Significance GP C
K 4	22° 57' 21.1824" E	27° 52' 01.6861" S	LSA CCS blade and hornfel MSA flake	Low Significance GP C
K 5	22° 57' 16.0777" E	27° 52' 38.3304" S	Ruin	Low Significance GP C
K 6	22° 57' 48.0960" E	27° 50' 45.3120" S	Isolated flake on quartzite	Low Significance GP C
K 7	22° 57' 38.3869" E	27° 50' 50.0353" S	Flakes on calcrete next to stream	Low Significance GP C
K 8	22° 57' 59.9148" E	27° 50' 27.5351" S	MSA side scraper	Low Significance GP C
K 9	22° 57' 45.3419" E	27° 50' 15.9217" S	Ridge with flakes on gravel	Low Significance GP C
K 10	22° 57' 39.1319" E	27° 50' 15.7847" S	Flake	Low Significance GP C
K 11	22° 57' 48.5999" E	27° 50' 18.0490" S	Stone Cairn measuring approximately 1x1m. Probably related to explorations activities	Low Significance GP C
K 12	22° 58' 16.2011" E	27° 50' 28.6800" S	Cemetery with stone packed grave dressings.	High social significance GP A

General site conditions are shown in Figure 80.

1.f.vii.1.m.8 . Cultural Landscape

Khumani was constructed from October 2006 (http://www.assmang.co.za/content), prior to this the area was undeveloped and characterised by sparse vegetation. The surrounding area is characterised by intensive mining activities. The pre-colonial landscape consists of widespread Stone Age occupation.

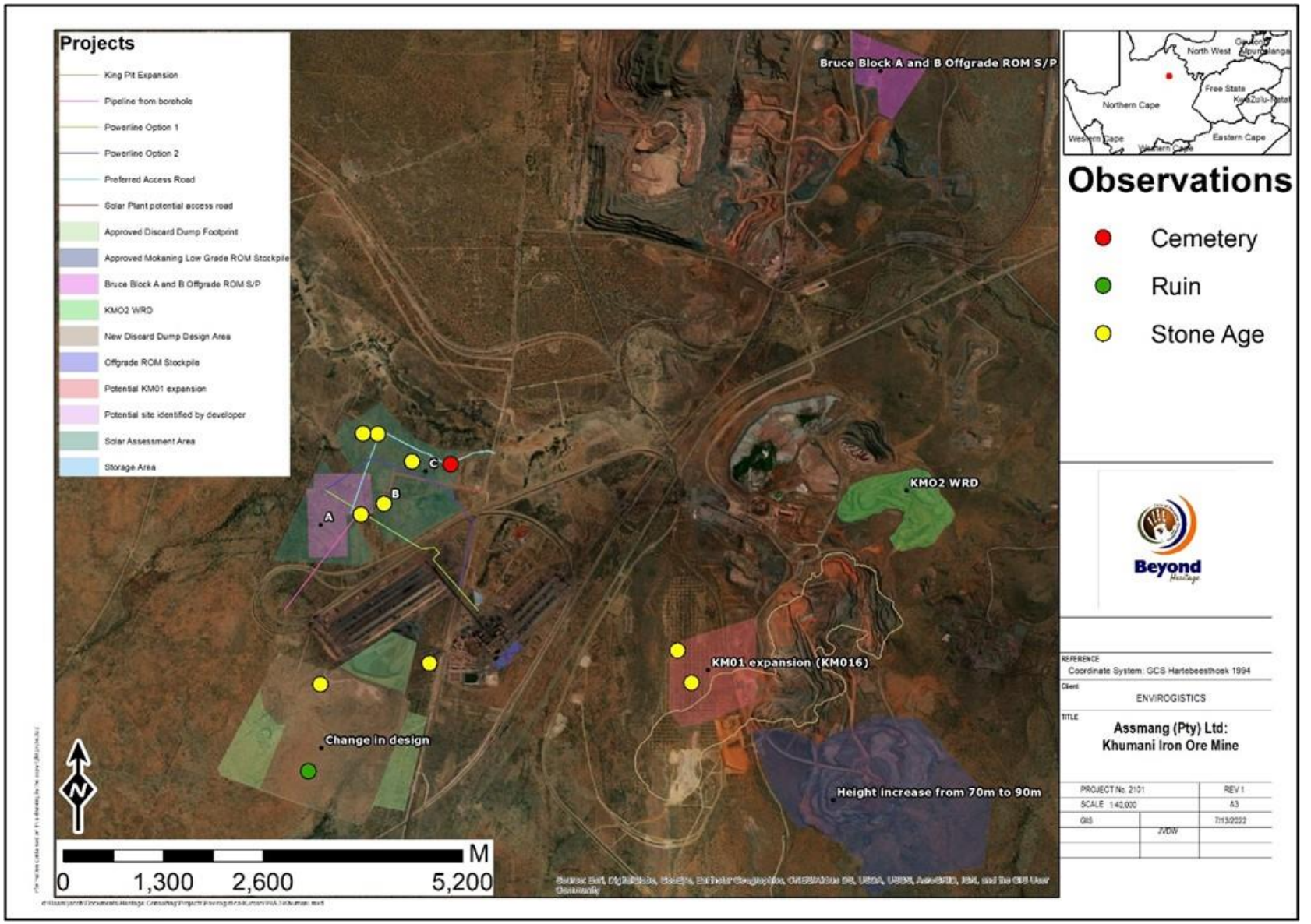


Figure 78: Recorded features in relation to the proposed Projects.

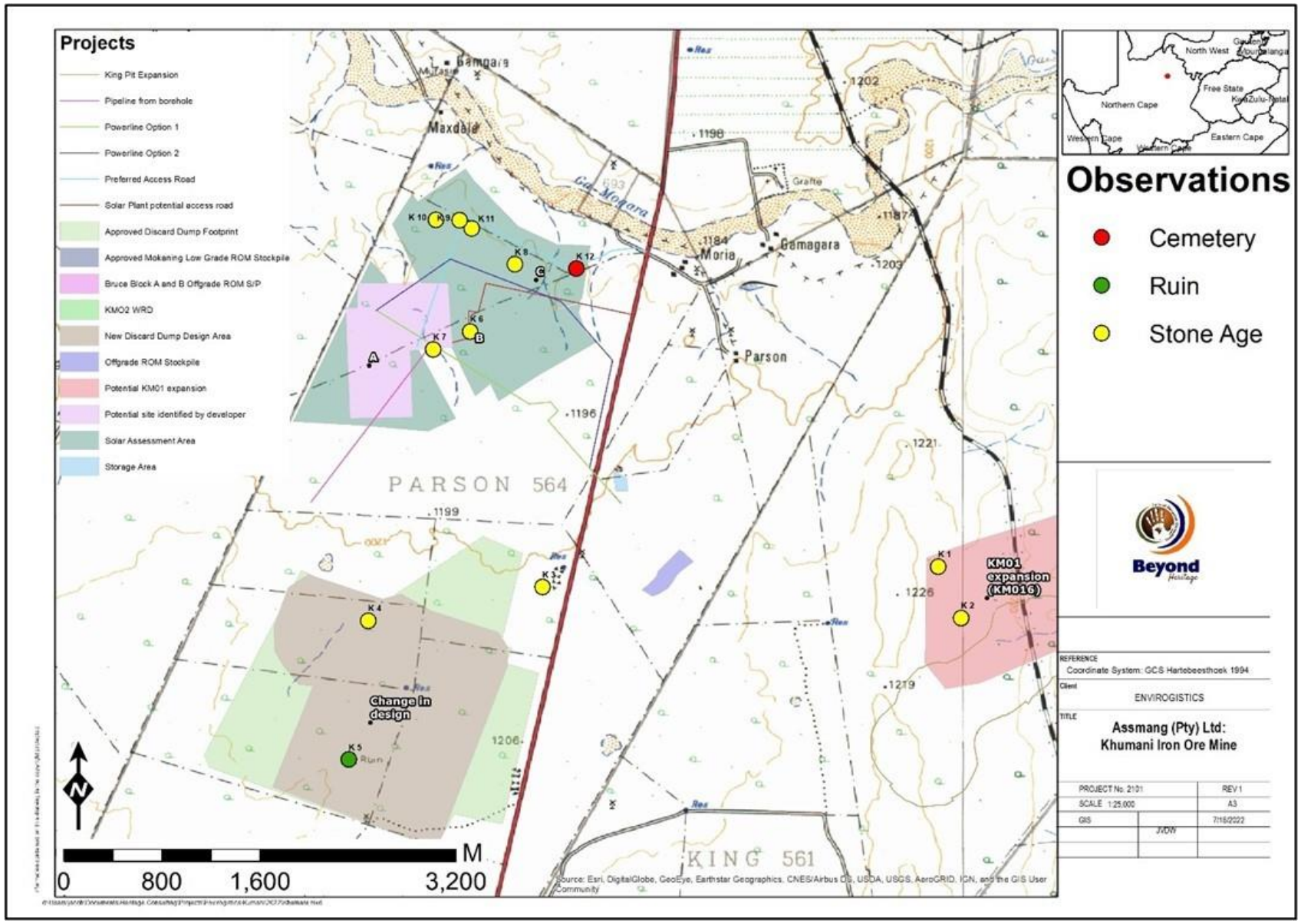


Figure 79: Numbered observation points in relation to the proposed projects


MSA side scraper on the left with a miscellaneous flake on the right typical of the lithic assemblage of the area.

Ruin at K5.

Alternative view of the ruin at K5.

Stone cairn at K11.

General site conditions at the cemetery at K12.

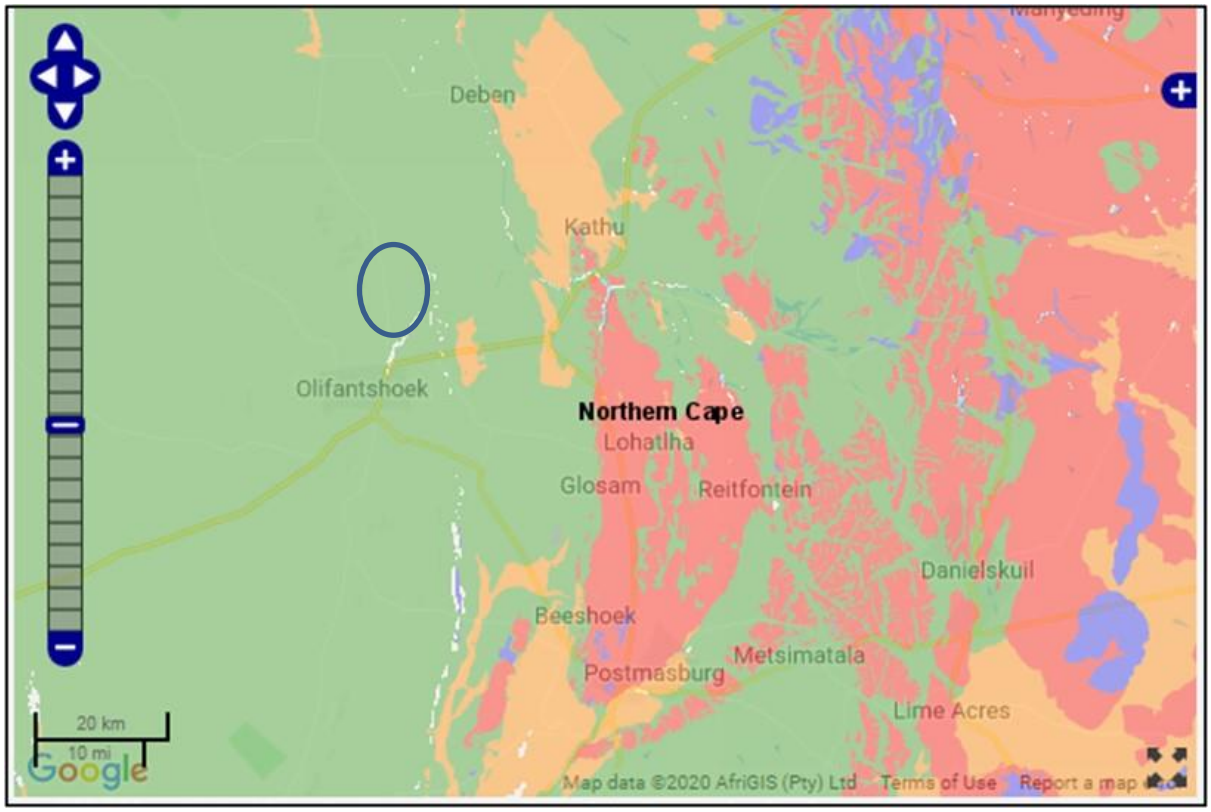
Grave dressing in the cemetery at K12.

Grave dressing at K12.

Figure 80: Site Observation Photos

1.f.vii.1.m.9 Paleontological Resources

The study area ranges from moderate to very high palaeontological sensitivity (refer to figure below) and further studies will be required in the EIA phase.



Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study; a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 81: Palaeontological sensitivity map of the study area (blue polygon).

1.f.vii.1.m.10 Outcomes

The ruin in the Discard Low Grade Stockpile area could be older than 60 years and if this is the case the feature is protected by legislation based on its age and will require a destruction permit. No other preconstruction heritage mitigation is required at the other capital projects.

No fatal flaws were recorded, and the impact of the propoed Capital Projects can be mitigated to an acceptable level. To comply with the National Heritage Resources Act (Act 25 of 1999) (NHRA) the next phase of study is the

Phase 1 Heritage Impact Assessment for the Project. During the Heritage Impact Assessment (HIA) the potential impact on heritage resources will be determined as well as levels of significance of recorded heritage resources. The HIA will also provide management and mitigation measures should any significant sites be impacted upon, ensuring that all the requirements of the SAHRA are met.

1.f.vii.1.n Socio-Economic Setting

The mine and study are falls within two Local and two District Municipalities. The farms Parson, Bruce and King are situated within the Gamagara Local Municipality (NC01B1), which forms part of the John Taolo Gaetsewe District Municipality (formerly known as the Kgalagadi District Municipality), while the farm Mokaning is situated within the Tsantsabane Local Municipality (NC085), which forms part of the ZF Mgcawu District Municipality (formerly known as the Siyanda District Municipality).

Table 38: District and Local Municipalities of the study area

Area	District Municipality	Local Municipality
Farm Parson 541	John Taolo Gaetsewe District Municipality	Gamagara Local Municipality
Farm Bruce 544		
Farm King 561		
Farm Mokaning 560	ZF Mgcawu District Municipality	Tsantsabane Local Municipality

Below is a description of these different authorities.

1.f.vii.1.n.1 John Taolo Gaetsewe District Municipality (Projects 1a, 2, 3, 4, 5, 6)

In 2006 the boundaries of the John Taolo Gaetsewe District Municipality (JTGDM) were demarcated to include the once north-western part of Joe Morolong and Olifantshoek, along with its surrounds. It was thus formerly known as the Kgalagadi District Municipality which comprised the three local municipalities of Gamagara, Ga-Segonyana and Joe Morolong (previously Moshaweng). There are approximately 186 towns and settlements within the district. The majority (80%) of these are villages or rural settlements (www.localgovernment.co.za).

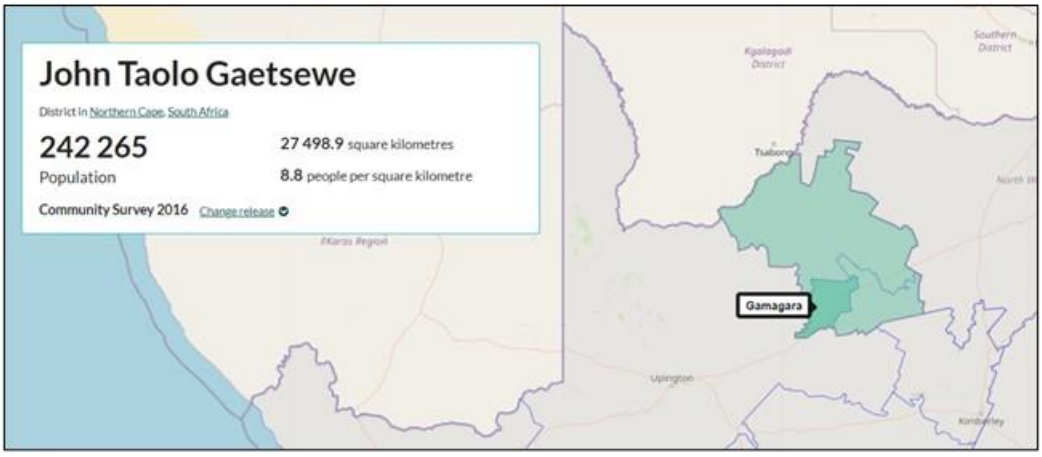


Figure 82: John Taolo Gaetsewe District Municipality and Gamagara Local Municipal area

(Source: www.wazimap.co.za)

The district is characterised by a mixture of land uses, but agriculture (cattle, sheep, goat and game farming) and mining are dominant. A decline in mining related employment however was experienced with the closure of many asbestos mines during the 1980s. Today, minerals being mined include manganese ore, iron ore and tiger's eye. The Sishen iron-ore mine is one of the largest open-cast mines in the world and the iron-ore railway from Sishen to Saldanha is one of the longest iron-ore carriers in the world.

Key characteristics of the socio-economic environment of the district are summarised below (JTGDM IDP, 2022):

- Approximately 40.8% of the people of the district's population have no recordable income. This is extremely high and put extreme pressure on the Municipalities operating in the district. Communities cannot pay for basic services and that place severe pressure on municipal resources;

- The educational levels among the population of the district are relatively low. 10.3% of the population has no formal education, while only 26.7% has completed high school. Only a small percentage of the population has some tertiary education;
- The housing need in the district area remains high. The apparent growth in the percentage of informal settlements from 7.6% to 8.4% of the population is especially concerning.
- The growth in access to electricity as a primary source of energy in the district has been remarkable; A total of 91 618 (40.8%) people of the district's population have no recordable income. This is extremely high and puts extreme pressure on the Municipalities operating in the district. The result of such high level of unemployment is that communities cannot pay for basic services and that severe pressure is placed on municipal resources due to demands for services to a poverty-stricken population;
- The huge discrepancies between income levels in the district are a matter of concern;
- Unemployment is a serious problem in the district area. 8.24% of the total population and 26% of the economically active people are unemployed. The situation is especially problematic in the area of the Joe Morolong Local Municipality;
- The area's job opportunities are provided by three primary economic sectors, which are agriculture, mining and retail; and
- The district furthermore holds some potential as a viable tourist destination and has numerous growth opportunities in the industrial sector.

The main towns within the municipality include Kuruman, Kathu, Deben, Dingleton, Olifantshoek, Vanzylsrus, Bothitong, Churchill, Manyeding, Laxey, Batlharos, Mothibistat, Hotazel and Heuningvlei.

Gamagara Local Municipality

The Gamagara Local Municipal area include the towns of Kathu, Shesheng, Dibeng, Dingleton, and Olifantshoek, a large farming area and a considerable mining area.

Figure 83: Gamagara Local Municipality

Wards 5 and 6 of the Gamagara Local Municipality falls within the study area. The following figure indicates the Gamagara Local Municipal area, highlighting Ward 5 with Ward 6 directly to the east of Ward 5. Ward 5 includes Sesheng and Mapoteng, and Ward 6 includes a section of the town of Kathu, Siyathemba, Rooisand and Smartietown. Sesheng was originally developed to the west of Kathu as a high density residential area for mine workers. The larger residential area of Sesheng is now located nearer to Kathu in the form of single residential houses (Ext. 5) (GLM IDP, 2021).

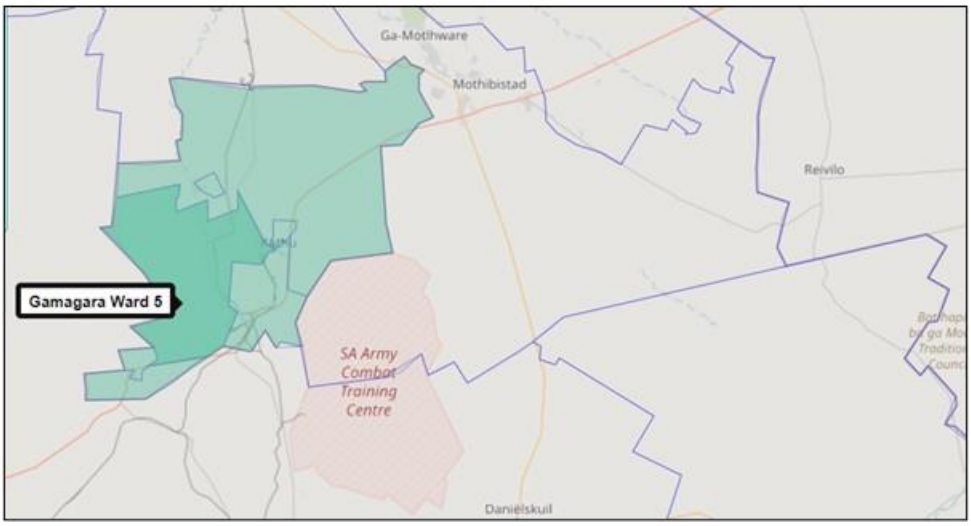


Figure 84: Wards 5 and 6: Gamagara Local Municipality

(Source: www.wazimap.co.za)

With the growth in mining activities, the town of Kathu and adjacent towns have seen a growth in the need for accommodation, mainly during 2015. Due to the high demand then, the rental prices increased significantly, resulting in unaffordability which again led to the mushrooming of illegal second dwellings (log homes in Kathu) and backyard shanties in the townships.

The above-mentioned scenario has led to a huge strain on the available infrastructure especially with regards to water and electricity supply, as well as waste removal. The housing situation have now again normalised and there is a sufficient supply of accommodation facilities.

The municipality's local economy is highly dependent on mining and thus requires diversification to ensure a more stable economy. In this regard, planning has started for various other types of developments within the larger area e.g. a proposed textile manufacturing factory, Kathu Supplier Park, general waste recycling and furniture making factory and so forth. A brick-making factory has been established in Kathu as a joint venture between Khumani and the municipal Social Economic Development (SED) projects. Engagements with different stakeholders have also been initiated for a skills development programme to align the local skills with the employment requirements in the area (GLM IDP, 2021).

1.f.vii.1.n.2 ZF Mgcawu District Municipality (Project 1b)

The ZF Mgcawu District Municipality was formerly known as the Siyanda District Municipality. It lies within the mid-northern section of the Northern Cape Province and covers an area of 102 524 km^2 (ZF Mgcawu District Municipality IDP, 2019).

Figure 85: ZF Mgcawu District Municipality and Tsantsabane Local Municipality area

(Source: www.wazimap.co.za)

The main towns that are scattered through the area are Beeshoek, Brandboom, Danielskuil, Eksteenskuil, Groblershoop, Kakamas, Keimoes, Kenhardt, Lime Acres, Mier, Postmasburg, Rietfontein, and Upington. The

latter serves as the district municipal capital where the municipal government is located (ZF Mgcawu District Municipality IDP, 2019).

Key characteristics of the socio-economic environment of the district are summarised below (ZF Mgcawu District Municipality IDP, 2022):

- In 2015, the ZF Mgcawu District Municipality was the second largest contributor to the Northern Cape economy, contributing 21% of total provincial output;
- In 2016, the main economic sectors were mining (16%), agriculture (15%) and wholesale and retail (15%);
- Agriculture, as well as government and community services are the biggest contributors to employment in the district and was estimated at a 28% contribution;
- The population of the ZF Mgcawu District Municipality has low levels of education, and thus not properly equipped with the required skills to serve the needs of industry;
- The municipality is characterised by high poverty levels; and
- There is inadequate infrastructural services provision in terms of electricity, potable water, sewage, waste management, roads and housing (ZF Mgcawu District Municipality IDP: 2022).

The district therefore has to create sustainable local economic development programmes conducive to rural communities and to support and guide the development of a diversified and sustainable district economy. Support of infrastructure development projects will further allow for the improvement of municipal service provision and can enhance local skills development. In addition it is critical to strengthen the agricultural sector to allow a greater use of labour in the production processes (ZF Mgcawu District Municipality IDP, 2022).

Tsantsabane Local Municipality

The Tsantsabane Local Municipality (TLM) falls under the jurisdiction of the ZF Mgcawu District Municipality. The extent of the geographical area of the municipality is 5 887 km^2. It is bordered by the John Taolo Gaetsewe and the Pixley-ka-Seme District Municipalities. Furthermore, Tsantsabane Municipality is bordered by Ga-Segonyana Local Municipality in the north, Siyancuma Local Municipality in the south, Kgatelopele Local Municipality in the east and the Gamagara Local Municipality to the west.

Figure 86: Tsantsabane Local Municipality

Postmasburg is the main town within the Tsantsabane Local Municipality , with various other small rural communities such as Newtown, Boichoko and Postdene. Groenwater, Jenn Haven, Skeifontein, Soetfontein, Strathmore, and Beeshoek are scattered through the municipal area. Some residential settlements are the remnants of railway stations. The main routes include the R385 and R31 from Kimberley that runs through Beeshoek, the R309 and the R325 to Kathu.

Economically, Tsantsabane is known for being rich in minerals, and for its mining, agriculture, manufacturing and farming sectors. Over the past couple of years the municipality experienced high growth in economic development as a result of the booming mining sector. As a result various different opportunities exist within the local SMME sphere versus the influx of people from various areas in South Africa for jobs.

Planning and development within the area therefore remains critical. The implication is an increase in the existing backlog of basic services (TLM: IDP: 2021).

Ward 6 of the Tsantsabane Local Municipality falls within the study area and includes White City, Glossom, Maremane, Beeshoek, and Stasie (TLM IDP, 2021).

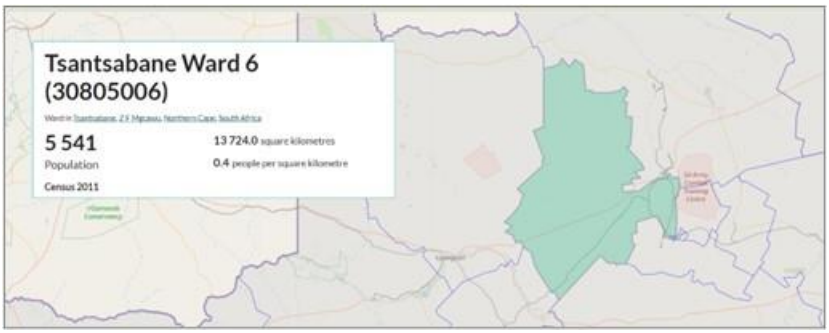


Figure 87: Tsantsabane Local Municipality Ward 6

1.f.vii.1.n.3 Social Profile

Population and Household Figures

The population figures in the study area are as follows:

Table 39: Population figures within the study area

POPULATION FIGURES WITHIN STUDY AREA			
Municipal area / Ward	**Population**	**Number of Households**	**% Under 18 Years Age Group**
John Taolo Gaetsewe DM	242 265	72 310	40%
Gamagara Local Municipality	53 655	15 721	33%
Ward 5 (2011 statistics)	7 540	2 984	15%
Ward 6 (2011 statistics)	11 348	3 249	28%
ZF Mgcawu DM	252 691	74 090	36%
Tsantsabane Local Municipality	39 344	11 820	34%
Ward 6	5 541	1 798	30%

(Source: StatsSA; Community Survey 2016 & 2011 Statistics)

The Gamagara Local Municipality might have the smallest population size in the John Taolo Gaetsewe district but has the highest growth. According to StatsSA, the population increased from 41 617 (2011) to 53 656 (2016) which means that population grew by 28.9%. Two factors that attributed to this exponential increase is the increase in mining activities and the establishment of the solar facilities resulting in high numbers of people coming to the municipal area, in search of employment or better living conditions. The population has thus almost doubled in the last 10 years (GLM IDP, 2019).

The total population of the Tsantsabane Local Municipality is 39 344 individuals based on the 2016 Community Survey. There is an average 2.1 person population density per km^2 and the number of households totals 11 820 (www.wazimap.co.za).

Within Tsantsabane Ward 6 there is a total of 5 541 individuals and 0.4 person population density per km^2. This figure indicates a low population density within the rural areas within the study area The Gamagara LM Wards 5 and 6 have 7540 and 11 348 individuals respectively with and a 10.9 and 47.3 person density per km^2. These higher density in these wards are attributed to the ward sizes and the concentration of individuals in the nearby towns e.g. Kathu (a section of Ward 6 includes a large part of the town) and Sesheng (www.statssa.gov.za).

Education and Skills Levels

The workforce in the Gamagara and Tsantsabane Local Municipalities have an overall low level of education and skills. Individuals would thus find it difficult to enter the job market.

Table 40: Education levels within the Gamagara and Tsantsabane Local Municipalities

EDUCATION LEVELS WITHIN STUDY AREA						
Municipal area / Ward	**No Schooling**	**Some Primary**	**Completed Primary**	**Some Secondary**	**Completed Secondary**	**Higher Education**
Gamagara LM	8%	1%	4%	33%	35%	6%
Ward 5 (2011 statistics)	4%	10%	4%	37%	28%	16%
Ward 6 (2011 statistics)	2%	7%	3%	30%	41%	7%
Tsantsabane LM	7%	9%	6%	36%	36%	4%
Ward 6	17%	13%	5%	30%	27%	3%

(Source: StatsSA; Community Survey: 2016 & 2011 Statistics)

The high percentage of persons employed in elementary occupations in the area further confirms the employment and skills patterns in the community. The result is that a high percentage of the specialised skills and competencies are "imported" from elsewhere.

Employment and Annual household Income

Although various mines operate in the Tsantsabane and Gamagara Local Municipality areas, these mines cannot accommodate all the jobseekers. Relative few other types of employment opportunities remain in the municipal areas.

The official unemployment rate for the Gamagara Local Municipality , according to the Census 2011 statistics, amounts to 12%, with 32% not being economically active and 3% classified as discouraged work seekers. Ward 6 in the Gamagara Local Municipality has a slightly higher employment profile. This could be the due to a section of the town of Kathu, providing some employment opportunities, also being located within Ward 6.

The official unemployment rate for the Tsantsabane Local Municipality , according to the Census 2011 statistics, amounts to 16%, with 37% not being economically active and 2% classified as discouraged work seekers. Ward 6 in Tsantsabane, also have a higher employment rate that the municipal rate. This could be due to the Beeshoek Mine as employment creator being located in the area.

Table 41: Employment Profile of the Gamagara and Tsantsabane Local Municipalities

EMPLOYMENT PROFILE WITHIN STUDY AREA				
Municipal area / Ward	**Employed**	**Unemployed**	**Discouraged work-seeker**	**Other non-economically active**
Gamagara LM	53.6%	12%	3%	32%
Ward 5 (2011 statistics)	58%	9%	3%	30%
Ward 6 (2011 statistics)	62%	12%	1%	26%
Tsantsabane LM	45%	16%	2%	37%
Ward 6	55%	7%	1%	37%

(Source: StatsSA; Community Survey 2016 & 2011 Statistics)

Land-Use

Farms adjacent to the proposed mining activity and proposed projects are listed in the table below.

Table 42: Land-Use surrounding the proposed mining

LAND-USE		
FARM	**DIRECTION FROM PROPOSED MINING**	**MAIN KNOWN LAND-USE**
Sishen No. 543	North	Mining and farming
Gamagara No. 541	Northwest	Municipal land
Sims No. 462	North	Mining and farming
Sekgame No. 461	Northeast	Unknown
Legoko No. 460	East	Unknown
Lyleveld No. 545	East	Unknown
Kadgame No. 558	Southeast	Unknown
Jenkins No. 562	South	Unknown
Roscoe No. 563	Southwest	Farming
Smythe No. 566	West	Farming
Dingle No. 565	West	Farming

Infrastructure and Services

Roads and Transport

The N14 and the Sishen Saldanha railway line are the primary movement corridors with the R325 and R385 being secondary movement corridors. These roads accommodate relative high volumes of daily traffic.

Health Care and Safety

Challenges with regard to the provision of health services include the following:

- The vastness of the area result in people not having easy access to health services when in need of these services;

- Limited services are being offered at the health facilities;
- The distances that people have to travel before receiving services creates various problems;
- Lack of ambulance services; and
- Not all villages have clinics or health centres.

Within the larger study area there are police stations at Postmasburg, Dingleton and Kathu. Police are understaffed and lack enough vehicles to respond to all the crime related issues. Due to the influx of more individuals to the area, as well as an increase in alcohol and drug abuse, the crime levels in the study area have increased over the past couple of years.

The police stations also do not have sufficient resources to deal with the crime found in the area. The safety of people could be jeopardised due to the lack of police stations or satellite stations in a vast area of jurisdiction.

Housing

Human settlements are scattered throughout the Tsantsabane Local Municipal area resulting in some areas still lacking services and infrastructure in comparison to other areas in the Municipality. From information gathered, it is clear that Tsantsabane has made some progress with regards to the provision of housing, but due to the influx of outsiders to the area, it seems as if the need remains higher than the actual approved allocations. Main concerns in the area still remain the provision of water, sanitation and electricity (TLM IDP, 2019 & 2021).

The Tsantsabane Local Municipality is continuously aiming to address the issues of basic service delivery and the provision of housing, but significant issues still need to be addressed.

The housing needs in the Gamagara Local Municipality has also grown exponentially in a period of ten years (up to the 2011 census years). The in-migration has prompted a growth of 21,1% in the number of households. Various households reside in inadequate types of housing facilities and the housing target was set at 7 300 units in 2011 (GLM IDP, 2021). It is unclear whether the situation has changed since then, although it seems that the housing demand has stabilised.

Basic Service Delivery

The following table provides a brief outline of the basic service delivery within the two local municipalities.

Table 43: Basic Service Delivery

HOUSEHOLD SERVICE DELIVERY WITHIN STUDY AREA					
Municipal area / Ward	**Piped water inside house**	**Piped water inside yard**	**Electricity: In-house prepaid meter**	**Sanitation: access to flush toilet**	**Refuse disposal from service provider**
Gamagara LM	60%	29%	82%	90%	83%
Ward 5 (2011 statistics)	-	-	-	97%	94%
Ward 6 (2011 statistics)	-	-	-	98%	98%
Tsantsabane LM	50%	36%	83%	83%	58%
Ward 6	-	-	-	77%	60%

(Source: StatsSA; Community Survey 2016 & 2011 Statistics)

Gamagara Local Municipality is a Water Service Authority which is responsible for the development and maintenance of water sources, bulk pipelines, reticulation networks, the water treatment works and to ensure rendering of potable water to the community. There are three systems of supply within the Gamagara Local Municipality which are: boreholes, dewatering from mining and the bulk water supply from Sedibeng Water Board. Sedibeng water serves as the bulk water service provider (supply only to the municipality), which is sourced from the Vaal Gamagara Water Scheme. Sishen Iron Ore (Kumba Mine) supplies dewatering water to the municipality in Kathu (GLM IDP, 2019).

In both municipalities, the shortage of underground water sources, loss of water due to ageing infrastructure, illegal connections and non-payment by water users are all challenges that needs to be overcome to ensure sufficient water provision in the municipality.

Economic profile of the area

Although mining and agriculture are the main industries in the Northern Cape Province, this province has the smallest economy of the nine provinces.

As with the provincial economy, the economies of the ZF Mgcawu District Municipality (including the Tsantsabane Local Municipality) and the John Taolo Gaetsewe District Municipality (including the Gamagara Local Municipality)

are largely dominated by mining, agriculture and manufacturing. Expansions in the mining sector led to the growth in the local economy. Downscaling in this regard, however also had a significant impact on the local economies dependent on mining. It is expected that recovery from this deterioration will be slow and uneven.

Owing to the economic slowdown, financial resources are further limited due to reduced payment levels by consumers. This has resulted in declining cash inflows for the municipalities, which has necessitated restrained expenditure to ensure that cash outflows remain within the affordability parameters of the Municipality's finances.

The Covid-19 Pandemic furthermore had an impact on the local economies and the performance of markets are still unstable. This has led to negative growth of the local economies and a slowdown in job creation and other means of employment creation. Unemployment and the closing of many local businesses pose severe challenges. A few interventions have been introduced by the National government in the form of the unemployment grants and the distribution of food parcels which provided some short-term relief in the area.

Furthermore, tourism could be a relatively small but important contributor to the local economy as more tourists are attracted to the distinguishing desert landscape with relative accessibility. The vision of the district municipalities is to market, develop and co-ordinate tourism in the area.

Although Gamagara Local Municipality has become a significant player in the Northern Cape Province and an important contributor to South Africa's mining sector, and international mining value chain, the municipality is planning to develop into a commercial and industrial town over and above the mining economic spin-offs. It has a potential to develop into an industrial city by 2030 and a manufacturing city by 2060. The Northern Cape Saldanha Bay railway line as a national development corridor also present the municipality with the opportunity to grow economically. Exploiting the benefits and spinoffs that could be derived from the N14 road to Namibia could also contribute to the local growth. It is envisaged that mining will provide the platform for economic growth and diversification of the economy, which will mature from primary, secondary and tertiary sectors, the Kathu Supplier Park, Skill Development Centre, and so forth.

In order to ensure further economic growth in the region, the Tsantsabane Local Municipality's Local Economic Development strategy should thus ensure the utilisation of the economic potential to the benefit of the broader community. Projects would include supporting the establishment of various industries and businesses and the promotion of tourism through the development of a Tourism Marketing Strategy.

The Tsantsabane Local Municipality's Economic Development and growth plan includes the following:

- To facilitate sustainable economic empowerment for all communities in the municipal area;
- Creating an enabling and conducive environment for job creation;
- Develop an economic investment and incentive policy; and
- Functional LED Governance structures.

As part of local growth further key investment opportunities within the Tsantsabane Local Municipality relate to:

- Public-private partnerships to speed up development in the area;
- Developmental assistance to the agricultural sectors with the focus on the emerging farmers;
- The development of a manufacturing strategy including the availability of serviced plots and the development of local skills;
- Identification of export opportunities and international markets;
- The establishment of a permanent working group between the mining companies and the municipalities to ensure an effective relationship together with the development of skills training and support programmes;
- Investigating and exploiting activities related to road-transport routes or corridors due to the suitable location of the municipality;
- The establishment of a local business support centre for the benefit of local entrepreneurs and informal traders;
- Exploit possible benefits of solar development projects in the area (e.g. Lesedi, Jasper and Red Stone projects) to the benefit of the local communities; and
- The development and implementation of an aggressive tourism marketing strategy.

1.f.vii.2 Environmental and Current Land Use Map

The project boundary is largely dominated by mining and related activities, while the surrounding areas are dominated by wilderness and mining activities to the north (Sishen Mine) with subsistence farming practices to

the south of the project boundary. No cultivated dryland or irrigated farming practices were observed in the surrounding areas and may be attributed to the arid nature of the region (i.e., high temperatures and low rainfall) with limited irrigation options due to the non-perennial systems and limited groundwater resources.

Figure 88: Current Land Uses

The regional landscape can be broadly divided into three main categories:

- Natural areas – consisting of undisturbed bushveld, shrubland and grassland vegetation. These areas are mostly used for livestock and game farming;
- Mining areas – consisting of disturbed areas in the form of mine dumps, bare areas, open pits and mine infrastructure; and
- Residential areas – Kathu and its immediate surrounding area in the far north of the study area.

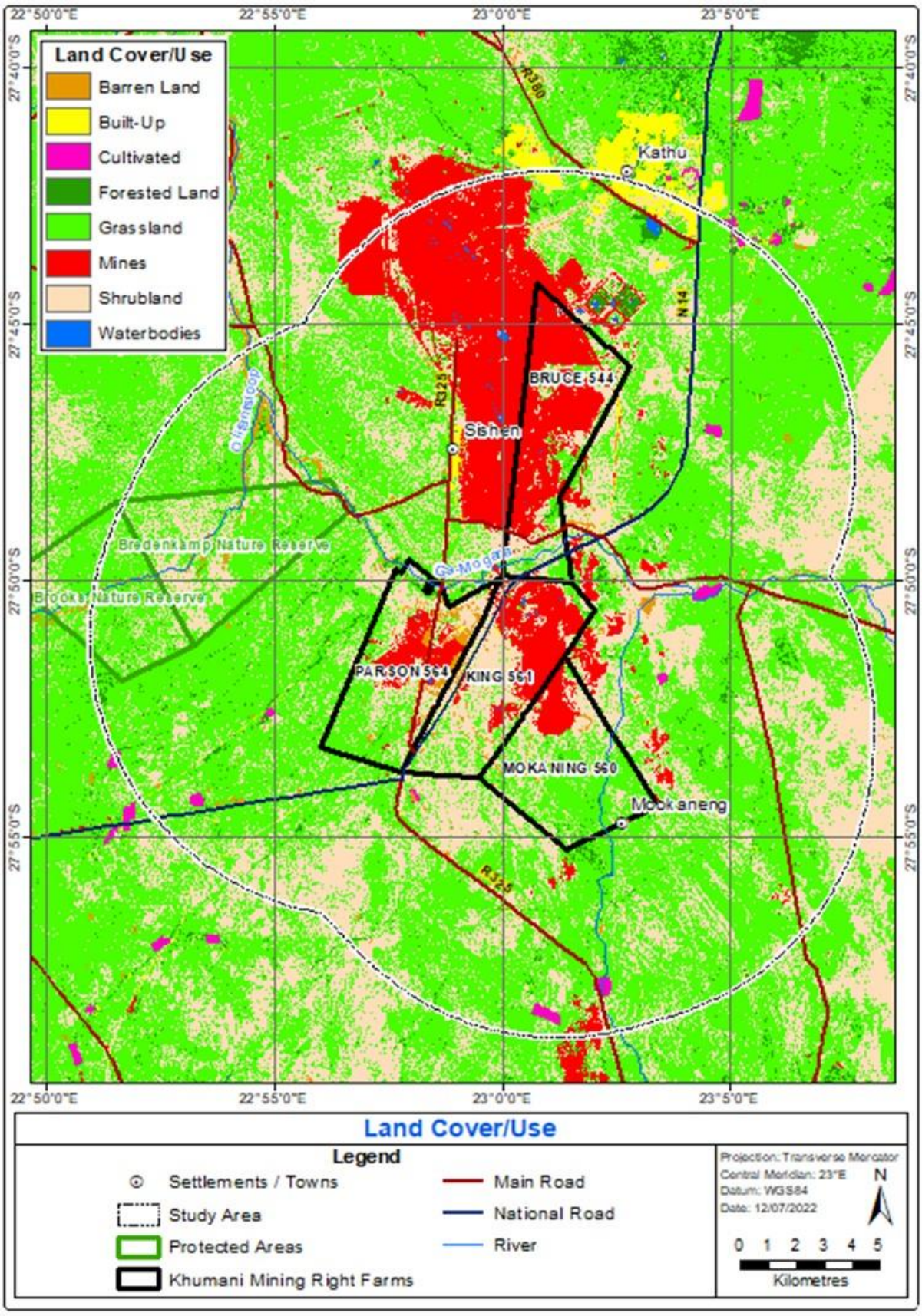


Figure 89: Land cover/use

1.f.viii Impacts Identified

1.f.viii.1 Methodology used in determining and ranking the Nature, Significance, Consequences, Extent, Duration and Probability of potential Environmental Impacts and Risks

In order to adequately assess and evaluate the impacts and benefits associated with the project it is necessary to use a methodology that could scientifically achieve this and to reduce the subjectivity involved in making such evaluations. For proper decision making it is necessary to assess all legal requirements and clearly defined criteria in order to accurately determine the significance of the predicted impacts or benefits on the surrounding natural and social environment.

This section will aim to discuss the methodology to be followed to determine, assess and describe possible impacts as a result of project implementation. Impacts will be discussed in terms of the construction, operational and decommissioning/closure phases of the project. The evaluation of impacts is conducted in terms of the criteria discussed below. The various environmental impacts and benefits of this project will be discussed in terms of the nature of the impact, as well as the status, certainty, duration, magnitude, extent, intensity, frequency and significance. The significance rating of each impact will determine whether or not mitigation will be required.

The EIA will also aim to achieve the following:

- Provide an overall assessment of the social and biophysical environments affected by the proposed project;
- Assess the study area in terms of environmental criteria;
- Identify and recommend appropriate mitigation measures for potentially significant environmental impacts, and
- Successfully analyse all public issues raised to date in order to recommend appropriate mitigation measures for all social and environmental related concerns.
- Impacts and benefits are assessed before and after the application of mitigation measures.

The following section presents the criteria used to assess the potential impacts presented in the previous section.

1.f.viii.1.a Criteria of assigning significance to potential impacts

The evaluation of impacts is conducted in terms of the criteria detailed in Table 44 to Table 49. The various environmental impacts and benefits of this project are discussed in terms of impact status, extent, duration, probability, and intensity. Impact significance is regarded as the sum of the impact extent, duration, probability and intensity and a numerical rating system has been applied to evaluate impact significance. Therefore, an impact magnitude and significance rating are applied to rate each identified impact in terms of its overall magnitude and significance (Table 49).

In order to adequately assess and evaluate the impacts and benefits associated with the project, it was necessary to develop a methodology that would scientifically achieve this and to reduce the subjectivity involved in making such evaluations. To enable informed decision-making it is necessary to assess all legal requirements and clearly defined criteria in order to accurately determine the significance of the predicted impact or benefit on the surrounding natural and social environment.

1.f.viii.1.b Impact Status

The nature or status of the impact is determined by the conditions of the environment prior to construction and operation. A discussion on the nature of the impact will include a description of what causes the effect, what will be affected and how it will be affected. The nature of the impact can be described as negative, positive or neutral.

Table 44: Status of Impact

Rating	Description	Quantitative rating
Positive	A benefit to the receiving environment.	P
Neutral	No cost or benefit to the receiving environment.	-
Negative	A cost to the receiving environment.	N

1.f.viii.1.c Impact Extent

The extent of an impact is considered as to whether impacts are either limited in extent or if it affects a wide area or group of people. Impact extent can be site specific (within the boundaries of the development area), local, regional or national and/or international.

Table 45: Extent of Impact

Rating	Description	Quantitative rating
Low	Site Specific; Occurs within the site boundary.	1
Medium	Local; Extends beyond the site boundary; Affects the immediate surrounding environment (i.e. up to 5 km from the Project Site boundary).	2
High	Regional; Extends far beyond the site boundary; Widespread effect (i.e. 5 km and more from the Project Site boundary).	3
Very High	National and/or international; Extends far beyond the site boundary; Widespread effect.	4

1.f.viii.1.d Impact Duration

The duration of the impact refers to the time scale of the impact or benefit.

Table 46: Duration of Impact

Rating	Description	Quantitative rating
Low	Short term; Quickly reversible; Less than the project lifespan; 0 – 5 years.	1
Medium	Medium term; Reversible over time; Approximate lifespan of the project; 5 – 17 years.	2
High	Long term; Permanent; Extends beyond the decommissioning phase; >17 years.	3

1.f.viii.1.e Impact Probability

The probability of the impact describes the likelihood of the impact actually occurring.

Table 47: Probability of Impact

Rating	Description	Quantitative rating
Improbable	Possibility of the impact materialising is negligible; Chance of occurrence <10%.	1
Probable	Possibility that the impact will materialise is likely; Chance of occurrence 10 – 49.9%.	2
Highly Probable	It is expected that the impact will occur; Chance of occurrence 50 – 90%.	3
Definite	Impact will occur regardless of any prevention measures; Chance of occurrence >90%.	4
Definite and Cumulative	Impact will occur regardless of any prevention measures; Chance of occurrence >90% and is likely to result in in cumulative impacts	5

1.f.viii.1.f Impact Intensity

The intensity of the impact is determined to quantify the magnitude of the impacts and benefits associated with the proposed project.

Table 48: Intensity of Impact

Rating	Description	Quantitative rating
Maximum Benefit	Where natural, cultural and / or social functions or processes are positively affected resulting in the maximum possible and permanent benefit.	+ 5
Significant Benefit	Where natural, cultural and / or social functions or processes are altered to the extent that it will result in temporary but significant benefit.	+ 4
Beneficial	Where the affected environment is altered but natural, cultural and / or social functions or processes continue, albeit in a modified, beneficial way.	+ 3
Minor Benefit	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are only marginally benefited.	+ 2
Negligible Benefit	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are negligibly benefited.	+ 1
Neutral	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are not affected.	0
Negligible	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are negligibly affected	- 1
Minor	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are only marginally affected.	- 2
Average	Where the affected environment is altered but natural, cultural and / or social functions or processes continue, albeit in a modified way.	- 3
Severe	Where natural, cultural and / or social functions or processes are altered to the extent that it will temporarily cease.	- 4

Rating	Description	Quantitative rating
Very Severe	Where natural, cultural and / or social functions or processes are altered to the extent that it will permanently cease.	- 5

1.f.viii.1.g Impact Significance

The impact magnitude and significance rating are utilised to rate each identified impact in terms of its overall magnitude and significance.

Table 49: Impact Magnitude and Significance Rating

Impact	Rating	Description	Quantitative rating
Positive	High	Of the highest positive order possible within the bounds of impacts that could occur.	+ 12 – 16
	Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. Other means of achieving this benefit are approximately equal in time, cost and effort.	+ 6 – 11
	Low	Impacts is of a low order and therefore likely to have a limited effect. Alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time-consuming.	+ 1 – 5
No Impact	No Impact	Zero impact.	0
Negative	Low	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. Social, cultural, and economic activities of communities can continue unchanged.	- 1 – 5
	Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of adverse impacts, mitigation is both feasible and fairly possible. Social cultural and economic activities of communities are changed but can be continued (albeit in a different form). Modification of the project design or alternative action may be required.	- 6 – 11
	High	Of the highest order possible within the bounds of impacts that could occur. In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or a combination of these. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt.	- 12 - 16

1.f.viii.2 Impacts and Risks identified

The following table presents the potential list of impacts, which will be assessed as part of the specialist studies during the EIA Phase.

Table 50: Potential Impacts – Planning Phase (CbA – Can be Avoided, R – Reversible, Ir -Irreplicable, SbM – Significance before Mitiation, SaM – Significance After Mitigation)

Name of Activity		Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
Legal Requirements (Environmental Permits)	Legal Compliance	Unlawful water and waste activities, which could lead to NWA Directives and Section 24G Rectification fines.	N	-4	-3	-2	-5	-14	CbA	A legal assessment of all activities and future planned activities must be undertaken annually to ensure that all activities are authorised. All legally appointed personnel responsible or involved in water use activities and activities associated with the Environmental Authorisations on site must receive training on the requirements of the Environmental Authorisations, Permits and relevant Environmental Legislation. Quarterly internal audits on the lawful implementation of the Environmental Authorisation must be undertaken during the construction phase, where after biannual audits can be undertaken once construction has been completed. A Water Use Licence (WUL) must be available on site at all times for all Section 21 Water Uses. The following buffers should be maintained: No activities may take place within the 1:100 year flood line of the Gamagara River. No activities may take place within 100m of the pans located south and south-west of the Discard Dump/ Discard Low Grade Stockpile.	P	4	3	5	5	17
Infrastructure Establishment (BESS, Roads & Power lines)	Landowner Relationships	Unlawful placement of activities	N	-3	-2	-3	-3	-11	CbA	Early consultation must be undertaken with the owners of the farm roads which will be used for accessing the PV Solar Pant to determine whether there are any specific requirements which must be considered. A detailed transportation plan and schedule for the transport of components, main assembly cranes and other large pieces of equipment will be compiled during the detailed design phase prior to the commencement of the construction activities. All vehicles exceeding these limitations will require an abnormal transportation permit. An open channel of consultation must be maintained throughout the process. Ensure that the battery storage facility designs are reviewed and approved by a suitably qualified engineer prior to commencement of construction activities (battery housing designed for the type of battery chosen with input from provider). Notify the local municipality of the Major Hazard Installation (MHI) including information on location of the installation.	N	-1	-1	-1	-1	-4

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures						CbA, R, Ir	Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM		Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										The power lines should be constructed over the railway lines in accordance with the Transnet requirements.						
										The Standard Operating Practices (SOP) and/or Contactors SOP for the establishment of the road and power lines must be compiled.						

Table 51: Potential Impacts – Construction Phase

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures						CbA, R, Ir	Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM		Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
Site Clearance and Infrastructure Establishment	Geology	Dolomites have been identified within the King Mining Area. The necessary inspections are required to ensure that the iron ore resources can be mined optimally and with safe mining practices.	N	-3	-3	-3	-4	-13	CbA	Ongoing monitoring of the surface movement of land. Continues exploration activities must be undertaken. Safety berms and signage must be in place around the pits areas.	N	-2	-1	-1	-1	-5
	Topography	Clearing and landscaping of terrain for the establishment of infrastructure may have impact on the pre-construction layout. This is not regarded a significant impact, due to the presence of activities as a result of mining activities.	N	-1	-1	-3	-1	-6	CbA	The footprint areas of all surface infrastructure must remain as small as possible within the parameters of operational and engineering requirements. Footprint areas should be accessed through existing road network, where feasible to avoid unnecessary excavation. Excavation and long-term stockpiling of soil should be limited within the demarcated areas as far as practically possible Linear infrastructure must follow for as far as practically possible the natural contours of the area. Construction areas must be clearly demarcated to control movement of personnel and vehicles, providing clear boundaries for construction sites in order to limit the spread of impacts. Markers and pegs will be erected and maintained along the boundaries of the working areas, access roads, haul roads and paths before commencing any work. If proved insufficient for control, these shall be replaced by fencing.	N	-1	-2	-1	-1	-5
	Ecology		N	-2	-3	-4	-4	-13	CbA	Pre-construction walk-through of the development footprint to locate and identify protected species within the development footprint. All	N	-1	-1	-2	-1	-2

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		Loss of vegetation and habitat due to vegetation clearance.								relevant clearing or translocation permits must be obtained before construction starts. Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc. Construction areas must be clearly demarcated to control movement of personnel and vehicles, providing clear boundaries for construction sites in order to limit the spread of impacts. Markers and pegs will be erected and maintained along the boundaries of the working areas, access roads, haul roads and paths before commencing any work. If proved insufficient for control, these shall be replaced by fencing. For the PV Solar Plant Project specifically and independent Environmental Control Officer (ECO) to provide supervision and oversight of vegetation clearing activities. The ground below the PV Solar Plant will be scraped level and cleared, once level and clear, herbicide will be utilised, specific product specified by the EIA Team, to make sure no vegetation grows below the Solar Plant as this can be a fire hazard. The herbicide will be contained to only the Solar Plant utilising a barrier around the Solar Farm. Designs of the facilities must be undertaken by a registered Engineer. Draw up a procedure clearly reflecting the method and phases of clearance of vegetation only in areas where construction will take place. Prior to any vegetation clearance activities taking place a walkdown of the footprint must be undertaken and all floral and faunal SCC encountered must be GPS marked and the necessary permits applied for with the relevant national and provincial departments. The site walk down is to be conducted prior to clearance activities and ideally post good rains between November and February when the smaller bulbous plants are growing and visible. If such species are present, the required permits must be obtained. Removal of vegetation must be undertaken in a phased approach to limit surface exposure. Temporary erosion control measures may be used to protect the disturbed soils during the construction phase until adequate vegetation has established. Clean and dirty water separation must be implemented early in the construction phase, especially down-gradient of construction areas to						

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										ensure that the natural runoff patterns are impacted as little as possible.						
										Activities must remain outside of the 1:100-year flood lines, where this is not possible, the required approval must be obtained from the DWS and activities should further be restrained to the dry season.						
		The unmanaged disposal of waste, could result in the spread of invader species, as well as the influx of opportunistic species.	N	-2	-3	-3	-4	-12	CbA	Develop dedicated waste handling areas; prevent access to rodents and opportunistic species; prevent the spread of waste.	N	-1	-1	-2	-1	-5
										Develop dedicated waste handling areas, fit for purpose and prevent the spread of waste.						
		Spread of invader species	N	-2	-3	-4	-4	-13	CbA	Alien and Invasive Plant (AIP) species monitoring and clearing/control should take place throughout the construction phase of the development.	N	-1	-1	-2	-1	-2
										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.						
		Accidental death of animals on the roads and other causes of animal fatalities	N	-2	-3	-2	-5	-12	CbA	Clearly marked signs will be erected along the transportation routes to create awareness of animal crossings.	N	-1	-3	-1	-3	-8
										A clearly marked and enforced vehicle speed will be implemented on the internal mine and transportation routes.						
										Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas, etc						
										If trenches need to be dug for electrical cabling or other purpose, these should not be left open for extended periods of time as fauna may fall in and become trapped in them. Trenches which are standing open should have places where there are soil ramps allowing fauna to escape the trench.						
										All power lines should be equipped with flight diverters.						
										Vehicles may only travel on demarcated roads on site.						
										A fire management plan must be developed for the mine.						
										Fire belts must be constructed around the boundaries of the mine.						
										In terms of fencing: *no electrified strands should be placed within 30 cm of the ground as some species are susceptible to electrocution from electric fences • the electrified strands should be placed on the inside of the fence and						

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										not the outside as is the case on the majority of already constructed PV plants • there should not be a large gap between the inner and outer fence • a single fence with mesh or plain wire strands on the outside and electrified strands on the inside is recommended.						
										The poaching and/or hunting of animals will be strictly forbidden.						
		Habitat degradation due to dust: Increased dust will occur in all areas where vegetation is cleared. Dust will be caused by excavation, and construction. Dust in the area will be greatly increased due to the dry weather conditions and the nature of the soil in the area. Dust settling on plant material can reduce the amount of light reaching the chlorophyll in the leaves, thereby reducing photosynthesis, which in turn reduces plant productivity, growth and recruitment	N	-2	-2	-2	-2	-8	CbA	Maintain the current air quality monitoring stations that determine fallout and implemented respirable dust (PM10) monitoring that could arise from the mining activities. Dust suppression should be undertaken where and when dust is present.	N	-1	-1	-2	-1	-5
	Soil and Land use	The removal and stockpiling of topsoil may lead to a loss of soil resource and land capability through erosion of the stockpiles and chemical and physical degradation. This impact is considered important due to the fact that the mine may	N	-1	-2	-4	-4	-11	CbA	Excavation and long-term stockpiling of soil should be limited within the demarcated areas Adhere to Soil Stripping, Soil Stockpiling and Soil Management Plan as part of the EMP (where feasible). Topsoil should be stockpiled on designated topsoil stockpiles, unless around linear infrastructure, where the topsoil could be stockpiled next to the linear structure. 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.	N	-1	-2	-1	-1	-5

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		be operating on a negative topsoil balance and therefore the retaining of suitable topsoil is important for successful rehabilitation.								Stockpile height should be restricted to that which can deposited without additional traversing by machinery. Stockpiles should be treated with 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. Minimize compaction during the stockpile phase by keeping stockpile soil loose and limit stockpile height to 5 meters height, to limit internal soil compaction (Coaltech: chamber of mines, 2007)						
										Temporary stockpiles must be protected by means of suitable geotextiles such as hessian sheeting, silt curtains, sandbags etc. to prevent contamination of runoff and sedimentation of freshwater resources in the vicinity of the surface infrastructure and should remain outside of the buffer zones.						
										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.						
										Temporary berms can be installed, around stockpile areas whilst vegetation cover has not established to avoid soil loss through erosion						
										The topsoil stockpile should be vegetated and while vegetating, measures will be needed to contain erosion of the stockpile during rain events.						
										The recovered soils should be re-used to rehabilitate the mine footprint as part of the annual rehabilitation plans.						
		Soil compaction - Heavy equipment traffic during construction and exploration activities is anticipated to cause soil compaction.	N	-2	-3	-5	-4	-14	CbA	The contractor will ensure that all activities, material and equipment storage and personnel movement take place within the designated area. All vehicular traffic should be restricted to the existing service roads and the selected road servitude as far as practically possible; to avoid unnecessary compaction of the surrounding soils	N	-1	-1	-2	-1	-5
										A site plan must be developed, indicating the following: Location of all approved activities; 1:100 year buffer around all watercourses; Location of the pans.						
										Laydown areas should be located within already disturbed areas.						
										Soil compaction is usually greatest when soils are moist, so soils should be stripped when moisture content is as low as possible. If they have to be moved when wet, shovel and truck should be used as bowl scrapers create excessive compaction when moving wet soils.						
										Minimize compaction during the stockpile phase by keeping stockpile soil loose and limit stockpile height to 5 meters height, to limit internal soil compaction (Coaltech: chamber of mines, 2007).						

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										Compaction should be minimised by use of appropriate equipment and replacing soils to the greatest possible thickness in single lifts.						
										Heavy equipment movement over replaced soils should be minimised						
										Minimise compaction during smoothing of replaced soils by using dozers rather than graders.						
										Following placement, compacted soils should be ripped to full rooting depth (at least 60 cm or 30 cm as the bare minimum seedbed) to allow penetration of plant root).						
										Compacted soils adjacent to the focus areas can be lightly ripped to at least 25 cm below ground surface to alleviate compaction prior to re-vegetation.						
										Compaction of soil can be mitigated by ripping the footprint and introducing both organic and inorganic fertilizers.						
										All contractors must receive induction. The induction should be updated on site, to make provision for the site plan and a detailed explanation on the purpose of the no-go zones, presence of protected species, presence of the Protected Areas and ESAs and the meeting thereof.						
		Clearing vegetation will result in the exposure of soil, which may in turn lead to soil erosion, in addition to this, stockpiling of topsoil material on sloping areas leading to increased runoff and erosion.	N	-2	-3	-5	-4	-14	CbA	Clean and dirty water systems must be established prior to construction.	N	-1	-1	-2	-1	-5
										No construction or project related activities may be undertaken outside of the demarcated areas.						
										Ensure the required erosion protection measures are monitored and corrected where necessary.						
										Bare soils can be regularly dampened with water to suppress dust during the construction phase, especially when strong wind conditions are predicted according to the local weather forecast						
										Natural vegetation establishment (self-succession) will be encouraged on cleared areas, and topsoil stockpiles.						
										If natural succession of vegetation is not established within one rainy season, after rehabilitation, the disturbed areas and areas adjacent to the infrastructural areas must be re-vegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission.						
										A fire management plan must be developed for the mine.						
										Fire belts must be constructed around the boundaries of the mine.						
										Water pipelines must preferably follow existing roads or other linear infrastructure.						
										Daily fire danger ratings must be viewed and addressed where required.						

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										The mine must have equipment, protecting clothing and trained personnel for extinguishing fires.						
										No open fires must be allowed.						
		Potential of Soil Contamination	N	-2	-3	-5	-4	-14	CbA	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.	N	-1	-1	-2	-1	-5
										Construction requirements specific for the BESS: *The battery storage facility should be constructed on concrete surface with acid lining or similar structure and comply with relevant standards and South African National Standards (SANS) requirements. *The battery storage facility should be a secured and well-ventilated area. *Secondary containment must be provided for leaks of electrolyte.						
										All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.						
										Machinery, trucks and vehicles must be well maintained and serviced regularly as per a recommended service guide.						
										Refuelling must be undertaken over hard park bunded areas that are adequately sized to capture and contain spillages.						
										Machinery and vehicles should be parked on appropriately lined areas.						
										Drip trays must be employed under stationary machinery.						
										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 ingress.						
										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.						
		Contamination of soils as a result of a lack of sanitary services	N	-1	-2	-4	-4	-11	CbA	Chemical toilets must be readily available to employees where permanent infrastructure is not available.	N	-1	-2	-1	-1	-5
										Licensed companies must be appointed to remove any contaminated material and or wastes to licensed landfill sites.						
		Impact on land use	N	-2	-2	-2	-1	-7	R	Direct surface disturbance of soils should be avoided where possible.	N	-1	-1	-2	-1	-5
										The footprint as well as areas affected by edge effect should be ripped to alleviate compaction.						
										Placement of lighting should be undertaken in such a manner to reduce the impact on surrounding land users.						

Name of Activity		Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										Equipment choice for the PV Solar Plant (inverters and transformers) should be undertaken in such a manner to reduce vibration and noise levels which may occur.						
										Where farm roads are used to bring construction equipment on site, the necessary agreements and early notification should be undertaken by the mine to ensure that the farm activities are not impacted upon.						
										Construction activities may only be undertaken during the day period (6h00 to 18h00).						
										A complaints register should be kept on site and surrounding landowners should be notified of its availability and the contact procedure.						
	Freshwater Ecosystem	Specifically at the Discard Dump and Solar Farm: Site preparation and construction activities of surface infrastructure, including placement of contractor laydown areas and storage facilities may lead to: •Damage to and loss of vegetation, leading to exposed/compacted soil, in turn leading to potential for increased runoff from exposed areas, erosion of the downgradient watercourses and potential for increased sedimentation of the watercourses; •Increased sedimentation of the watercourses may lead to changes in instream habitat, potentially altered surface water quality particularly in the	N	-1	-2	-2	-2	-7	CbA	Clean and Dirty water separation systems should be implemented in line with the Storm Water Management Plan developed for this project.	N	-1	-1	-2	-1	-5
										Remain outside of the 1:100 year floodlines, or 100m buffers of watercourses, unless authorised to do so.						
										As far as practically possible, clearing and construction activities must be restricted to the dry season to minimise the risk of sediment-laden runoff entering the downgradient watercourses and reduce the risk of erosion and formation of preferential flow paths						
										Sediment traps must be constructed around the construction sites line to minimise the risk of sediment entering the downgradient watercourses;						
										Appropriate control methods for alien vegetation in line with existing and approved alien vegetation control within the mine must be implemented.						
										No waste material is permitted to be disposed of within the watercourse.						
										Undertake the construction activities during the dry season if feasible to minimise the chance of runoff entering the watercourse.						
										Limit the footprint of vegetation clearing to what is absolutely essential.						
										Retain as much indigenous vegetation as possible.						

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		downstream reaches of the system, and smothering of vegetation and/or altered vegetation composition; •Potential impacts on water quality due to leaks and spills from construction machinery and increased sediment availability; •Decreased ecoservice provision and biodiversity maintenance capacity; and •Proliferation of alien vegetation as a result of disturbances.														
	Hydrology	Impact on watercourses identified in the Hydrological study due to uncontrolled runoff.	N	-1	-2	-2	-3	-8	CbA	Clean and Dirty water separation systems should be implemented in line with the Storm Water Management Plan developed for this project. Temporary erosion measures such as sediment nets and berms should be employed around bare exposed areas. Pathways and access roads must be routed to avoid watercourses and should cross these as seldom as possible. Remain outside of the 1:100 year floodlines, or 100m buffers of watercourses, unless authorised to do so. Upslope runoff should be diverted around the proposed facilities. A river diversion is already in place upslope of the KM01 Pit expansion. It is recommended that berms are placed around the pit perimeter As far as practically possible, clearing and construction activities must be restricted to the dry season to minimise the risk of sediment-laden runoff entering the downgradient watercourses and reduce the risk of erosion and formation of preferential flow paths	N	-1	-1	-2	-1	-5
		Also refer to the impacts and management measures presented under the soils, ecological and								Also refer to the impacts and management measures presented under the soils, ecological and freshwater ecosystem setting.						

Name of Activity		Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		freshwater ecosystem setting.														
	Groundwater	Construction of the Block A and B Low Grade ROM Stockpile is not regarded as a pollution source of groundwater considering the Leachable Concentrations of Mine Residue on site and past Numerical Models.	N	-2	-1	-2	-2	-7	CbA	The new Bruce Block A & B Low Grade ROM Stockpile should be designed by a Professional Registered Engineer. It is recommended that a Class D liner be implemented on this facility. Clean and dirty water separation systems should be implemented in line with the Storm Water Management Plan developed for this project. Groundwater monitoring should be undertaken to include the assessment of the potential impacts of this facility. The required Code of Practice for the operations of this facility should be develop.	N	-1	-1	-1	-1	-4
		No further expansion in footprint is applied for the King/Mokaning Low Grade ROM Stockpile.	No impact to assess.	-	-	-	-	-	-	-	-	-	-	-	-	-
	Air Quality	Construction activities and material movement may temporarily result in dust dispersion. Considering that the nearest sensitive receptors (in the vicinity of DFO sample point BKM16 and the Hoffman PM10 monitoring station) are located more than 1.4 km from the proposed Solar PV development area, atmospheric impacts from dust emissions during the temporary construction phase are expected to be low. With the implementation of appropriate control measures, the impact on neighbouring	N	-2	-1	-2	-1	-6	CbA	Maintain the current air quality monitoring stations that determine fallout and implemented respirable dust (PM10) monitoring that could arise from the mining activities. All construction vehicles should adhere to a low speed (30km/h for trucks and 40km/h for light vehicles) limit to avoid collisions with susceptible species such as snakes and tortoises. Implement dust suppression in and around the construction area where required.	N	-1	-1	-1	-1	-4

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		sensitive receptors can be reduced further.														
	Visual	Soil stripping and footprint clearance. The main visual impact associated with the construction phase would be the actual construction sites, possible storage of equipment and construction vehicles (laydown area), as well as the disruption of the soil and vegetation.	N	-2	-2	-2	-2	-8	R	Stripping of vegetation and soils should be undertaken within the demarcated areas and be kept to a minimum. Exposed areas should be vegetated as soon as possible. Self-succession will be preferred, however if vegetation establishment is not successful after the first rainy season, revegetation practices should be implemented. Dust suppression measures should be implemented to limit the generation of dust.	N	-1	-1	-1	-1	-4
		The presence and use of heavy machinery, trucks and vehicles for construction purposes. Due to the existing mining in the area, vehicles and heavy machinery are already present and are not uncommon.	N	-2	-1	-2	-2	-7	CbA	Construction activities must remain within demarcated footprints. Dust suppression measures should be implemented to limit the generation of dust.	N	-1	-1	-1	-1	-4
	Noise	Large truck loads of construction material will be present in and around the site for the purposes of the Solar Plant.	N	-3	-1	-3	-3	-10	CbA	A Traffic Management Plan must be developed by the developer. Where farm roads are used to bring construction equipment on site, the necessary agreements and early notification should be undertaken by the mine to ensure that the farm activities are not impacted upon. Equipment will be well maintained to reduce excessive noise creation. Construction activities may only be undertaken during the day period (6h00 to 18h00). A complaints register should be kept on site and surrounding landowners should be notified of its availability and the contact procedure.	N	-3	-1	-1	-1	-6
	Heritage	The study area was assessed both on desktop level and by a non-intrusive pedestrian field survey.	N	-3	-3	-3	-4	-13	CbA	The artefacts around the final selected PV Solar Plant should be avoided as far as practically possible. The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as	N	-1	-1	-1	-1	-4

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		Stone Age scatters were noted alluding to Stone Age occupation of the area and additional finds were limited to a ruin in the discard dump, a stone cairn of unknown purpose and a cemetery (located within Site B and C the Solar Facility alternatives), the latter of high social significance. These (2) areas have slightly higher artefact concentrations occur at K7 and K9 and might warrant further mitigation if impacted on. The proposed Solar Farm location has recommended that these areas are avoided and thereafter no identified artefacts are present. The study area is of moderate palaeontological significance based on the SAHRA paleontological map and specialist assessment will be required in the EIA phase. The ruin in the discard dump area could be								stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find and therefor chance find procedures should be put in place as part of the EMP. This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below. • If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager. • It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area. • The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.						

Name of Activity		Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		older than 60 years and if this is the case the feature is protected by legislation based on its age and will require a destruction permit. No other preconstruction heritage mitigation is required at the other capital projects. No fatal flaws were recorded, and the impact of the Capital Projects can be mitigated to an acceptable level.														
	Socio-Economic	The developers of this project anticipate that the construction phase and associated infrastructure (including overland power lines) provision of each phase will take approximately 18 months to complete. The main road to the site is the N14. The N14 is a national freeway in South Africa, under the jurisdiction of the South African National Road Agency, and transverses the Northern Cape from Springbok (in the west) to Kuruman (in the east). The road is approximately 8 m wide which is located within a 45 m wide road	N	-2	-2	-3	-2	-9	CbA	Appropriate warning traffic signs, in accordance with the South African Road Traffic Signs Manual, should be erected to protect road users on the approaches to the sharp curves and the access road junction. Temporary signs should be erected on the approaches to the access road junction warning motorists of heavy vehicle traffic during the construction phase. Promote travelling in groups to avoid additional vehicles on site.	N	-2	-2	-3	-2	-9

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		reserve. The speed limit of the road is 120 km/h, reducing to 60 km/h when passing through the towns along the route. This is a single carriageway paved road, with one lane in each direction and paved shoulders. The general road safety conditions on the N14 within the study area is good as no road safety hazards were observed during the site visit. Very little pedestrian and cyclist activity was observed along this section of the N14. The current pavement condition on the N14 within the study area ranges from good to fair throughout its length within the study area. The design criteria for the N14 road is unknown. However, since this is a freeway, the classification of this road should be Road Category A, thus in accordance with TRH-4, the road would have been designed for a daily traffic in excess of 4000														

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		equivalent vehicles units. The horizontal alignment of this road within the study area ranges from fairly gentle to moderately winding in some sections. The vertical alignment of this road ranges from fairly flat in some sections to rolling in other sections. As such, the general geometric design of this road is conducive to the movement of heavy vehicle traffic. Since this road is a national road, it is prudent to assume that this road was built to fairly high structural standards. As such, the road pavement will have the structural strength to convey the additional volumes of heavy vehicles that will be generated by this project without showing signs of any major structural distress. It is envisaged that deliveries of material and equipment to site will be distributed throughout the day, while the transportation of the construction workforce will result in														

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		the morning and afternoon peaks. It is foreseen that the total traffic generation for this size of facility will be negligible. According to section 2.6 of the "South African Traffic Impact and Site Traffic Assessment Manual", "A Traffic Impact Assessment shall be undertaken and submitted when an application is made for a change in land use and when the highest total additional hourly vehicular trip generation (including pass-by and diverted trips) as a result of the application exceeds 50 trips per hour". As the project will remain part of a mining site and the increase in traffic is not planned to exceed 50 trips per hour, a low significance to traffic increase is concluded. It is envisaged that deliveries of material and equipment to site will be distributed throughout the day, while the transportation of the operating staff will contribute to the morning and afternoon peaks. It is envisaged														

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		that the operating staff will travel to site, in pairs, using light vehicles.														
		Mining activities, stockpiles and associated infrastructure are usually perceived to be visually unsightly. The location of the proposed mining activities and associated infrastructure is within an area characterised by long term historical mining activities, with various different infrastructural developments nearby such as roads, mining activities, conveyor belts, transmission lines, railway line and so forth. New infrastructure associated with the Photovoltaic facility will have additional negative impacts on the landscape character and aesthetic quality of the area. The proposed projects aim to optimise mining activities and improve logistics on site and has as overall purpose the continuation of the mining activities within	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		the existing mining rights boundary. As the aim of the projects is to sustain the existing production capacity, it is not anticipated that additional employees would be sourced for the construction or the operational period. Some opportunities can, however, be created as part of the construction of the Khumani Photovoltaic Solar Project through direct and indirect employment. Please refer to the sections relating to land use, visual, and noise.														
Waste Management and Handling Hydrocarbon spills within the Mining Area and the management of Domestic and Hazardous Waste	Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Topography	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Soils	Contamination of soil resources due to hydrocarbon spills.	N	-1	-2	-4	-4	-11	CbA	Storage of fuels and oils, the refuelling of vehicles and equipment maintenance must be limited to designated, bunded (bunds to be 110% of volume of the materials stored) areas. All contaminated material at the Exploration Activities, associated with the ongoing assessment of opencast development must be contained in mobile sumps. The mobile sumps must maintain a suitable freeboard, to ensure when these are moved/transported, that no spillage will occur. All fuels and soils must be stored in appropriate containers. Chemicals and hazardous material must be stored in suitable containers, fit for purpose and in line with SDS requirements. Where drip trays are too small, specially prepared, non-pervious bunds with solution trenches must be used to capture spillages Oils and potentially hazardous materials must be disposed of at a licensed facility and waste certificates obtained.	N	-1	-2	-1	-1	-5

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										A spill kit must be provided to be used in the event of a spill. If a spill occurs, the contaminated soil must be removed immediately. Contaminated soil must be stored according to best practices until it can be disposed of at a suitably licensed facility. Safety signage must be used at designated storage areas. Any emulsion or other contaminants should be collected and the soils remediated immediately. All workers must undergo an induction which includes environmental awareness training to make them aware of the environmental incident management procedures as well as the importance of complying with management measures.						
		Contamination of soils as a result of a lack of sanitary services	N	-1	-2	-4	-4	-11	CbA	Chemical toilets must be readily available to employees where permanent infrastructure is not available. Licensed companies must be appointed to remove any contaminated material and or wastes to licensed landfill sites.	N	-1	-2	-1	-1	-5
		Handling of building Rubble	N	-2	-2	-1	-2	-7	CbA	Burying of any waste including rubble, domestic waste, empty containers on the site etc. should be strictly prohibited and all construction waste must be removed to an approved disposal site. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. All waste must be removed by licensed contractors and disposed of at a licensed landfill site or be disposed of at a licensed landfill site. As a duty of care and the cradle to grave principles, the mine should regularly inspect disposal site to ensure that best practices are implemented. Recycling practices must be investigated and implemented on site where practical.	N	-1	-1	-1	-2	-5
	Ecology	The unmanaged disposal of waste, could result in the spread of invader species, as well	N	-2	-3	-3	-4	-12	CbA	Develop dedicated waste handling areas; prevent access to rodents and opportunistic species; prevent the spread of waste. Develop dedicated waste handling areas, fit for purpose and prevent the windblown litter.	N	-1	-1	-2	-1	-5

Name of Activity		Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		as the influx of opportunistic species.														
	Hydrology and Freshwater Ecosystems	Handling of Hazardous Waste within workshops, water containment facilities and general mine area could contaminate the dirty water storage areas. The water is then reused in the system and could have impacts on the integrity of the storm water system and also the production.	N	-3	-2	-2	-4	-11	CbA	Clean and dirty water separation systems should be incorporated. A detailed waste management strategy will be established and implemented, which will clearly demarcate the containments for different waste streams. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. All contaminated material must be contained in mobile sumps. The mobile sumps must maintain a suitable freeboard, to ensure when these are moved/transported, that no spillage will occur. Hazardous waste handling should only take place within bunded and/or lined areas. Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site. Clean spills, if occur within 24 hours. Documentation of removal and safe disposal must be available on site. The mine will adopt a cradle-to grave approach to ensure that the waste is removed and disposed of in a legally compliant manner. Notify the relevant regulatory authorities in the event of the occurrence of a reportable incident. Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.	N	-1	-1	-2	-2	-6
		Handling and Storing of Domestic Waste should have no impact on the surface water resources due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	N/A	-1	-2	-3	-3	-9	CbA	Clean and dirty water separation systems should be incorporated. Waste management training must be implemented on site. Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed. Clear signs informing staff of waste management practices must be implemented on site. Access control must be strictly enforced. Waste should be disposed of by licensed companies to licenced facilities. Recycling practices must be investigated and implemented on site.	N	-1	-1	-2	-1	-5
	Groundwater	Large scale hydrocarbon spills could be present at the mining area	N	-3	-1	-4	-4	-12	CbA	Clean and Dirty water separation systems should be incorporated. No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area.	N	-2	-1	-2	-1	-6

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site. Any spills occurring during the collection process must be cleaned up immediately. Any significant spills must be captured in the incident reports and must be reported to the relevant department (DMRE, Catchment Management Agency/DWS). All equipment and machinery should be kept in good working order. A clean up procedure (i.e. Works Instruction) must be in place. Clean spills, if occur within 24 hours.						
		Handling or Hazardous Waste within workshops and general mine area.	N	-2	-2	-2	-4	-10	CbA	Clean and Dirty water separation systems should be incorporated. The workshop should be designed with the suitable waste containment measures (berms, sumps, oil separators). Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. Hazardous waste handling should only take place within bunded and/or lined areas, with a capacity of at least 110% of the volume stored. Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site. Documentation of removal and safe disposal must be available on site.	N	-1	-1	-2	-2	-6
		Handling and Storing of Domestic Waste	N	-2	-2	-1	-2	-7	CbA	Clean and dirty water separation systems should be incorporated. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. All waste must be removed by licensed contractors and disposed of at a licensed landfill site. As a duty of care and the cradle to grave principles, the mine should regularly inspect disposal site to ensure that best practices are implemented. Recycling practices must be investigated and implemented on site where practical. Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.	N	-1	-1	-1	-2	-5
	Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
	Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 52: Potential Impacts – Operational Phase

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type						
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
Expansion of Opencast Operations	Geology	The removal of iron ore via the opencast pits is a permanent impact on the geology as the mineral resource will not be able to be replaced.	N	-4	-3	-4	-3	-14	I	To ensure that the Mining Works Programme is continuously optimised to mine the minerals optimally. Ongoing research and exploration should be undertaken to ensure the optimal mining practices. These activities should take place within the stipulations of the EMP. Environmental Gap Assessments should be undertaken prior to the initiation of exploration activities or amendment to infrastructure design to ensure that such activities are undertaken in an environmentally lawful manner.	P	4	4	4	3	15
	Topography	Excavations in the landscape to the mining activities.	N	-1	-3	-4	-3	-11	R	Ongoing rehabilitation during opencast mining of the opencast pits, via the use of infill of the pits with excess mine residue. These areas should be shaped to be free draining, resembling the natural surface topography. Backfilling must be undertaken as part of the operational practices where possible without the sterilisation of ore reserves. Annually revisit the Visual Impact in parallel with the Annual Rehabilitation and Final rehabilitation plans.	N	-2	-2	-2	-1	-7
	Dolomite impact on pits	The presence of cavities have been shown to occur on the site. The occurrence of these is difficult to predict as they occur within the bedrock where solution cavities may be present. Although they are likely to be rare occurrences,	N	-3	-3	-3	-3	-14	CbA	There is evidence that dewatering has had some effect on surface instability on the property. It is recommended that a study be conducted to explore techniques that will aid the identification of potential problems area. Such techniques include inter alia geophysical methods such as a gravity survey to identify low gravity anomalies that will aid identifying voids in bedrock. Investigation in the filling of cavities below opencast pits must be undertaken in consultation with the DWS to ensure safe opencast mining practices.	N	-2	-2	-4	-2	-10

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type						
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		they do pose a significant risk to mining activities.								The development of a Dolomite Risk Management Plan (DRMP) is recommended to mitigate the risks posed by dolomite related instability and involves devising an appropriate monitoring programme and reaction plan to incidents to mitigate against the risks around the King Mining Area.						
	Soil and Land use	Please refer to the Construction Phase management measures, no additional impacts have been identified.	N	-2	-2	-4	-2	-10	CbA	Regular monitoring must be undertaken through walk-abouts to ensure that the mine is aware of any leaks along the pipelines. Where erosion is present this must be rehabilitated as soon as practically possible. Where leaks are present measures must be implemented to contain and reduce the volumes of loss of water by either shutting down the pipeline or any other measure economically viable at that time of the operation. Water leaks must be rectified and fixed within 12 hours from occurrence. Any leaks must be documented on the Isometrix system, no matter the quantity thereof. This will ensure that recurrences or areas where maintenance are required are identified proactively prior to a serious encounter. A detailed water management and system maintenance procedure must be implemented on site, documenting the responsible persons, actions required on a daily, weekly, monthly or annual basis as well as recording requirements.	N	-1	-1	-2	-2	-6
	Ecology	The establishment of Weeds and Invader Species.	N	-2	-3	-4	-4	-13	CbA	The AIP species eradication plan will be implemented continuously. If natural succession of vegetation is not established within one rainy season, after commencement of rehabilitation, the disturbed areas and areas adjacent to the infrastructural areas must be re-vegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission.	N	-1	-1	-2	-1	-2
	Hydrology and Freshwater Ecosystems	Runoff into the Opencast Pit areas, which could result in the loss of water to the catchment and unsafe mining conditions.	N	-2	-3	-3	-3	-11	R	The proposed Opencast Pit expansion should be kept to minimum footprint area. Enviroberms should be place around the perimeter fence of the opencast pits to ensure safe mining conditions. Rainfall entering the pit area, should be managed within the pit area with mobile pumps to allow evaporation to take place.	N	-1	-2	-1	-1	-5
	Groundwater	Dewatering of opencast pits to allow for safe mining conditions. Dewatering may	N	-1	-2	-1	-2	-6	CbA	Groundwater monitoring must be undertaken in line with the approved monitoring network. Dewatering should only be undertaken for safe mining purposes.	N	-1	-1	-1	-1	-4

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type						
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		only occur from 2034. Dewatering will be contained to the existing dewatered aquifer.								All water dewatered must be reused in the mining operations to reduce the water requirements from the Sedibeng Pipeline Scheme. Biennial (every second year) numerical model updates must be undertaken to determine the impact of dewatering on the surrounding environment if any. The mine should remain involved in the Water Forum to ensure that potential concerns from surrounding stakeholders can be identified and addressed proactively.						
	Air Quality	Blasting activities, although a minimal contribution by the small increase in opencast operations may contribute to dust emissions in the area.	N	-2	-1	-2	-1	-6	CbA	Maintain the current air quality monitoring stations that determine fallout and implemented respirable dust (PM10) monitoring that could arise from the mining activities. Develop a strategy for ongoing rehabilitation on each of the Mine Residue Deposits (such as ongoing vegetation).	N	-1	-1	-1	-1	-4
	Heritage	Please refer to the Construction Phase management measures, no additional impacts have been identified.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Noise	Noise activities, although a minimal contribution by the small increase in opencast operations may contribute to vibrations in the area.	N	-2	-1	-2	-1	-6	CbA	Maintain the current air quality monitoring stations that determine fallout and implemented respirable dust (PM10) monitoring that could arise from the mining activities. Develop a strategy for ongoing rehabilitation on each of the Mine Residue Deposits (such as ongoing vegetation).	N	-1	-1	-1	-1	-4
	Visual	No further impact, please refer to the air quality section before.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Socio-Economic	No further impacts are foreseen	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Operation of King/Mokaning Low Grade ROM Stockpile, Bruce Block A & B Low Grade ROM Stockpile and the Discard Dump. (no additional impacts and management measures are	Geology	No impact is foreseen to take place on geology as a result of the project.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Topography	No impact is foreseen to take place on geology as a result of the project.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Soil and Land use	No impact is foreseen to take place on geology as a result of the project.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ecology	The establishment of Weeds and Invader Species.	N	-2	-3	-4	-4	-13	CbA	The AIP species eradication plan will be implemented continuously.	N	-1	-1	-2	-1	-2
	Surface Water	No impacts are foreseen to take place on surface water, as the pipeline route is not located in	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type						
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
discussed for the Product Stockpile as these will be located within the already managed clean and dirty water system of the Beneficiation Plant)		close vicinity of watercourses. Clean and dirty water infrastructure will be implemented around these facilities during the construction phase.														
	Groundwater	According to the Golder Groundwater study, 2019 no significant impact on groundwater is foreseen from the Mine Residue Deposits.	-	-1	-2	-1	-1	-5	CbA	Designs as at closure should be available for each of the Mine Residue Disposal Facilities, and the facilities should be operated in accordance and material be disposed on these as stipulated in the designs. Develop a strategy for ongoing rehabilitation on each of the Mine Residue Deposits (such as ongoing vegetation). Groundwater monitoring must continue in line with the requirements of the approved WUL.	-	-1	-1	-1	-1	-4
	Air Quality	Mine Residue Disposal Facilities may contribute to dust emissions in the area.	N	-2	-1	-2	-1	-6	CbA	Maintain the current air quality monitoring stations that determine fallout and implemented respirable dust (PM10) monitoring that could arise from the mining activities. Develop a strategy for ongoing rehabilitation on each of the Mine Residue Deposits (such as ongoing vegetation).	N	-1	-1	-1	-1	-4
	Heritage	No further impact is foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Noise	No impact on the ambient noise levels are foreseen as a result of the operation of the water containment facilities.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Visual	The increase in the WRDs will contribute to the negative visual characteristics of this area.	N	-2	-2	-2	-2	-8	CbA	Develop a strategy for ongoing rehabilitation on each of the Mine Residue Deposits (such as ongoing vegetation). Disposal onto the Mine Residue Deposits should be undertaken with closure in mine. This should include the sloping of the facilities and allowance for self-succession to continue.	N	-1	-1	-1	-1	-4
	Socio-Economic	No further impact is foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Operation of the Solar Plant	Geology	No impact is foreseen to take place on geology as a result of the project.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Topography	No impact is foreseen to take place on geology as a result of the project.	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type						
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
	Soil and Land use	Contamination of soil resources due to hydrocarbon or chemical spills.	N	-1	-2	-4	-4	-11	CbA	Storage of fuels and oils, the refuelling of vehicles and equipment maintenance must be limited to designated, bunded (bunds to be 110% of volume of the materials stored) areas. All fuels and soils must be stored in appropriate containers. Chemicals and hazardous material must be stored in suitable containers, fit for purpose and in line with SDS requirements. Where drip trays are too small, specially prepared, non-pervious bunds with solution trenches must be used to capture spillages Oils and potentially hazardous materials must be disposed of at a licensed facility and waste certificates obtained. A spill kit must be provided to be used in the event of a spill. If a spill occurs, the contaminated soil must be removed immediately. Contaminated soil must be stored according to best practices until it can be disposed of at a suitably licensed facility. Safety signage must be used at designated storage areas. All workers must undergo an induction which includes environmental awareness training to make them aware of the environmental incident management procedures as well as the importance of complying with management measures.	N	-1	-2	-1	-1	-5
		No impacts in terms of land use has been identified, as this area is identified in the Strategic Development Framework for mining and prospecting activities.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Spills along water pipelines and runoff from the Farm could contaminate or impact on the conditions of soils through soil erosion.	N	-2	-2	-4	-2	-10	CbA	Regular monitoring must be undertaken through walk-abouts to ensure that the mine is aware of any leaks along the pipelines. Implement an effective system of storm water run-off control using bunds and ditches, where it is required - that is at points where water accumulation might occur. The system must effectively collect and safely disseminate any run-off water from all hardened surfaces and it must prevent any potential down slope erosion Strips of natural vegetation (i.e. locally occurring species) should be allowed to re-grow between rows of PV panels, to reduce runoff rates, and to allow local infiltration of water that runs off the panels.	N	-1	-1	-2	-2	-6

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type						
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas, where self-succession is not possible throughout the site, to stabilise the soil against wind erosion Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the storm water run-off control system and to specifically record the occurrence of any erosion on site or downstream. This inspection should be done once per month during the construction phase and once every six months during the operation phase. Corrective action must be implemented to the run-off control system in the event of any erosion occurring Where erosion is present this must be rehabilitated as soon as practically possible. Where leaks are present measures must be implemented to contain and reduce the volumes of loss of water by either shutting down the pipeline or any other measure economically viable at that time of the operation. Water leaks must be rectified and fixed within 12 hours from occurrence. Any leaks must be documented on the Isometrix system, no matter the quantity thereof. This will ensure that recurrences or areas where maintenance are required are identified proactively prior to a serious encounter. A detailed water management and system maintenance procedure must be implemented on site, documenting the responsible persons, actions required on a daily, weekly, monthly or annual basis as well as recording requirements.						
	Ecology	Spread of invader species	N	-2	-3	-4	-4	-13	CbA	AIP monitoring and clearing/control should take place throughout the construction phase of the development. 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.	N	-1	-1	-2	-1	-2
		Accidental death of animals on the roads and other causes of animal fatalities	N	-2	-3	-2	-5	-12	CbA	Clearly marked signs will be erected along the transportation routes to create awareness of animal crossings. A clearly marked and enforced vehicle speed will be implemented on the internal mine and transportation routes. A detailed induction programme will be in place to ensure that all parties are aware of the rules and regulations on site in terms of the use of roads. All power lines should be equipped with flight diverters.	N	-1	-3	-1	-3	-8

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type						
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										Vehicles may only travel on demarcated roads on site. A fire management plan must be developed for the mine. Fire belts must be constructed around the boundaries of the mine. The poaching and/or hunting of animals will be strictly forbidden.						
	Ecology, Soils, Social	Risks considered in terms of the Battery Storage Area are fire, explosion or leak resulting from the battery storage system which may result in contamination of soil and water ecosystems and may affect the health and safety of any staff, contractor and member of the workforce as well as neighbouring residents and other interested and affected parties. Due to the nature of the attributes under consideration (i.e. human health and state of soil and water features) the significance of the identified impacts/risks is high pre-mitigation.	N	-2	-3	-4	-1	-10	CbA	Ensure that BESS is contained to avoid any potential spills. All employees must receive the necessary training. Maintain an Incident Register on site. Fire belts must be constructed around the boundaries of the mine. Emergency preparedness plan must be implemented. Ensure that Emergency Response Procedures are in place in case of fire, explosion or leak resulting from the battery storage system, including fire suppression, storage system design, and fail-safes. Material safety data sheets must be in place of all hazardous substances, maximum quantity of each substance on premises, and assessment report. Prevent any risk of fire, explosion or release of toxic gas risk from battery storage facility. Obtain special instructions from supplier before use. Do not handle until all safety precautions have been read and understood. Ensure compliance with Materials and Safety Data Sheet. Wear protective gloves/protective clothing, eye protection and face protection. In case of overheated Batteries/Gas Sensor Activation, shutdown of system may not be required, especially if critical systems will be disabled. Check for deformities or bulging of batteries and for electrolyte spills. If the system is on fire or other life safety/property hazard exists locate emergency stop, disconnect or circuit breaker and shutdown the battery storage system. Stay away from open bus bars (shock hazards). In case of overheated Batteries/Gas Sensor Activation, shutdown of system may not be required, especially if critical systems will be disabled. Check for deformities or bulging of batteries and for electrolyte spills.	N	-1	-1	-2	-1	-5
	Hydrology and Freshwater Ecosystems	Washing of the solar panels may result in contaminated runoff from the facility.	N	-2	-3	-2	-3	-10	-	Implement an effective system of storm water run-off control using bunds and ditches, where it is required - that is at points where water accumulation might occur. The system must effectively collect and safely disseminate any run-off water from all hardened surfaces and it must prevent any potential down slope erosion. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize the soil against wind erosion.	N	-1	-1	-1	-2	-5

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type						
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										It is recommended that cleaning is done with automated tracking mechanisms with very little water use and often dry cleaning products. For washing purposes the use of environmentally friendly cleaning agents must be implemented. Wash water should be contained as far as practically for reuse. To ensure that the water can be used for dust suppression or reuse in cleaning. Stormwater should not be conveyed along lined channels or in pipes and discharged directly into watercourses, but must be allowed to flow along unlined swales, permeable areas or bioswales (i.e. vegetated channels). Strips of natural vegetation (i.e. locally occurring species) should be allowed to re-grow between rows of PV panels, to reduce runoff rates, and to allow local infiltration of water that runs off the panels						
		Contamination of watercourses due to the presence of vehicles and operational activities in the area.	N	-2	-3	-2	-3	-10	-	No operational activities, unless authorised may take place within 100m from a watercourse. Services and maintained toilets and wash facilities. No irrigation of landscaped areas on the site. It is recommended that cleaning is done with automated tracking mechanisms with very little water use and often dry cleaning products. Clean and dirty water separation must be implemented and maintained during the operational phase.	N	-1	-1	-1	-2	-5
	Groundwater	No impact is foreseen to take place on geology as a result of the project.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Air Quality	No impact on the ambient air quality conditions are foreseen as a result of the operation of the water containment facilities.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Noise	When considering the noise and vibration associated with the proposed Solar Plant – specifically considering the transformers and inverters, no significant concern has been raised:	N	-2	-3	-2	-3	-10	CbA	Ensure to utilise equipment which will not result in a significant impact on the ambient noise conditions.	N	-1	-2	-1	-1	-5

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type						
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		The inverters contained within the MVPSs have a rating of 67dB at a 10m distance. The largest transformers to be used may be 40MVA therefore looking at around 45dB per transformer. According to the International Standards, Guidelines and Requirements the recommended noise level for a noise sensitive area is 55.0dBA during the day and 45.0dBA during the night (World Bank, 2005). By not considering the correct equipment, vibration may become a concern to surrounding landowners.														
	Heritage	No impact is foreseen to take place on geology as a result of the project.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Visual	The additional infrastructure in this section of the mine could result in light nuisance to surrounding landowners.	N	-2	-3	-2	-3	-10	CbA	Lights should be placed in such a manner not to impact on surrounding landowners. It is recommended that all lighting faces down.	N	-1	-1	-1	-1	-4
										A lighting plan should be prepared by the proponent or the electrical or lighting engineer/consultant to monitor the type and intensity of lighting and any light spillage and avoid high-mast lighting.						
										Outdoor lighting should be fitted with reflectors to minimise light spillage on the surroundings.						
										Security lighting kept as unobtrusive as possible through use of low-level bollard type lights where possible.						
										Location of internal power lines underground, where possible.						
										In addition to the above, if the site must be lit at night for security purposes, this should be done with downward directed low-UV type lights (such as most LEDs), which do not attract insects						

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
	Socio-Economic	No impact is foreseen to take place on geology as a result of the project.	P	3	1	2	3	9	-	The Water Balance must be updated annually, with a strong focus on improving the management of the internal water circuit on site.	P	3	3	5	5	16
Waste Management	Please refer to the Construction Phase		-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 53: Potential Impacts – Decommissioning Phase

Name of Activity	Impact Area	Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities		Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
Legal Requirements (Environmental Permits)	Legal Compliance	Unlawful activities could lead to NWA Directives and Section 24G Rectification fines.	N	-4	-3	-2	-5	-14	CbA	A legal assessment of all activities must be undertaken annually to ensure that all are licensed. A detailed closure plan must be developed and submitted to the relevant departments for approval. All legally appointed personnel responsible or involved in activities on site must receive training on the requirements of the Environmental Authorisations and EMPs Quarterly decommissioning must be undertaken, on the lawful implementation of the Environmental Authorisation Environmental Authorisations must be available on site at all times. The legal register must be updated to indicate all updated activities.	P	4	3	5	5	17
Infrastructure Removal	Geology	No direct impact	-	-	-	-	-	-	-	-		-	-	-	-	-
	Topography	Removal of infrastructure may impact on the topography.	N	-2	-3	-4	-4	-13	R	Linear infrastructure constructed by the mine will be removed if it proves to inhibit land use at decommissioning. Where possible, infrastructure will remain for social investment opportunities, this will be decided in conjunction with the IDP of the area and the local authorities. Ensure the entire site remains fenced for the duration of rehabilitation. Retain security access control to the site for the duration of rehabilitation. All fixed assets that can be profitably removed will be removed for salvage or resale (the salvage and resale value	P	3	3	4	4	14

Name of Activity		Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										have however not been incorporated into the closure cost estimate as per the legislative requirements)						
										All surface structures, infrastructure and 'hard surfaces' (*inter alia* redundant pump equipment, etc.) are to be demolished and removed from the disturbed mine footprint, unless an alternative/ continued use for any such items is agreed upon, in writing, with the DMRE.						
										All surface infrastructure would be demolished and removed to a depth of at least 1m. Any infrastructure below 1m will be sealed, made safe and left *in situ*.						
										All fences erected around the infrastructure be dismantled and either disposed of at a permitted disposal site or sold off as scrap (provided that these structures will no longer be required by the post mining land owner). Fences erected to cordon off dangerous excavations will remain in place and will be maintained as and when required.						
										Water pollution control structures will remain until the completion of all demolition and associated rehabilitation activities where after these will be rehabilitated.						
	Soil, Land Use and Land Capability	Spills around decommissioning areas (hydrocarbons and paste) may result in the contamination of soils.	N	-1	-2	-4	-4	-11	CbA	Draw up a plan clearly defining the area where the removal of infrastructure should take place. Implement the plan with sufficient measures in place not to compact new areas.	N	-1	-2	-1	-1	-5
										All hazardous waste should be disposed of at licensed and fit-for-purpose areas and safe disposal records should be kept on file.						
										Any hydrocarbon, effluent or other contaminants should be collected and the soils remediated immediately.						
		Contamination of soils as a result of a lack of sanitary services	N	-1	-2	-4	-4	-11	CbA	Chemical toilets must be readily available to contractors.	N	-1	-2	-1	-1	-5
										Licensed companies must be appointed to remove any contaminated material and or wastes to licensed landfill sites.						
		Loss of soils due to decommissioning activities present on site.	N	-1	-2	-4	-4	-11	CbA	Draw up a plan clearly defining the area where the removal of infrastructure should take place. Implement the plan with sufficient measures in place not to compact new areas.	N	-1	-2	-1	-1	-5
										Compacted soils adjacent to the infrastructure footprint can be lightly ripped to alleviate compaction where required.						
										Implement a strict penalty fine system for rule breaking with regard to vehicular movement.						

Name of Activity		Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										Maintain clean and dirty water systems and undertake regular monitoring and maintenance thereof.						
	Ecology	The establishment of Weeds and Invader Species.	N	-2	-3	-4	-4	-13	CbA	The AIP species eradication plan will be implemented continuously. If natural succession of vegetation is not established within one rainy season, after commencement of rehabilitation, the disturbed areas and areas adjacent to the infrastructural areas must be re-vegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission.	N	-1	-1	-2	-1	-2
	Surface Water	Erosion control over rehabilitated areas and the prevention of erosion gullies.	N	-1	-1	-4	-2	-8	CbA	The topography of all disturbed areas must be shaped in such a manner that the surrounding natural area blends naturally with the rehabilitated areas well as to be free-draining. This will reduce soil erosion and improve natural re-vegetation.	N	-1	-1	-2	-2	-6
		Contamination of surface water as a result of removal of infrastructure.	N	-2	-2	-4	-3	-11	CbA	The detailed waste management strategy implemented during the construction and operation phases must be continuously implemented throughout the closure and decommissioning phase. Contaminated water from the water containment facilities should be reused in the plant system as long as possible and left to evaporate. No unlawful discharge of water will be allowed.	N	-1	-1	-2	-2	-6
		Rubble and waste from site could pollute runoff.	N	-1	-1	-4	-2	-8	CbA	All wastes required should be removed to licensed waste disposal facilities and by licenced companies.	N	-1	-1	-2	-2	-6
	Groundwater	Decommissioning and removal of facilities could lead to the infiltration of dirty water to groundwater resources.	N	-2	-3	-2	-2	-9	CbA	No water may be discharged into watercourses, if this water has not been treated to the correct quality OR if approval from the DWS for such activity has not been obtained. Groundwater monitoring must continue up until closure is obtained.	P	2	3	4	5	14
	Heritage	No direct impact	-	-	-	-	-	-	-	-		-	-	-	-	-
	Visual	Fugitive dust emissions as a result of infrastructure removal and associated exposed/bare areas may have an impact in terms of air quality and visual characteristics.	N	-2	-2	-4	-3	-11	CbA	The dust monitoring network and dust suppression programme established during the construction phase of the project will be maintained throughout the decommissioning/ closure phase of the mine. With respect to road dust levels, it is recommended to limit vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity.	N	-2	-1	-3	1	-5

Name of Activity		Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										Establish and implement a dust suppression plan in consultation with the Environmental Control Officer and an air quality specialist as part of the contractor's responsibility.						
	Air Quality	All activities associated with the removal of infrastructure and rehabilitation has the potential to release dust.	N	-2	-2	-4	1	-7	CbA	The dust monitoring network and dust suppression programme established during the construction phase of the project will be maintained throughout the closure phase of the mine. With respect to haul road dust levels, it is recommended to limit vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity.	N	-2	-1	-3	1	-5
	Noise	All activities associated with the removal of infrastructure and rehabilitation has the potential to generate noise.	N	-2	-2	-4	1	-7	CbA	The removal of all infrastructure is to take place during daytime periods only. Where noise becomes a nuisance, management measures will be investigated and implemented to address these.	n	-2	-1	-3	1	-5
	Social	No direct impact, however communication is important.	N	-2	-2	-4	1	-7	-	Local residents, with the focus on the surrounding landowners, should receive accurate information with regards to the project status, timeframes for decommissioning and other relevant information about issues that could influence their daily living and movement patterns.	N	-2	-1	-3	1	-5
Earth Moving, shaping and ripping of ground	Geology	No direct impact	-	-	-	-	-	-	-	-		-	-	-	-	-
	Topography	The shaping of the site should be undertaken in such a manner that it improves the overall topography of the site.	P	1	3	4	5	13	R	Pre-mining topography should be reasonably restored through shaping and landscaping, such that the topography of rehabilitated areas will ultimately be commensurate with that of adjacent, non-disturbed areas. The rehabilitation of the opencast pit expansion will tie into the overall Khumani EMPr objectives - should the pits not be backfilled during the operational phase; the pits will be made safe with the implementation of enviroberms. Remaining Mine Residue Deposits, must be shaped to a 1:3 slope and should fulfil the design parameters of a final rehabilitation plan, developed by a Qualified Engineer. Where stockpiles have been removed, the surface areas must be ripped and ameliorated. Measures must be implemented to reduce erosion and to promote self-succession. If a reasonable assessment indicates that the re-establishment of vegetation is unacceptable slow, the soil	P	1	3	5	5	14

Name of Activity		Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										need to be analysed and any deleterious effects must be corrected and the area be seeded with a seed mix to specification. The final shaping should be viable to allow for final post mining land use. If possible, ensure a continuation of the pre-mining surface drainage pattern.						
	Soils	Soil erosion	N	-6	-3	-4	-3	-16	CbA	If a reasonable assessment indicates that the re-establishment of vegetation is unacceptable slow, the soil need to be analysed and any deleterious effects must be corrected and the area be seeded with a seed mix to specification.	N	-2	-1	-3	1	-5
		Ripping and topsoil replacement will restore the soil physical characteristics prior to re-vegetation.	P	1	3	4	5	13	CbA	Compacted soils will be ripped and topsoil will be replaced if the latter is deemed necessary for effective vegetation. Where sites have been alienated of vegetation or where soils have been compacted or covered with concretes, these sites will be ripped and ploughed. If a reasonable assessment indicates that the re-establishment of vegetation is unacceptable slow, the soil need to be analysed and any deleterious effects must be corrected and the area be seeded with a seed mix to specification.	P	1	3	5	5	14
	Terrestrial Ecology (Fauna & Flora)	The rehabilitation of the site will allow re-establishment of natural vegetation.	P	1	2	3	4	10	CbA	Compacted soils will be ripped and topsoil will be replaced if the latter is deemed necessary for effective vegetation. After the topsoil has been replaced the area should be ameliorated and seeded, should self-succession of vegetation not take place. Only species indigenous to the area will be included. The soil fertility status should be determined by soil chemical analysis after levelling and before seeding/re-vegetation if deemed applicable. On-going AIP species control is required through all phases of rehabilitation. If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the soil need to be analysed and any deleterious effects must be corrected and the area be seeded with a seed mix to specification.		3	3	3	4	13
	Wetland	No direct impact	-	-	-	-	-	-	-	Access to rehabilitated areas should be restricted to vehicles/ machinery specifically required for the implementation of the decommissioning/ closure plan.		-	-	-	-	-
			N	-2	-1	-3	1	-5	CbA	-	P	3	3	3	4	13

Name of Activity		Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
	Surface Water	Runoff from rehabilitated areas will impact on watercourses especially during intensive rainstorms especially if the area are not free draining.								The areas will be shaped to be free draining in line with the approved storm water management plan.						
	Groundwater	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Heritage	No direct impact	-	-	-	-	-	-	-		-	-	-	-	-	-
	Visual	The rehabilitation (ripping, topsoil replacement and landscaping) will remove the visual incongruity.	P	2	4	4	1	11	CbA	-	P	2	4	4	3	13
										An overall visual improvement will be noticed once all mining related infrastructure has been demolished and the area has been shaped and self-succession has occurred.						
										Demarcate the decommissioning area and limit the decommissioning activities as far as possible.						
										Final shaping will be implemented such that the final profile of the rehabilitated areas are formed to emulate natural contours of the area.						
										Foundations will be removed to a depth of 1 m below the surface and the area rehabilitated.						
										All material recovered from the demolition of buildings and/or structures will either be transported to a permitted disposal site, or made available to the local community as building materials (provided they are in a satisfactory condition following demolition).						

Name of Activity		Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										Linear infrastructure constructed by the mine (i.e. pipelines) will be removed if it proves to inhibit land use at decommissioning.						
	Air Quality	All activities associated with the removal of infrastructure has the potential to release dust.	N	-2	-2	-4	1	-7	CbA	All fences erected around the mine will be dismantled and disposed of at a permitted disposal site. Dust sampling will be undertaken on a monthly basis. Monthly monitoring reports will be generated by the mine or through a suitably qualified air quality specialist.	N	-2	-1	-3	1	-5
	Noise	All activities associated with the removal of infrastructure and rehabilitation has the potential to generate noise.	N	-2	-1	-4	3	-4	CbA	In the event that air quality or dust issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation. The removal of all infrastructure is to take place during daytime periods only. Where noise becomes a nuisance, management measures will be investigated and implemented to address these. Machinery with low noise levels and maintained in a good order to be used and to comply with the International Finance Corporation's (IFC) Health and Safety Regulations. Speed control measures will be implemented by the mine through the placement of adequate signage. Implement a penalty system for non-compliance to speed control measures and ensure that all workers are made aware of the penalty systems.	N	-2	-1	-3	1	-5
	Social	No direct impact	-	-	-	-	-	-	-	Gravel roads to be maintained in as good and smooth a condition as possible.		-	-	-	-	-
Waste Management and decommissioning of hazardous (also fuels) substances	Geology	No direct impact	-	-	-	-	-	-	-	-		-	-	-	-	-
	Topography	No direct impact	-	-	-	-	-	-	-	-		-	-	-	-	-
	Soil, Land Use and Land Capability	Spills around the diesel storage areas and product stockpiles may result in the contamination of soils.	N	-1	-2	-4	-4	-11	CbA	- Any hydrocarbon, effluent or other contaminants should be collected and the soils remediated immediately.	N	-1	-2	-1	-1	-5

Name of Activity		Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		Handling of Building Rubble	N	-2	-2	-2	-3	-9	CbA	Documentation of removal and safe disposal must be available on site. All infrastructure will be removed and rehabilitated, should no alternative use be found for the structures. Foundations will be removed to a depth of 0.5m below surface.	N	-1	-1	-2	-2	-6
	Terrestrial Ecology (Fauna & Flora)	No direct impact	-	-	-	-	-	-	-	A contaminated land assessment should be undertaken at all areas where diesel was stored, as well as where fuel pipelines were placed.	-	-	-	-	-	-
	Wetland	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Groundwater	Handling or Hazardous Waste within workshops and general mine area.	N	-2	-2	-2	-4	-10	CbA	- Clean and Dirty water separation systems should be incorporated in terms of the Geo Tail water study recommendations or any approved update thereafter. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. Hazardous waste handling should only take place within bunded and/or lined areas. Hazardous waste should be removed by a licensed hazardous waste removal company and taken to a suitable and licensed landfill site.	N	-1	-1	-2	-2	-6
		Handling of Building Rubble	N	-2	-2	-2	-3	-9	CbA	Documentation of removal and safe disposal must be available on site. All infrastructure will be removed and rehabilitated, should no alternative use be found for the structures. Foundations will be removed to a depth of 0.5m below surface.	N	-1	-1	-2	-2	-6
		Handling and Storing of Domestic Waste	N	-3	-3	-3	-3	-12	CbA	All building rubble will follow the waste hierarchy and will therefore either be sold for reuse where possible and as a last option be disposed of at a licensed facility suitable for such waste in line with the NEMWA. Clean and dirty water separation systems should be maintained. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the site can be detected.	N	-2	-3	-2	-2	-9

Name of Activity		Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
										Recycling practices must be investigated and implemented on site.						
	Surface Water	Handling of Hazardous Waste within workshops and general mine area could contaminate the dirty water storage areas. The water is then reused in the system and could have impacts on the integrity of the storm water system and also the production.	N	-3	-2	-2	-4	-11	CbA	Clean and dirty water separation systems should be maintained up until closure. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. Hazardous waste handling should only take place within bunded and/or lined areas. Hazardous waste and contaminated materials should be removed by a licensed hazardous waste removal company and taken to a suitable and licensed landfill site. Documentation of removal and safe disposal must be available on site.	N	-1	-1	-2	-2	-6
		Handling and Storing of Domestic Waste should have no impact on the surface water resources due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	N/A	-1	-2	-3	-3	-9	CbA	Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed. Clean and dirty water separation systems should be maintained up until closure. Waste management training must be implemented on site. Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed. Clear signs informing staff of waste management practices must be implemented on site. Recycling practices must be investigated and implemented on site. Building rubble must be disposed of in line with the requirements of the NEMWA. Access control must be strictly enforced.	N	-1	-1	-2	-1	-5

Name of Activity		Potential Impacts	Rating Prior to Measures							Mitigation Type	Rating Post Measures					
Activities	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	CbA, R, Ir	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
	Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1.f.viii.3 The Positive and Negative Impacts that the Proposed Activity (in terms of the Initial Site Layout) and Alternatives will have on the Environment and the Community that may be affected.

The proposed projects as part of this application are situated on the existing Khumani Mining Area. Mining activities have been present in this area since the late 2000s.

1.f.viii.3.a Positive Impacts

The following key positive impacts are foreseen:

- The operation of the mine due to the lawful construction of the activities will allow the mine to operate within the legal realm of the Environmental Legislation;
- The construction of the various activities will ensure that the mining environment is safe and well designed to optimise the mining operations;
- The development of the new Bruce Block A & B Off-Grade ROM Stockpile will allow for improved logistics on site in terms of shorter travelling distance as the mine progresses to the south, as well as the opportunity for long-term ongoing mining and beneficiation activities;
- The expansion of the King KM01 Opencast Pit makes provision for the optimal mining of iron ore resources as part of the approved Mining Works Programme, with the King/Mokaning Low Grade ROM height increase in height allowing for improved logistics on site in terms of shorter travelling distance;
- The rehabilitation of the KM02 Mine Residue Stockpile gives effect to the Closure Commitment of the mine to ensure that facilities are rehabilitated. By rehabilitating the facility during the Operational Phase, operational costs can be utilised and thereby reducing the requirement for an increase in the financial provision for closure;
- The formalisation of the product area in the existing Beneficiation Plant area is undertaken to improve housekeeping in this area and also to improve general environmental management. The formalisation of this area will also improve the provision to reprocess the material more effectively;
- The Solar Farm Development not only will ensure sustainable electricity supply to the mine, but will also form part of the overall initiatives in South Africa to promote the use of renewable energies and thereby reduce the demand on the Eskom Grid. This may have far reaching possible impacts on the local municipality as well; and
- The activities mentioned above allow the mine to operate, invest in the local municipal setting, be a key employment supplier in the area, and participate as one of South Africa's chrome supply mines.

With any activity where invasive tasks will take place, such as site clearance and constructions, negative impacts may arise. As part of this project various initial or potential impacts have been identified in the four (4) tables before. Specialist studies are currently underway to assess each of the project areas in detail to determine the possible impacts and associated management measures required. For the purpose of the ESR, the current available information and the experience of the EAP were used to identify potential impacts and management measures.

1.f.viii.3.b Negative Impacts

The key potential negative impacts which may/will arise and for which management measures have been recommended are, but still require confirmation by specialists are:

<u>Geology</u>

- No impacts have been identified.

<u>Topography</u>

- The increase in the Low-Grade ROM Stockpile and the development of a new facility will alter the topography of the area permanently.

<u>Soils</u>

- Vegetation clearing within the proposed areas as part of site preparation prior to commencement mining and related of activities, leading to soil disturbances and risk of erosion of exposed soils.
- Potential risk of soil erosion and disposal of waste on soil resources, leading to altered soil chemistry and quality.

- Contamination resulting from spillages of hydrocarbons and heavy metals.
- Movement of heavy machinery/ construction vehicles off existing/demarcated roads, leading to soil compaction.

Ecology

- Site clearing and construction activities will lead to habitat destruction within the footprint areas and will likely lead to the loss of floral and faunal species in the footprint areas, consequently impacting on the terrestrial biodiversity in the adjacent habitats.
- Vegetation clearance and constructions activities may result in the loss of faunal and floral SCC within the impacted areas.
- Potential indiscriminate fires by construction personnel may lead to uncontrolled/ run-away fires, impacting on floral and faunal communities.
- Construction and introduction of foreign material (e.g. soil) may lead to the further introduction of alien and invasive plant species, impacting on the floral characteristics within the natural areas remaining on the mine.
- Vehicles may impact upon the sensitive habitat during construction and operation, resulting in a loss of habitat. Vehicular movement and construction activities, could additionally cause increased erosion, leading to poor vegetation growth, consequently providing sub-optimal living conditions for faunal species.
- Dumping of construction and operational waste materials in the surrounding habitat will result in floral and faunal habitat changes, which is likely to push faunal species out of their current home ranges, resulting in an increased competition for space and resources in the areas surrounding the footprints.
- Earthworks may lead to increased runoff and erosion resulting in a further loss of faunal and floral habitat.
- Increased personnel on site may result in an increased risk of harvesting/overutilisation of medicinal and endangered floral species. Moreover, increased personnel inherently bring a higher risk of poaching activities, threatening the current faunal populations.

Freshwater Ecosystems

- Increased sedimentation and erosion of watercourses situated within 500m of the existing Discard Low Grade Stockpile.

Hydrology

- Erosion and consequent increase in Total Suspended Solids (TSS) in surrounding watercourses.

Hydrogeology

- No specific impact has been identified as a concern in terms of this project.

Air Quality

- Creation of a bare areas and the generation of dust.

Visual Impacts

- The presence of the new PV Solar Plant and the increase in the heights of the stockpiles, as well as the additional facility in the landscape, changing the topographic and visual characteristics of the area.
- Additional night lighting from the PV Solar Plant.
- Dust generation.

Heritage and Palaeontology

- Currently the projects will be developed in a manner not to impact on any Heritage Artefacts and environments.

1.f.viii.4 The possible mitigation measures that could be applied and the level of risk.

As mentioned before, specialist studies are currently underway to assess each of the project areas in detail to determine the possible impacts and associated management measures required. For the purpose of the ESR, the current available information and the experience of the EAP were used to identify potential impacts and management measures. Detailed mitigation measures and recommendations will be included in detail in the draft EIAR. The draft EIAR will take into account EAP and specialist findings.

Please refer to Table 50 to Table 53 for potential management measures which will be further assessed and confirmed by the specialist investigations.

1.f.viii.5 The outcome of the Site Selection Matrix, Final Site Layout Plan

Please refer to Section 1.f, and specifically Section 1.f.iv.9 of this report.

1.f.viii.6 Motivation where no alternatives sites exist

Not applicable.

1.f.ix Statement motivating the preferred site

Please refer to Section 1.f, and specifically Section 1.f.iv.9 of this report.

1.g Plan of Study for the Environmental Impact Assessment

1.g.i Description of alternatives to be considered including the option of not going ahead with the activity

Please refer to Section 1.f, and specifically Section 1.f.iv.9 of this report.

Based on the outcomes of the site selection, the Developer has to provide a detailed layout of all infrastructure which will be associated with the Solar Plant, such as the location of the Transformers, Inverters, Offices, Laydown Areas, etc.

1.g.ii Description of the aspects to be assessed as part of the environmental impact assessment process

The aspects of the project that will be assessed in the EIA phase are those considered by the EAP as having the potential to result in environmental and social impacts. They include:

- Clearing of vegetation in an area regarded as sensitive;
- Proximity of activities to watercourses in the area;
- Removal of topsoil and the associated loss thereof in an area which has a negative topsoil balance;
- Impact on animals along the current open spaces;
- Visual impacts;
- Impacts on surrounding landowners, in terms of noise and vibration;
- Release of dust due to clearance activities; and
- Loss of heritage resources in an area not currently assess for this purpose.

The various projects which will therefore be considered will be the:

- Upgrades of roads;
- Expansion of KM01 Open Cast Pit;
- Increase in the height of the King/Mokaning Low Grade ROM Stockpile;
- Rehabilitation of the KM02 Mine Residue Stockpile;
- Construction of the proposed new Bruce Block A & B Off-Grade ROM Stockpile;
- Reduction in size of the Discard Low Grade Stockpile deign footprint (approved activity, only design change to avoid pans);
- Construction of the PV Solar Plant.

Detailed description of each of the activities are presented in Section 0.

1.g.iii Description of aspects to be assessed by specialists

Please refer to Annexure 5 for the current available views of specialists appointed for this project.

1.g.iii.1 Soils and Land Capability

1.g.iii.1.a Specialist Appointed:

Zimpande Research Collaborative (Pty) Ltd

1.g.iii.1.b Scope of Work for EIA

Prior to commencement of the field assessment, a background study, including a literature review, was conducted to collect the pre-determined soil and land capability data in the vicinity of the project boundary. Various data sources including, but not limited to, the Agricultural Geo-Referenced Information System (AGIS) and other sources were utilized to fulfil the objectives for the assessment.

A soil survey was conducted in July 2022, at which time the identified soils within the focus areas was classified into soil forms according to the Soil Classification System: A Natural and Anthropogenic System for South Africa Soil Classification System (2018). The soil survey will be restricted to the investigation area. Subsurface soil observations will be made using a manual hand auger to assess individual soil profiles, which will entail evaluation of physical soil properties and prevailing limitations to various land uses.

The scope of work and specific outcomes in terms of the EIA Phase report are presented in the points below:

- Analysis of field results considering the various soil types;
- Data analysis will include a description of physical soil properties, including the following parameters:
    - Terrain morphological unit (landscape position) description;
    - Diagnostic soil horizons and their respective sequence;
    - Texture, estimated as % clay according to the in-situ hand feel method;
    - Depth of identified soil horizons;
    - Soil form classification name(s);
    - Observed land capability limitations of the identified soil forms; and
    - Depth to saturation (water table), if encountered.
- Group uniform soil patterns into map units, according to observed limitations;
- Analyse and interpret soil analysis data to assess the contamination risk / impacts; and.
- Provide recommended mitigation measures, monitoring practices and management practices to implement in order to comply with the National Environmental Management Act (NEMA) 107 of 1998

1.g.iii.2 Ecological and Terrestrial

1.g.iii.2.a Specialist Appointed:

Scientific Aquatic Services (Pty) Ltd

1.g.iii.2.b Scope of Work for EIA

Specific outcomes in terms of the EIA phase report are presented in the points below:

- To identify and consider all sensitive landscapes and/or any other special features within and surrounding the focus area;
- The biodiversity assessment will focus on: o Conducting a SCC assessment (for all habitat units associated with the focus area), including a POC assessment for potentially occurring species within the focus area;
    - Providing floral and faunal inventories of species that were encountered on site;
    - Describing the spatial significance of the solar PV plant development with regards to surrounding natural areas;
    - Describing floral habitats, communities and ecological state of the proposed solar PV plant layout as is determined on site; o Identifying dominant floral and faunal species for each habitat type;
    - Focus will be given to identifying areas of severe AIP encroachment and listing Category 1, 2 and 3 species in terms of GN number 1003 Alien and Invasive Species List, 2020: NEMBA; and
    - Specific focus will also be given to establishing the presence of SCC and protected fauna and flora as listed within the IUCN List, the National Forest Act, 1998, the NEMBA TOPS list of NEMBA, and relevant provincially protected species (NCNCA).

- The reports produced will include a detailed impact assessment of all identified significant risks, including cumulative impacts on ecological assemblages in the region; and
- Recommendations on the management and mitigation measures (including opportunities and constraints) with regards to the construction and operation of the proposed mining activities, will be provided to manage and mitigate impacts on the terrestrial ecology of the area.

1.g.iii.3 Aquatic and Wetland Systems

1.g.iii.3.a Specialist Appointed:

Scientific Aquatic Services (Pty) Ltd

1.g.iii.3.b Scope of Work for EIA

A desktop study was compiled with all relevant information as presented by the SANBI's Biodiversity GIS website (http://bgis.sanbi.org). Relevant databases and documentation that were considered during the assessment of the focus area included the following:

- National Freshwater Ecosystem Priority Areas (NFEPAs, 2011);
- Department of Water and Sanitation Research Quality Information Services [DWS RQIS PES/EIS], 2014 database;
- Mining and Biodiversity Guidelines (2013);
- National Biodiversity Assessment (NBA, 2018);
- Northern Cape Critical Biodiversity Areas (2016); and
- National Web-based Environmental Screening Tool (2022).

The following points highlight the envisaged activities during the EIA phase of the project:

- Field verification and delineation of the potential watercourses must be undertaken, and the field verification assessment must ensure no other watercourses are located within the focus area that may have been missed on the digital satellite imagery;
- Following the field verification, the classification of the watercourses must be undertaken according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland systems (Ollis et al., 2013);
- The Ecological Importance and Sensitivity (EIS) of the watercourses must be determined according to the method described by Rountree and Kotze, (2013);
- The services provided by the watercourses associated with the focus area and 500 m investigation area must be assessed according to the method of Kotze et al (2009) in which services to the ecology of the focus area as well as services to the people of the area were defined;
- The Present Ecological State (PES) of the watercourses must be assessed according to the resource directed measures guideline as advocated by Macfarlane et al., (2008) or DWAF (2007) as applicable;
- Watercourses should be mapped according to the ecological sensitivity of each hydrogeomorphic unit in relation to the focus area. In addition to the watercourse boundary, buffers will be generated and the applicable zones of regulation will be refined and depicted, where applicable;
- The PES, EIS, and ecological service provision of the watercourses should be highlighted;
- Expected impacts on the watercourses must be assessed according to the DWS Risk Assessment Matrix (2016) methodology; and
- Applicable mitigation measures will be refined

1.g.iii.4 Hydrology

1.g.iii.4.a Specialist Appointed:

Hydrology, Water Balance and Storm Water Management: HydroSpatial (Pty) Ltd

1.g.iii.4.b Scope of Work for EIA

The following scope of work will be undertaken:

The following is proposed to be undertaken during the EIA phase of the project:

- Development of a conceptual Stormwater Management Plans (SWMP) in accordance with the DWS BPG G1: Storm Water Management and GN704 regulations. The primary purpose of the SWMP is to ensure that clean (non-impacted mine water) and dirty water (mine impacted water) are clearly separated in accordance with the above-mentioned guideline and regulations;
- Determination of the 1:100 year floodlines for drainage channels within close proximity to the proposed projects;
- Update of the Khumani water balance to include the proposed activities (should this be necessary);
- An assessment of the potential surface water impacts and possible mitigation measures; and
- Development of monitoring plans that can be used to monitor potential impacts resulting from the proposed mining activities.

1.g.iii.5 Hydrogeology

1.g.iii.5.a Specialist Appointed:

Golder and Associates

1.g.iii.5.b Scope of Work for EIA

Golder has been associated with Groundwater investigations at Khumani Mine since 2016. Over this period a numerical model, developed in Feflow, has been constructed to represent the catchment and specifically the groundwater compartment containing Khumani and Sishen Mine. The proposed expansion occurs within the Khumani Mine/Sishen Mine groundwater compartment and hence the impacts associated with proposed expansions are required to be considered in context of the existing impacts associated with mining activities within the compartment. The existing model will therefore form the basis of the expansion project. Golder studies undertaken include:

- Golder (2017) Augmentation of Water Resources for Assmang's Khumani Mine Report No.: 1529363-311812-1
- Golder (2017) Numerical Groundwater Flow Model, Report No.: 1774550-314589-1.
- Golder (2019) Khumani Mine Numerical Groundwater Flow and Contaminant Transport Model Report no.: 19116111-324250-1 3.0

The Scope of Work will comprise of the following:

- Phase A: Desktop Review It is proposed to undertake a desktop review of any recent hydrogeological relevant information for the pit and dump development areas.
- Phase B: Update of the conceptual Model and Numerical Model The existing conceptual model will be updated to align with the information gained from the desk study and development plans for the additional open pits and stockpiles. Thereafter the existing numerical model will be recalibrated against data collected as part of Phase A. The calibrated model will thereafter be used for impact prediction purposes, key scenarios to be considered and the objectives are outlined below:
- Simulation of the expansion of the new pits
    - The purpose of this scenario is to determine the expected groundwater inflows to the pits and to determine the resulting cone of depression associated with development of the pit expansion. The drawdown is required to be evaluated as an incremental difference relative the impacts expected from existing licenced mining activities within the compartment.
- Simulation of seepage associated with the proposed stockpile facility
    - As described above, a new Low Grade ROM Stockpile measuring a footprint area of 55 Ha is proposed. Previous investigations were undertaken to evaluate the expected seepage associated with Paste and Waste Rock materials Bruce 544 and King 561. The deposit targeted on Mokaning is a continuation of the targeted at Bruce and Kinga and consequently it is assumed appropriate that information gathered for the Bruce and King areas is relevant for defining the source terms for this facility.
- Simulation of 1 water supply borehole for the solar project.
- Post closure scenario modelling
    - The recovery of water levels will be evaluated to determine the period it is anticipated to take for water level recovery in this area and to quantify impacts on receptors during the post operational phase.

- Phase C: Impact Assessment and reporting A groundwater report will be prepared to document the baseline groundwater results and will include the desk study, conceptual site model, groundwater numerical model design and parameters as well as the model results. Based on the scenario modelling undertaken, an environmental impact assessment will be compiled and, where required, appropriate mitigation measures and recommendations will be formulated.

1.g.iii.6 Visual

1.g.iii.6.a Specialist Appointed:

HydroSpatial (Pty) Ltd

1.g.iii.6.b Scope of Work for EIA

The following will be undertaken during the EIA phase of the project for the VIA study:

- Viewshed modelling of proposed infrastructure heights will be undertaken to determine the visibility of the projects on the surrounding landscape; and
- The visual impacts will be assessed in detail and mitigation measures will be proposed.

1.g.iii.7 Air quality

1.g.iii.7.a Specialist Appointed:

WSP (Pty) Ltd

1.g.iii.7.b Scope of Work for EIA

Key emission sources from the proposed changes to mining operations include opencast pits, stockpiles, and material handling. Emissions from solar energy generation are predominantly particulates associated with the construction phase. As such, the inventory and modelling simulations are limited to the assessment of:

- Total suspended particulates (TSP), assessed as dust fallout (DFO);
- Particulates less than 10 microns (PM10); and
- Particulates less than 2.5 microns (PM2.5).

Emergency releases associated with the operation and decommissioning of the BESS will be qualitatively assessed (i.e. anticipated emissions will be discussed in the Atmospheric Impact Report (AIR) but not calculated as part of the emissions inventory nor included in the dispersion model). A cumulative assessment of impacts from the proposed site changes will be undertaken using available ambient air quality monitoring data. The quantification and modelling of existing site activities or surrounding land uses is thus excluded from this proposal.

1.g.iii.8 Noise and Vibration

1.g.iii.8.a Specialist Appointed:

dBAcoustics

1.g.iii.8.b Scope of Work for EIA

<u>Environmental Noise and Vibration study</u>

The environmental noise and vibration study will be done to determine the prevailing environmental ambient noise levels within and adjacent to the proposed project area. This information will be used to determine the potential noise and vibration intrusion levels at the different noise receptors in the vicinity of the project areas.

<u>Area of Influence</u>

All residential properties in the vicinity of the proposed project study area.

Methodology

A site visit will be carried out to determine the prevailing ambient environmental noise and vibration levels by means of a qualitative evaluation and/or a quantitative evaluation. Calibrated instruments will be used to do the environmental noise survey. The impact assessment methodology will be used to identify the area likely to be affected. In terms of the International Finance Corporation Performance Standards the area of influence is defined as:

- the project and the client's activities and facilities that are directly owned, operated, or managed (including by contractors) and that are a component of the project;
- impacts from unplanned but predictable developments caused by the project that may occur later or at a different location;
- indirect project impacts on biodiversity or on ecosystem services upon which affected communities' livelihoods are dependent;
- Associated facilities, which are facilities that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable.
- Cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted

The environmental noise and vibration survey will be done during the day and the night-time periods so as to determine the baseline noise levels which will be used to identify possible noise intrusion levels at the abutting noise receptors. The vibration study will be done during daytime as blasting will only be done during daytime periods. This will assist in the management of the project in terms of noise and vibration mitigatory measures and management principles for implementation during the construction and operational phases of the project

1.g.iii.9 Heritage and Palaeontology

1.g.iii.9.a Specialist Appointed:

Heritage Contracts and Archaeological Consulting CC (HCAC).

1.g.iii.9.b Scope of Work for EIA

HCAC was contracted by EnviroGistics to conduct a heritage study at the mine.

The aim of the scoping report is to conduct a desktop study to identify possible heritage resources within the project site. The study furthermore aims to assess the impact of the proposed project on non - renewable heritage resources and to submit appropriate recommendations with regards to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve and develop them within the framework provided by Heritage legislation.

The assessment is to be undertaken in two phases, a desktop study (scoping phase) and a field-based assessment (Heritage Impact Assessment). This report concerns the scoping phase. The aim of the scoping phase is to cover available data regarding archaeological and cultural heritage to compile a background history of the study area in order to identify possible heritage issues or fatal flaws that could possibly be associated with the project and should be avoided during development.

- Literature review

A review was conducted utilising data for information gathering from a range of sources on the archaeology and history of the area. The aim of this is to extract data and information on the area in question, looking at archaeological sites, historical sites and graves of the area.

- Information collection

The South African Heritage Resources Information System (SAHRIS) was consulted to further collect data from CRM practitioners who undertook work in the area to provide the most comprehensive account of the history of the area where possible. In addition, the archaeological database housed at the University of the Witwatersrand was consulted.

- Public consultation

Consultation as part of the overall EIA Project.

- Google Earth and mapping survey

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where archaeological sites might be located.

- Genealogical Society of South Africa

The database of the genealogical society was consulted to collect data on any known graves in the area.

- Restrictions

This study did not assess the impact on intangible resources or the palaeontological component of the project. Based on available data and resources as outlined in the report additional information that becomes available at a later stage might change the outcome of the assessment.

Based on current available information, there it is possible to determine the probability of finding archaeological and cultural heritage sites within the study area to a certain degree. For the purposes of this section of the report the following terms are used – low, medium and high probability. Low probability indicates that no known occurrences of sites have been found previously in the general study area. Medium probability indicates some known occurrences in the general study area are documented and can therefore be expected in the study area. A high probability indicates that occurrences have been documented close to or in the study area and that the environment of the study area has a high degree of probability for the occurrence of sites.

- Archaeological and Cultural Heritage Landscape

NOTE: Archaeology is the study of human material and remains (by definition) and is not restricted in any formal way as being below the ground surface.

Based on the current information and with cognisance of the recorded archaeological sites in the wider area and in order to comply with the National Heritage Resources Act (Act 25 of 1999) it is recommended that a field-based assessment should be conducted. During this study sites of archaeological, historical or places of cultural interest must be located, identified, recorded, photographed and described. During this study, the levels of significance of recorded heritage resources must be determined and mitigation proposed should any significant sites be impacted upon, ensuring that all the requirements of the SAHRA are met.

1.g.iii.10 Socio-Economic

1.g.iii.10.a Specialist Appointed:

Batho Earth

1.g.iii.10.b Scope of Work for EIA

A detailed Social Impact Assessment with regards to the preferred site location will be undertaken during Phase two of the process to:

- Project and estimate potential positive and negative social impacts associated with the proposed tailings facility;
- Project and estimate how the economic impacts associated with the project would impact on the social environment within the study area;
- Determine indirect and cumulative impacts;
- Rate the anticipated impacts based on rating criteria;
- Propose mitigation measures to limit the negative impacts and enhance the positive impacts.

The methodology recommended include:

- A site visit to the area will be undertaken.
- Desktop research will be undertaken with regards to the socio-economic characteristics of the receiving environment.
- A baseline profile of the receiving environment will be compiled.

- A Scoping Report will be finalised that would note and assess the potential socio-economic impacts associated with the different site locations.
- During the EIA Phase, the anticipated socio-economic impacts of the proposed new infrastructure development (tailings facility) on a preferred site will be assessed.
- Consultation would link with the public participation process and will be undertaken with regards to the preferred site.
- Data received will be studied and analysed to assess the impact of the proposed tailings facility on the direct (surrounding communities) and indirect (regional) environment.

1.g.iv The proposed method of assessing duration significance

Please refer to Section 1.f.viii.1 presenting the methodology to be used in the determination of the significance of the impacts.

1.g.v Proposed method of assessing the environmental aspects including the proposed method of assessing alternatives

Please refer to Section 1.f.viii.1 presenting the methodology to be used in the determination of the significance of the impacts.

1.g.vi The stages at which the competent authority will be consulted

The Commenting Authorities have been notified of the proposed project via notification letters (Background Information Documents – please refer to Appendix 16. The documents provided high level project information with a reference to the project.

Commenting authorities received hard copies of the draft Scoping Report and will receive hard copies of the draft EIA Report.

All comments received from the authorities will be provided to the DMRE for considerations.

The EAP will arrange an authority meeting with the DMRE and DWS.

1.g.vii Particulars of the public participation process with regard to the Impact Assessment process that will be conducted

1.g.vii.1 Steps to be undertaken to notify interested and affected parties

In accordance with the NEMA, GNR 982, Chapter 6, potential I&APs either have been or will be notified of the proposed project using the following means:

- Fixing a notice board in conspicuous areas around the proposed project site.

Written notice to the:

- Land owner of the site where the activity to which the application relates to;
- The current occupier of the land;
- Municipal ward councillor(s) related to the project site;
- Municipality which has jurisdiction in the area; and
- Commenting authorities.

Placing an advertisement in a local newspaper.

Please refer to Appendix 16 for more detail in this regard.

1.g.vii.2 Details of the engagement process to be followed

Please refer to Section 1.f.vi and Appendix 16 for more detail in this regard.

1.g.vii.3 Description of the information to be provided to Interested and Affected Parties

During the initial stakeholder notification process, high level project detail will be provided including location of the project, boundary of the proposed project site, farm details, land use information, legal triggers and proposed way forward.

During the draft ESR, public review period (9 September to 10 October 2022), comments were received from stakeholders. These comments have been included into the Final ESR and will be address in further detail during the EIA Phase.

During the scoping phase the stakeholders obtained information regarding the:

- Site Plans;
- Alternatives;
- A description of activities and operations to be undertaken;
- Baseline information;
- Specialist studies to be undertaken; and
- Proposed impact assessment methods.

During the EIR Phase, the following information will be disclosed in the EIA Report:

- Impact assessment undertaken and results thereof;
- Management measures;
- Monitoring plans; and
- Closure objectives.

1.g.viii Description of the tasks that will be undertaken during the environmental impacts assessment process

Once the Final Scoping Report has been submitted to and accepted by the DMRE, the proposed project will proceed into the detailed EIA Phase, which involves the detailed specialist investigations (as described in earlier sections of this report).

The EAP will produce a Draft EIA Report after the completion of the required specialist studies. The Draft EIA Report will provide an assessment of all the identified key issues and associated impacts from the Scoping phase. All requirements as contemplated in the 2017 EIA Regulations will be included in the Draft EIAR.

1.g.ix Measures to avoid, reverse, mitigate, or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored

Please refer to Sections 1.f.viii.2, 1.f.viii.3, and 1.f.viii.4 for a detailed description of the potential impacts and management measures.

1.h Other Information required by the Competent Authority

None identified at this time.

1.h.i Compliance with the provisions of sections 24(4) (a) and (b) red with section 24(3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998). The EIA report must include the:-

1.h.ii Impact on the socio-economic conditions of any directly affected person

No negative impact, which cannot be managed has been identified to date. The project will allow for the long term continuation of the mining on site and will also benefit to the overall electricity grid by implementing renewable energy. In addition to this the project will allow for the improvement and formalisation of existing activities on site, which will enhance safety and environmental management on site.

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

A ESR has been completed for the proposed project. The current area of impact is listed below and will be further assessed during the EIA phase:

- The study area was assessed both on desktop level and by a non-intrusive pedestrian field survey. Stone Age scatters were noted alluding to Stone Age occupation of the area and additional finds were limited to a ruin in the discard dump, a stone cairn of unknown purpose and a cemetery (located within option B and C the Solar Facility alternatives), the latter of high social significance. The study area is of moderate palaeontological significance based on the SAHRA paleontological map and specialist assessment will be required in the EIA phase.
- Two areas within solar alternatives B & C with slightly higher artefact concentrations occur at K7 and K9 and might warrant further mitigation if impacted on.
- The ruin in the discard dump area could be older than 60 years and if this is the case the feature is protected by legislation based on its age and will require a destruction permit. No other preconstruction heritage mitigation is required at the other capital projects.
- No fatal flaws were recorded, and the impact of the Capital Projects can be mitigated to an acceptable level. To comply with the National Heritage Resources Act (Act 25 of 1999) the next phase of study is the Phase 1 Heritage Impact Assessment for the Project. During the HIA the potential impact on heritage resources will be determined as well as levels of significance of recorded heritage resources. The HIA will also provide management and mitigation measures should any significant sites be impacted upon, ensuring that all the requirements of the SAHRA are met.

1.i Other matter required in terms of sections 24(4) (a) and (b) of the Act.

None applicable.

2 UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

The EAP herewith confirms:

2.a The correctness of the Information provided in the Reports

2.b The inclusion of Comments and Inputs from Stakeholders and I&APs

2.c The inclusion of Inputs and Recommendations from the Specialist Reports where relevant

2.d That the Information provided by the EAP to I&APs and any Responses by the EAP to Comments and Inputs made by I&AP are correctly reflected herein

_____

Signature of the Environmental Assessment Practitioner

EnviroGistics (Pty) Ltd

Name of company

_____

Date

3 UNDERTAKING REGARDING LEVEL OF AGREEMENT

Undertaking by the client:

Herewith I, the person whose name and identity number is stated below, confirm that I am the person authorised to act as representative of the applicant, and confirm that the above report comprises EIA and EMP compiled in accordance with the guideline on the Departments official website and the directive in terms of sections 29 and 39 (5) in that regard, and the applicant undertakes to execute the Environmental management plan as proposed.

_____

Full Names and Surname

_____

Identity Number

_____

Designation

_____

Signature

_____

Date

Annexures

Appendix 1: DMR Acknowledgment of Receipt

Appendix 2: EAP Curriculum Vitae

Appendix 3: Environmental Permits

Appendix 4: Waste Classification

Appendix 5: KM02 WRD Design

Appendix 6: New Discard Dump Revision

Appendix 7: Air Quality

Appendix 8: Soils

Appendix 9: Ecology

Appendix 10: Freshwater Ecosystems

Appendix 11: Hydrological

Appendix 12: Visual Character

Appendix 13: Noise

Appendix 14: Heritage

Appendix 15: Stakeholder Consultation

Appendix 16: Social Assessment

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Appendix 15: Stakeholder Consultation

Stakeholder Consultation Databased

(only included in the Final ESR submitted to the Competent Authority)

Proof of Draft ESR Submission

Advertisement

Background Information Document

Minutes of Meetings

(to be included once undertaken)

Comments received from Stakeholders

Appendix 16: Social Assessment