

**DRAFT**

**ENVIRONMENTAL IMPACT ASSESSMENT  
REPORT FOR THE PROPOSED EXPANSION  
OF BUSHVELD VAMETCO MINE OPERATIONS  
IN BRITS WITHIN THE JURISDICTION OF  
MADIBENG LOCAL MUNICIPALITY IN THE  
NORTH WEST PROVINCE**

**JUNE 2021**

**DMRE REFERENCE NO.: [NW 30/5/1/2/3/2/1/08 EM](#)**

**MINING RIGHT NO.: [NW30/5/1/2/2/08MR](#)**



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**Prepared For:**

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 Date of Submission: 25 June 2021



“From the world we live to the world we seek”

Type of document	Revision	Date
Draft Scoping Report	Rev 000	June 2020
Draft Scoping Report	Rev 001	November 2020
Final Scoping Report	Rev 002	December 2020
Final Scoping Report	Rev 002	February 2021
Draft EIR	Rev 000	April 2021
Draft EIR	Rev 001	01 June 2021







*"From the world we live to the world we seek"*

**DOCUMENT CONTROL**

**PROJECT TITLE:**

The proposed expansion of Bushveld Vametco mine operations in Brits within the jurisdiction of Madibeng Local Municipality in North West Province.

**QUALITY CONTROL:**

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**EXECUTIVE SUMMARY**

Bushveld Vametco Holdings (Pty) Ltd. (MR - NW30/5/1/2/2/08M) (Vametco) is an open-cast mine which is located 5km west of Brits within the Jurisdiction of the Madibeng Local Municipality in the North West Province. The mine is approximately 3.5 kilometres long in a west-east direction and is regarded as a low-cost primary vanadium mining and processing company with a 186.7 million tonnes (Mt) Joint Ore Reserves Committee (JORC) compliant resource averaging 1.98% vanadium pentoxide ( $V_2O_5$ ) in magnetite grades (including 48.4 Mt in reserves). The mine has been operating since 1967 and it utilises a well-established salt roast processing method to produce refined vanadium in the form of Nitrovan and Vanadium Oxide.

Vametco proposes to expand its mining operations to increase mine production while ensuring environmental sustainability and management. The proposed expansion aims to increase mining production capacity from 1.2 million to an average of 4 million tons per annum. To achieve the aim, the proposed project will entail the following activities:

- The expansion of the existing slimes dam towards the east of the mine to cater for additional slimes waste.
- The expansion of the magnetite dump to the north and south of the mine.
- Construction of a 2.5MW Photovoltaic (PV) fixed-tilt solar park with a 1MW/4MWh Vanadium Redox Flow Battery Storage System.
- The construction of two Pollution Control Dams (PCDs) to service the magnetite dump and plants. The PCD that will service the magnetite dump will be  $\pm 2.65$  hectares (ha) while the PCD that will service plants will be  $\pm 1$ ha. These PCDs will be sized to accommodate return water and stormwater.
- Development of one new  $\pm 5$ ha Return Water Dam (RWD) to accommodate return/polluted water from the proposed and existing slimes dams as well as to accommodate stormwater within the mine.
- Construction of a barren dam to store barren and mother liquor solution (dam to store the excess of 100 000m<sup>3</sup>).
- Development of a new Waste Rock Dump (WRD) to reduce load and haul distance and to facilitate easy backfill.

The proposed development triggers the NEMA EIA listed activities, as such, Vametco is required to undertake an Environmental Impact Assessment (EIA) process and obtain an Integrated environmental authorisation prior to construction of the above-mentioned activities in accordance with the EIA Regulations, 2014 (promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended in April 2017 and National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM: WA).

This is an integrated Environmental Authorisation application and will include the following:

- Environmental Authorisation (EA) for listed activities as contained in Government Notice Regulations (GN R) GN R327 (983), GN R325 (984) and GNR 324 (985); and
- Waste Management Licence (WML) in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM: WA).

Further, the proposed development will trigger water use activities, as such, Vametco also needs to lodge an Integrated Water Use Licence Application (IWULA) in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) and obtain an Integrated Water Use Licence (IWUL) from the Department of Human Settlement, Water and Sanitation (DHSWS) before the commencement of any listed water use activity. Subsequently, Nsovo Environmental Consulting (Nsovo) has been appointed by Vametco to undertake the necessary authorisations and licencing process to comply with the requirement of the legislation. The project proponent is Bushveld Vametco Alloy (Pty) Ltd., whereas the Competent Authority (CA) is the North West Department of Mineral Resources and Energy (DMRE).

The Environmental Impact Assessment for the proposed project was undertaken in accordance with the EIA Regulations, in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended. The EIA phase aims to achieve the following objectives:

- a) Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- b) Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the scoping report;
- c) Identify the location of the development footprint within the approved site as contemplated in the scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- d) Determine the nature, significance, consequence, extent, duration, and probability of the impacts occurring to inform identified preferred alternatives; and the degree to which these impacts can be reversed; may cause irreplaceable loss of resources and can be avoided, managed, or mitigated;
- e) Identify an ideal location for the activity within the development footprint of the approved site as contemplated in the scoping report based on the lowest level of environmental sensitivity identified during the assessment;
- f) Identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the scoping report through the life of the activity;
- g) Identify suitable measures to avoid, manage or mitigate identified impacts; and
- h) Identify residual risks that need to be managed and monitored.

The Scoping phase entailed a detailed description of the baseline environment, which will form the backdrop of the impact assessment phase. Further, it allowed for the identification of critical issues and concerns based on input from the relevant stakeholders, Interested and Affected Parties (I&APs), and the Environmental Assessment Practitioner's (EAP) professional judgment based on experience and expertise in the field of EIA.

In accordance with the requirements of the EIA Regulations, the Final Scoping Report was submitted to the DMRE on the 14<sup>th</sup> of December 2021 and was accepted on the 18<sup>th</sup> of February 2021. After receiving the acceptance of the final Scoping Report, Nsovo has prepared the Draft EIA Report, which will be submitted to stakeholders for review and comment for 30 days (19<sup>th</sup> May to 19<sup>th</sup> June 2021), and the Final EIA Report will be submitted to DMRE for informed decision making. The conclusions and recommendations of this draft EIA are the outcomes of the identified impacts by the Environmental Assessment Practitioner's (EAP) professional judgment based on experience and expertise in the field and the specialists.

The identification and assessment of impacts were based on the input from specialist studies that provided baseline information and the necessary detail in the preparation of the report. The details of Specialists are included in Table A below, and the Reports are attached as Appendix C:

**Table A: Specialist studies undertaken**

Specialist Study	Company	Name of Specialist
Air quality Impact Assessment	Kijani Green Energy	Simon Gear
Heritage Impact Assessment	Farisani Investment T/A Archaeo-Ages Consulting	Moses Mabuda
Noise Impact Assessment	dB Acoustics	Barend Jacobus van der Merwe
Socio-economic Impact Assessment	NGT Holdings	Nkosinathi Thomose
Soil, Land use and Capability	Scientific Aquatic Services	Braveman Mzila
Traffic Impact Assessment	Eco Elementum	Pieter Jooste
Visual Impact Assessment	Outline Landscape	Kathrin Hamelouw
Wetland Impact Assessment	WaterMakers	Willem Lubbe
Biodiversity Impact Assessment	Scientific Aquatic Services	Chris Huton
Hydrological Impact Assessment	CM Electric	Chenai Makamure
Geohydrological Impact Assessment	MWEM	Golden Manganyi
Climate Change	EHRCON	Jeandré Neveling

The identified impacts associated with the proposed project and associated infrastructure are expected to include the following:

The **biodiversity impact** assessment was undertaken on all aspects of floral ecology deemed likely to be affected by the proposed expansion activities. The planning phase, i.e., the pre-construction phase, is essential in ensuring that activities associated with all phases of the project have the lowest possible impact on the receiving environment.

The construction and operational phases will have the largest direct impact on floral ecology due to extensive vegetation clearing associated with the earth moving activities. Long-term, and potentially permanent, high significance impacts are more likely to result from the decommissioning phase of the project, if all mitigation measures are not adequately implemented, i.e., without adequate rehabilitation and AIP control, indigenous floral species will struggle to establish and will be outcompeted by AIPs. Without sufficiently implemented mitigation measures, the decommissioning phase could result in a significant permanent loss of floral habitat, diversity, and SCC (including regionally and nationally protected species).

Even with extensive mitigation, latent impacts on the receiving floral ecological environment are deemed likely. The following points highlight the key latent impacts that have been identified and which are relevant to the study area:

- Loss of floral habitat.
- Permanent loss of; and altered floral species diversity; and
- Edge effects such as further habitat fragmentation and AIP proliferation.

Cumulative impacts include further loss of and fragmentation of the Freshwater Habitat, and Marikana Thornveld although degraded.

Based on the impact assessment of potential impacts on floral habitat, diversity and SCC associated with the study area, it is evident that during the construction and operational phases, the perceived impact on floral SCC, habitat and diversity is of high to medium significance prior to the implementation of mitigation measures. With mitigation measures fully implemented all impacts can be reduced to low significance levels.

Based on the impact assessment of potential impacts on faunal habitat, diversity and SCC associated with the study areas, it is evident that during the various phases, prior to mitigation, the perceived impact on faunal SCC, habitat and diversity is of medium high significance. With mitigation measures fully implemented all impacts can be reduced low significance levels.

**Impact on Wetlands** – within the study area and within 500m surrounding the study area, one hydro-geomorphic unit (HGM), comprising one HGM type, a channelled valley bottom wetland was delineated and classified. Several riparian watercourses were also delineated within and surrounding the study area. Wetlands and riparian habitat within the vicinity of the study area serve to improve habitat within and potentially downstream of the study area through the



provision of various ecosystem services. Many of these functional benefits therefore contribute directly or indirectly to increased biodiversity within the study area as well as downstream of the study area through provision and maintenance of appropriate habitat and associated ecological processes. To ensure that the water resources within the study area are managed properly and protected, a Water Use License will be lodged with the DHSWS.

The impact assessment identified surface water pollution including sedimentation as well as increased erosion, loss of wetland and riparian functionality and decreased downstream water quality as the major potential impacts during the construction and operational phase. Several general and specific mitigation measures were proposed to reduce negative impacts and incorporate some potentially positive impacts from the proposed development following the application of the mitigation hierarchy.

No fatal flaws were identified in terms of wetlands impacts. From this perspective, therefore, there is no reason why this development should not proceed.

Impact on surface water – hydrological impacts occur at every underground mining operation bringing about changes to surface landforms, groundwater, and surface water. Construction impacts associated with surface water would include surface water contamination, siltation of surface water and runoff. Contaminated runoff from concrete mixing and sediment release as well as hydrocarbon spillages may lead to the infiltration of pollutants into recharge, interflow, or responsive soils with potential negative impacts on freshwater ecosystems downstream.

Hydrocarbon-based fuels or lubricants spilt from construction vehicles, construction materials that are not properly stockpiled, and litter deposited by construction workers may be washed into the surface water bodies. Slag spillages or material containing high levels of metals or potentially harmful minerals, the mobilisation of sediments, excavations, removal, and disturbances to vegetation, could have various negative impacts on wetlands and their associated functionality.

No fatal flaws were identified in terms of surface water impacts. From this perspective, therefore, there is no reason why this development should not proceed.

**Impacts on Ground Water** - During the construction phase for the proposed activities, the following potential impacts on groundwater may result from the on-project site activities:

- Potential project site contamination of groundwater due to hydrocarbon spillages and leaks from construction vehicles and waste.
- A slight reduction of recharge to groundwater due to the compaction of the ground surface; and
- Clearing of footprints, the building of roads and other construction-related activities.
- Decrease in quality because of potential hydrocarbon spillages as well as seepage from the magnetite dump.

- Increased infiltration.
- Change in the geo-chemistry.

As these activities are relatively small in magnitude this will only pose a project site-specific low risk to groundwater if proper mitigation measures are implemented. No fatal flaws were identified in terms of groundwater impacts. From this perspective, therefore, there is no reason why this development should not proceed.

**Traffic impacts** -Traffic operating conditions were determined and compared for the baseline, project construction phase, and project operational phase scenarios. By comparing the operating conditions for the different scenarios, it was concluded the proposed development might increase in the amount of traffic during both construction and operation phases. However, this impact will be concentrated locally and the traffic influence outside the boundaries of the study area would be insignificant. No traffic problems or congestion are expected because of the project activities, provided that the issues discussed are considered. No fatal flaws were identified in terms of traffic impacts. From this perspective, therefore, there is no reason why this development should not proceed.

**Impacts on Heritage** - A graveyard has been recorded near the proposed site and is used by the Rankotea community. The identified cemetery has approximately 1200 graves and is not directly affected by the proposed mining expansion project. Further, the graves are marked and well maintained by both the community and the mine. However, approximately 30 formal graves with tombstones were recorded at the site proposed for the tailings dam. These graves will be directly affected by the proposed development (both expansion and the new Return Water Dam). The Heritage Impact Assessment Study assessed the project footprint concerning the proposed development and rated it medium to high in terms of cultural heritage significance.

Overall, impacts to heritage resources are not considered to be significant to warrant abandonment of the proposed project provided the proposed mitigation is adhered to. It is thus concluded that the project may be cleared to proceed as planned subject to the Heritage Authority ensuring that a detailed heritage monitoring procedure is included in the project EMP, for the construction phase.

**Impact on Waste** during the construction and operation phases. Naturally, the inhabitation of the land will result in the accumulation of various forms of waste in the area. The aesthetic value of the area will decrease if such waste is not collected and disposed of appropriately. Waste material will be generated during the construction phase. Such waste may accumulate from the worker's campsite or litter left around the work area by the construction staff. Other waste substances may accumulate from cement bags, amongst other construction material. The impact of waste is definite and will last for the duration of the construction phase as well as the operational phase, although reduced. It should also be noted that the nature of the proposed activity results in mining waste (i.e., tailings, magnetite, and waste rock etc.) which will be deposited in the Tailings Storage Facility, magnetite dump and waste rock.

No fatal flaws were identified in terms of waste impact. From this perspective, therefore, there is no reason why this development should not proceed.

**Noise impacts** - the environmental noise impact during the construction and decommissioning phases will be insignificant during summer and winter periods. The noise impact will change during the operational phase where the noise intrusion will be moderate and/or low. This is based on a noise intrusion level of 5.0dBA and not the benchmark noise intrusion of 7.0dBA before a noise disturbance is created. The potential environmental noise intrusion levels can however be controlled using approved acoustic screening measures, state of the art equipment, proper noise management principles and compliance to the Noise Regulations, 1994. The proposed Environmental Noise Management Plan must be in place during all the phases of the mining establishment to identify any noise increase on a pro-active basis and to address the problem accordingly.

No fatal flaws were identified in terms of noise impacts. From this perspective, therefore, there is no reason why this development should not proceed.

**Visual impact** - the proposed activities for the extension of the mine have been evaluated against internationally accepted criteria to determine the impact they will have on the landscape character and the viewers that have been identified in the study area. Most of the study area is considered to have moderate to low landscape character sensitivity due to the most developed landscape, environmental degradation and the minimal pristine condition of the landscape, the moderate visual quality and minimal tourism value. The proposed activities will, to a certain extent, change the visual character of the site, thus have a visual impact on the surrounding communities. However, the mitigation measures and recommendations were proposed to reduce or alleviate the intrusive contrast between the proposed project components and activities, and the receiving landscape to a point where it is acceptable to visual and landscape receptors.

No fatal flaws were identified in terms of visual impacts. From this perspective, therefore, there is no reason why this development should not proceed.

**Impacts on Climate change** - Local climate conditions do not appear to be of significant concern to the proposed project. On a broader scale, the project will have no direct significant impact on local and/or global climate change. According to the air quality specialist Climate change is unlikely to have a major direct impact on the mining industry, for which regulations and management strategies are already in place to manage factors such as water usage, water conservation and demand strategies, and environmental issues relating to rehabilitation and the provision of rehabilitation guarantees.

No fatal flaws were identified in terms of climate impacts. From this perspective, therefore, there is no reason why this development should not proceed.

**Socio-economic impacts** during the construction and operation phases of the proposed project. The socio-economic aspect has both positive and negative impacts. The significance of positive socio-economic benefits associated with the proposed development exceeds the significance of the negative socio-economic impacts. For example, the proposed mine expansion will result in sustainable jobs at the mine over the medium and long term. These include skilled, semi-skilled and under-skilled labourers, which could consist of locals (in and around the mining area) as well as regional and national communities.

No fatal flaws were identified in terms of socio-economic impacts. From this perspective, therefore, there is no reason why this development should not proceed.

### **Cumulative impacts**

Cumulative impacts in relation to an activity mean the past, present, and reasonably foreseeable future impacts of an activity, considered together with the impacts of activities associated with that activity, that may not be significant but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities (DEA, 2014 EIA Regulations). Considering the findings of the specialist studies undertaken for the project, the cumulative impacts for the proposed project will be acceptable and most of the impacts are rated as being low to medium significance with the implementation of mitigation measures to be included in the Environmental Management Programme (EMPr).

### **Conclusion**

Based on the studies undertaken and input from the specialists it can be concluded that the impacts associated with the construction and operation of the proposed project are expected to be of Medium to Low significance with the implementation of adequate mitigation measures. No environmental and social fatal flaws were identified to be associated with the proposed project.

The findings of the specialist studies undertaken as part of the EIA process concluded that:

- The impact associated with the proposed activities is expected to be of Medium to Low significance with the implementation of adequate mitigation measures.
- No environmental and social fatal flaws were identified to be associated with the proposed project.
- Two alternatives' sites for the barren dam and return water dam were assessed during this EIA phase.

Based on input from the specialist, assessment of the site, comparative analysis of the alternatives, and

many other factors highlighted above, all sites are feasible; however, Alternative 1 of both barren dam and RWD are the preferred sites.

- The other activities such as the expansion of the Tailings Storage Facility (TSF) and magnetite dump had no alternatives considered as they entail the expansion of the existing infrastructure.

## Recommendations

Based on the nature and extent of the proposed development, the local levels of disturbance predicted the expected benefits at a regional and national scale, the findings of the EIA and the understanding of the significance level of potential environmental and social impacts, it is the opinion of the EIA project team that the proposed project can proceed subject to the implementation of the mitigation measures detailed in Chapter 11 of this report and the EMPr.

Moreover, the following conditions must be included in the Environmental Authorisation to be issued by the DMRE:

- All mitigation measures detailed in this report and the specialist studies must be implemented.
- The EMPr, as contained within **Appendix I**, must be used as a blueprint throughout all phases of the project.
- The Design of the magnetite dump must be in line with the Minimum Liner Standards and approved by the DHSWS.
- An integrated Water Use license must be obtained from the DHSWS before commencement of the project.
- The proposed facilities must be lined according to the recommendations made in the waste classification reports and must comply with the DHSWS minimum requirements.
- The proposed Bushveld Vametco mine expansion project must be in line with the environmental noise standards and guidelines and the Noise Impact Management Plan (NIMP). Further, the Noise Monitoring Plan (NMP) for the Bushveld Vametco mine must be adhered to.
- The clean and dirty water separation infrastructure should be audited by a surface water hydrologist to ensure that adequate clean and dirty separation infrastructure is in place for the mining complex.
- An appropriate Wetland and Riparian Monitoring Program must be implemented prior to the start of the construction phase.
- Ensure that all stockpiles (especially topsoil) are clearly and permanently demarcated and located in defined No-Go areas.
- Soil stripping must be done in consultation with a soil specialist, and careful consideration of the pre-mining soil survey is essential.
- Utilise existing screening features such as dense vegetation stands or topographical features to place the construction camps and lay-down yards out of the view of sensitivity visual receptors.
- Suitable wetland rehabilitation design and implementation must ensure that wetland functionality is restored.

- Emergency plans and infrastructure to deal with spillages (especially hydro-carbon spillages) must be in place, this should include mobile response units to deal with spillages in the field;
- An independent Environmental Control Officer (ECO) must be appointed during construction phase to ensure environmental compliance monitoring and timeous reporting.
- A walled concrete platform, dedicated store with adequate flooring or bermed area should be used to accommodate chemicals such as fuel, oil, paint, herbicide, and insecticides, as appropriate, in well-ventilated areas.
- Storage of potentially hazardous materials should be above any 100-year flood line, or as agreed with the ECO. These materials include fuel, oil, cement, bitumen etc.
- The mine's internal Environmental Officers must be conversant with best practices in line with rehabilitation during decommissioning, and audit are to be conducted during and after rehabilitation.
- Where mining infrastructure is required across natural watercourses, new stormwater infrastructures, such as pipes and culverts, could replace the hydraulic function currently offered by the natural watercourses. This infrastructure should be designed for both hydraulic performance and environmental functionality. A thorough assessment of the suitability of the new stormwater infrastructure must be made at the preliminary design stage.
- A GN 704 audit is to be conducted bi-annually to assist with compliance with the separation of clean and dirty water infrastructure unless otherwise, the frequency of the audit is determined by the existing Water Use Licence.
- If archaeological materials are unearthed, all development within a radius of at least 10m of such indicator should cease, and the area must be demarcated by a danger tape. Accordingly, a professional archaeologist or SAHRA officer should be contacted immediately.
- Avoid any disturbance of the No-Go habitats, i.e., the rocky ledges south of the current mining plant.
- Minimize the physical destruction of any remaining primary vegetation, especially in or near wetland areas.
- Adequate stormwater control and management must be practised ensuring that contaminants are not introduced into water resources during the construction and operational phases of the proposed project.
- The Applicant must report any water pollution incidents originating from the proposed project to the Provincial Office of DHSWS within 24 hours.
- In general, minimize clearing and operations in habitats with a high sensitivity rating and delineate and maintain a No-Go buffer of at least 100m around such habitats.

This Draft EIA Report (EIAR) was compiled according to Appendix 3 (scope of assessment and content of Environmental Impact Assessment Report) of EIA Regulations of 2014, as amended. It contains all the information that is necessary for the competent authority to consider, allowing for informed decision making.

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The Draft EIA Report will be made available to the Interested and Affected Parties (I&APs) and Organs of State for thirty (30) days to allow for review and comment. All comments and recommendations received on the Draft EIAr will be included in the Comments and Response Report and incorporated into the final EIAr for submission to the DMRE for decision making.

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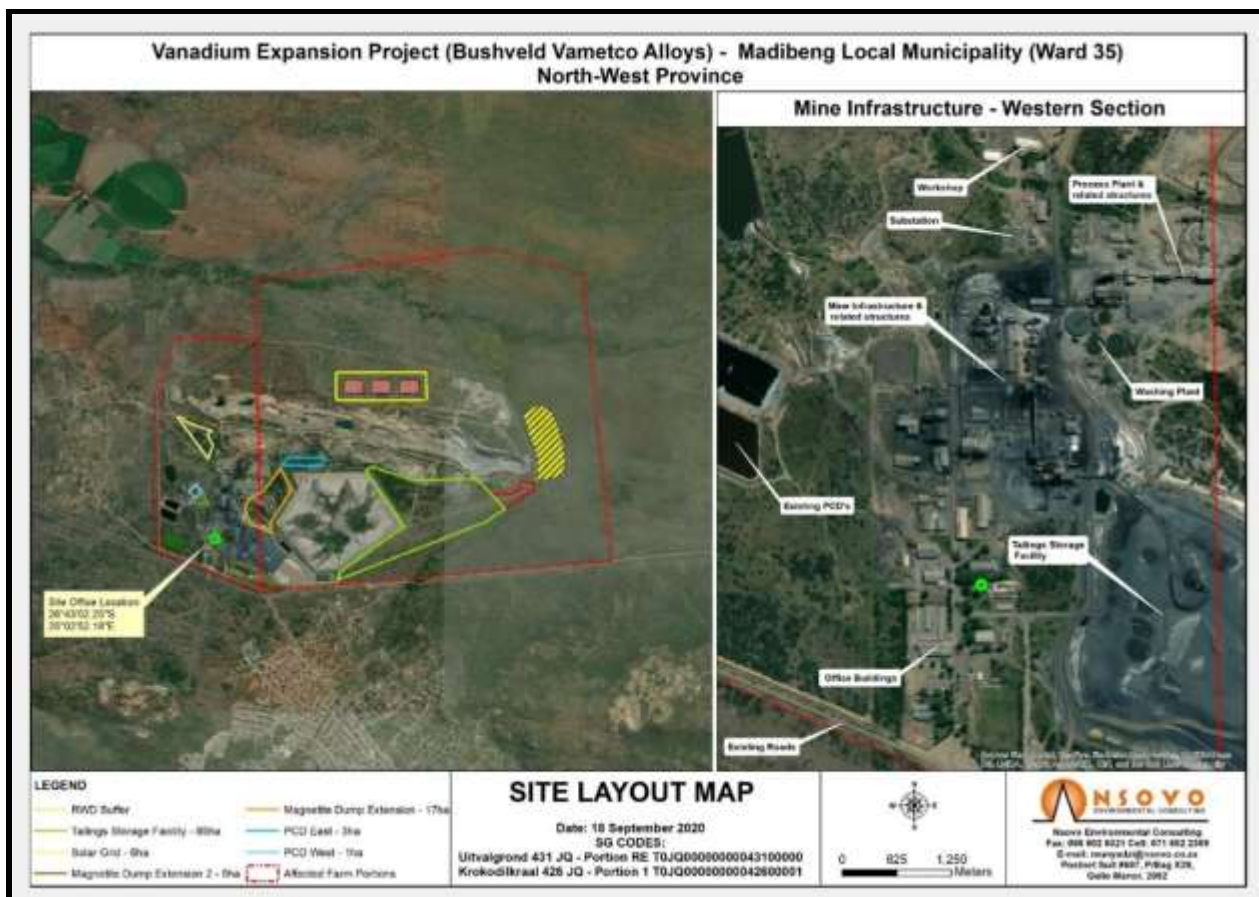


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## LIST OF ACRONYMS AND ABBREVIATIONS

BVH	Bushveld Vametco Holdings
CBA	Critical Biodiversity Area
DEFF	Department of Environment, Forestry and Fisheries
DHSWS	Department of Human Settlement Water and Sanitation
DMRE	Department of Mineral Resources and Energy
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GGP	Gross Geographic Product
GHG	Greenhouse gas
GNR	Government Notice Regulations
Ha	Hectares
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
MPRDA	Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MRA	Mining Right Area
MT	Metric Tonnes
mtVp.a	Metric Tonnes Vanadium Per Annum
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998)
NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM: WA)
NFEPA	National Fresh Water Ecosystem Priority Areas
NVO	Nitrovan and Vanadium Oxide
NWA	National Water Act, 1998 (Act No. 36 of 1998)
NWDARD	North West Department of Agriculture and Rural Development
PCD	Pollution Control Dam
PPP	Public Participation Process
ROM	Run of Mine

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RWD	Return Water Dam
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SWMP	Stormwater Management Plan
TSF	Tailings Storage Facility
UNFCCC	United Nations Framework Convention on Climate Change
VRFB	Vanadium Redox Flow Battery
WML	Waste Management Licence
WULA	Water Use Licence Application
JORC	Joint Ore Reserves Committee

## 1 INTRODUCTION

Bushveld Vametco Holdings (Pty) Ltd (hereafter referred to as Vametco) is an open-cast mine situated approximately 5km west of Ga-Rankuwa and 10km northeast from Brits town within the jurisdiction of Madibeng Local Municipality in the North West Province and has been operational since 1967. The mine is approximately 3.5 km long in an east-west direction and its Mining Right Area (MRA) is approximately 1507.7427 hectares (ha) in size. Vametco is regarded as a low-cost primary vanadium mining and processing company with a 186.7 metric tons (Mt) Joint Ore Reserves Committee (JORC) compliant resource averaging 1.98% vanadium pentoxide ( $V_2O_5$ ) in magnetite grades (including 48.4 Mt in reserves). It utilises a well-established salt roast processing method to produce refined vanadium in the form of Nitrovan and Vanadium Oxide.

Vametco has identified the need to expand its mining operations to increase production capacity from 1.2 million to an average of 4 million tons per annum. Further, the mine is expected to reach a steady state of 3,400 mtVp.a (Metric Tonnes Vanadium Per Annum) in the current year (90% of its processing nameplate capacity of 3,750 mtVp.a) increasing to more than 4,200 mtVp.a (85% of its processing nameplate capacity of 5,000 mtVp.a), through the planned expansion program. To achieve this, Vametco proposes the following activities:

- Expansion of the existing slimes dam towards the east of the mine to cater for additional slimes waste.
- Expansion of the existing magnetite dump to the north by approximately  $\pm 17$  hectares (ha) and south by approximately  $\pm 5$  ha of the mine.
- Construction of two Pollution Control Dams (PCDs) to service magnetite dump expansion and plants. The PCD to service the magnetite dump will be  $\pm 2.65$  ha while the PCD to service plants will be  $\pm 2.1$  ha. The PCDs will be sized to accommodate return water and stormwater.
- Development of one new  $\pm 5$  ha Return Water Dam (RWD) to accommodate return/polluted water from the proposed and existing slimes dams as well as to accommodate stormwater within the mine.
- Construction of a barren dam to store barren and mother liquor solution (dam to store the excess of 100 000 m<sup>3</sup>).
- Development of a new Waste Rock Dump (WRD) to reduce load and haul distance and to facilitate easy backfill.

The proposed development triggers listed activities under the EIA Regulations of 2014 promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended and National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM: WA). Consequently, Vametco is required to undertake an Environmental Impact Assessment (EIA) process and obtain an integrated Environmental Authorisation (EA) before the commencement of the above-mentioned construction activities. Also, the proposed development triggers water use activities; as such, Vametco has lodged an Integrated Water Use Licence Application (IWULA) in

terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) to obtain an IWUL from the Department of Human Settlement, Water and Sanitation (DHSWS) before the commencement of any listed water use activity.

This EIA process is an integrated Environmental Authorisation application and will include the following:

- Environmental Authorisation for listed activities as stipulated in Government Notice Regulations (GN R) 983, R984, and R985;
- Waste Management Licence (WML) NEM: WA; and
- Integrated Water Use Licence Application (IWULA) in terms of NWA.

Nsovo Environmental Consulting (Nsovo) has been appointed by Vametco as the independent environmental consultant to undertake the required Environmental Impact Assessment to identify and assess all the potential environmental impacts of the proposed projects and recommend appropriate mitigation measures. The project proponent is Bushveld Vametco Holdings (Pty) Ltd., whereas the Competent Authorities are the North West Department of Mineral Resources and Energy (DMRE) and DHSWS.

## 2 DETAILS AND EXPERTISE OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

Nsovo has been appointed by Vametco as the independent Environmental Assessment Practitioner (EAP) for the proposed project and meets the general requirements as stipulated in regulations 13(3) of the NEMA 2014 EIA Regulations as amended. Nsovo therefore:

- Is independent and objective.
- Has expertise in conducting EIAs.
- Considers all relevant factors relating to the application.
- Provides full disclosure to the applicant and the relevant environmental authority.

Table 1 below provides details of the EAP and relevant experience. A detailed Curriculum Vitae and Qualifications are attached as **Appendix E**.

**Table 1: Details of the Environmental Assessment Practitioner (EAP)**

Details of the Environmental Assessment Practitioner (EAP)	
Name of Company	Nsovo Environmental Consulting
Person Responsible	Munyadziwa Rikhotso
Professional Registration	South African Council for Natural Scientific Professions (SACNASP)

<b>Postal Address</b>	Private Bag x29 Postnet Suite 697 Gallo Manor 2052
<b>Telephone Number</b>	011 041 3689
<b>Cell Number</b>	071 602 2369
<b>Fax Number</b>	086 602 8821
<b>Email</b>	<a href="mailto:munyadzi@nsovo.co.za">munyadzi@nsovo.co.za</a>
<b>Qualifications &amp; Experience</b>	B.Sc. Honours Geography <b>17 years of experience</b>
<b>Project Related Expertise</b>	<p>In terms of project related expertise, the Environmental Assessment Practitioner has completed the following projects:</p> <ul style="list-style-type: none"> <li>• EIA for the proposed Maphutha-Witkop powerline in Limpopo Province.</li> <li>• EIA for the proposed Shongweni substation and Hector - Shongweni 400kV powerline in KwaZulu Natal Province.</li> <li>• EIA for the proposed Inyaninga substation and Inyaninga – Mbewu 400kV powerline in KwaZulu Natal Province.</li> <li>• EIA for the proposed Tubatse strengthening phase 1 – Senakangwedi B integration within the jurisdiction of Greater Tubatse Local Municipality in Limpopo Province.</li> <li>• EMPr, WULA and EA amendment for the proposed Juno Gromis 400kV power line</li> <li>• Basic Assessment for the proposed Decommissioning and Demolition of Verwoedberg Substation and 275kV power.</li> <li>• Basic Assessment for Bloemendal Substation and loop in and out powerlines.</li> </ul>

## 2.1 DETAILS OF THE APPLICANT

The Applicant for this proposed expansion project is Bushveld Vametco Holdings (Pty) Ltd. Their details are included in Table 2 below.

**Table 2: Details of the Applicant**

Details of Applicant	
Name of Mine	Bushveld Vametco Holdings (Pty) Ltd.
Physical Address	Main Mothutlung Road Extension Farm Krokodilkraal, District ODI North West Province 0250
Postal Address	P.O. Box 595 Brits 0250
Contact Person	Rudzani Mudau
Telephone Number	012 318 3323
Email address	<a href="mailto:rmudau@bushveldvametco.co.za">rmudau@bushveldvametco.co.za</a>
Project Manager	William Steinberg
Telephone Number	012 318 3200
Email	<a href="mailto:wsteinberg@bushveldvametco.co.za">wsteinberg@bushveldvametco.co.za</a>

## 2.2 DETAILS OF SPECIALIST

To adequately identify and assess potential environmental impacts associated with the proposed project, Nsovo has appointed the specialist sub-consultants listed in Table 3 to conduct various specialist impact assessments.

**Table 3: List of specialist sub-consultants**

Specialist Study	Company	Name of Specialist
Air quality Impact Assessment	Kijani Green Energy	Simon Gear
Heritage Impact Assessment	Farisani Investment T/A Archaeo-Ages Consulting	Moses Mabuda
Noise Impact Assessment	dB Acoustics	Barend Jacobus van der Merwe

Specialist Study	Company	Name of Specialist
Socio-economic Impact Assessment	NGT Holdings	Nkosinathi Thomose
Soil, Land use and Capability	Scientific Aquatic Services	Braveman Mzila
Traffic Impact Assessment	Eco Elementum	Pieter Jooste
Visual Impact Assessment	Outline Landscape	Kathrin Hamelouw
Wetland Impact Assessment	WaterMakers	Willem Lubbe
Biodiversity Impact Assessment	Scientific Aquatic Services	Chris Hutton
Hydrological Impact Assessment	CM Electric	Chenai Makamure
Geohydrological Impact Assessment	MWEM	Golden Manganyi
Climate change	EHRCON	Jeandré Neveling

### 3 THE LOCATION OF THE DEVELOPMENT FOOTPRINT OF THE ACTIVITY ON THE PROVED SITE AS CONTEMPLATED IN THE ACCEPTED COPING REPORT INCLUDING THE 21 SG CODE OF EACH CADASTRAL LAND PARCEL, WHERE APPLICABLE THE PHYSICAL ADDRESS AND FARM NAME

This section provides detailed information on the location of the proposed project. The main aim is to identify the environmental aspects found within the area of the proposed development and to provide the baseline description of the surroundings.

#### 3.1 LOCALITY OF THE PROPOSED PROJECT

The study area is situated approximately 5km west of Ga-Rankuwa and 10km northeast of Brits town. The approximate center co-ordinates for the study area are 25°35'4.01"S 27°52'33.13"E. **Figures 1 and 2** below illustrate the project locality at a scale of 1:50 000. Refer to **Appendix A** for the A3 locality map.

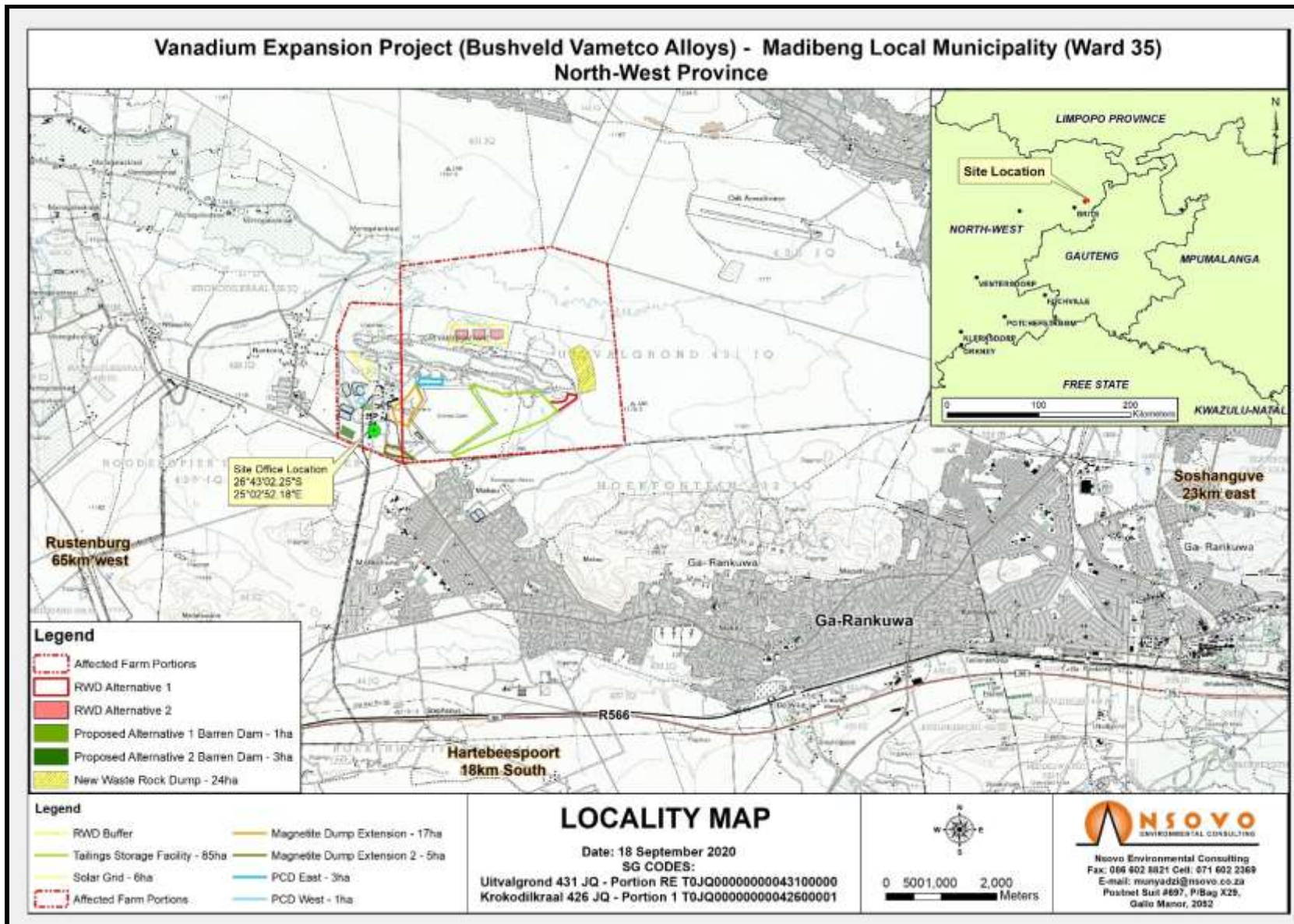


Figure 1: Locality map showing the proposed study area



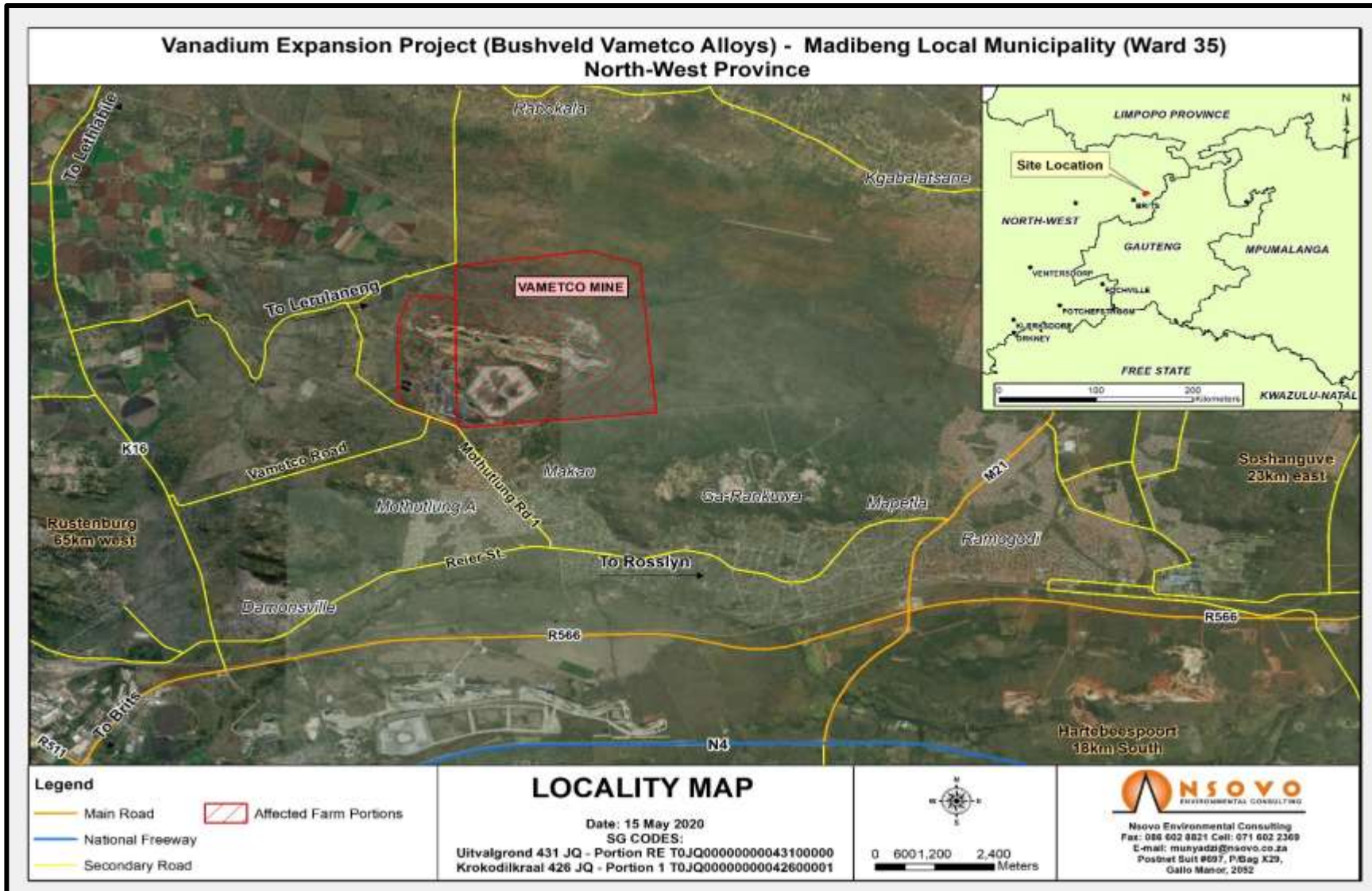


Figure 2: Locality map indicating Vametco mine

### 3.2 DESCRIPTION OF THE AFFECTED PROPERTY

The MRA traverses two farm portions that will be affected by the proposed development and expansion activities. Table 4 below provides the 21 digits surveyor-general code of the affected land parcel as well as the farm names.

**Table 4: Details of the properties affected**

Farm Name	SG Codes	Portion Number	Hectares	Division
Krokodikraal 426	T0JQ00000000042600001	Portion 1	272.1358	JQ
Uitvalgrond 431	T0JQ00000000043100000	RE	1235.6069	JQ

#### 3.2.1 PROVINCE AND PROVINCIAL BOUNDARIES

The proposed project will be undertaken within the North West Province located on the northern border of South Africa. The province is bordered by the following provinces: Northern Cape to the southwest, Free State to the south, Gauteng to the southeast, and Limpopo to the northeast.

#### 3.2.2 MUNICIPALITY AND WARDS

The proposed development is in Municipal Ward number 35 of Madibeng Local Municipality (hereafter referred to as Madibeng) within the jurisdiction of the Bojanala Platinum District Municipality in the North West Province.

### 3.3 SURROUNDING LAND USES

This section describes the land uses within and around the proposed study area, which includes farming, mining, and residential, discussed as follows:

#### 3.3.1 RESIDENTIAL

The residential communities located around the study area include semi-suburban (township) as well as suburban households. Water scarcity is evident in the area; however, there is also evidence of subsistence farming being practiced by the local communities. Table 5 describes the affected communities, while **Figure 3** shows their location with the study area.

**Table 5: Residential Communities and Farms adjacent the study area**

Area	Type of community	Distance from the study area
Rankotea	A low-medium income residential household located adjacent to the mine, there is a recently established informal community on the northeast of the mine.	Approximately 2km
Lerulaneng	A low-medium income residential household located adjacent to the mine; there is a recently established informal community directly on the west of the mine.	Approximately 5km
Makau	A low-medium income residential household located adjacent to the mine; there is a recently established informal community directly on the Northwest of the mine.	Approximately 3km
Mothutlung A	A low-medium income residential household located adjacent to the mine; there is recently established informal community directly on the Northwest of the mine.	Approximately 3.5km
Brits Town	It is the closest town from the site located in the north; approximately 10km from the mine.	Approximately 10km

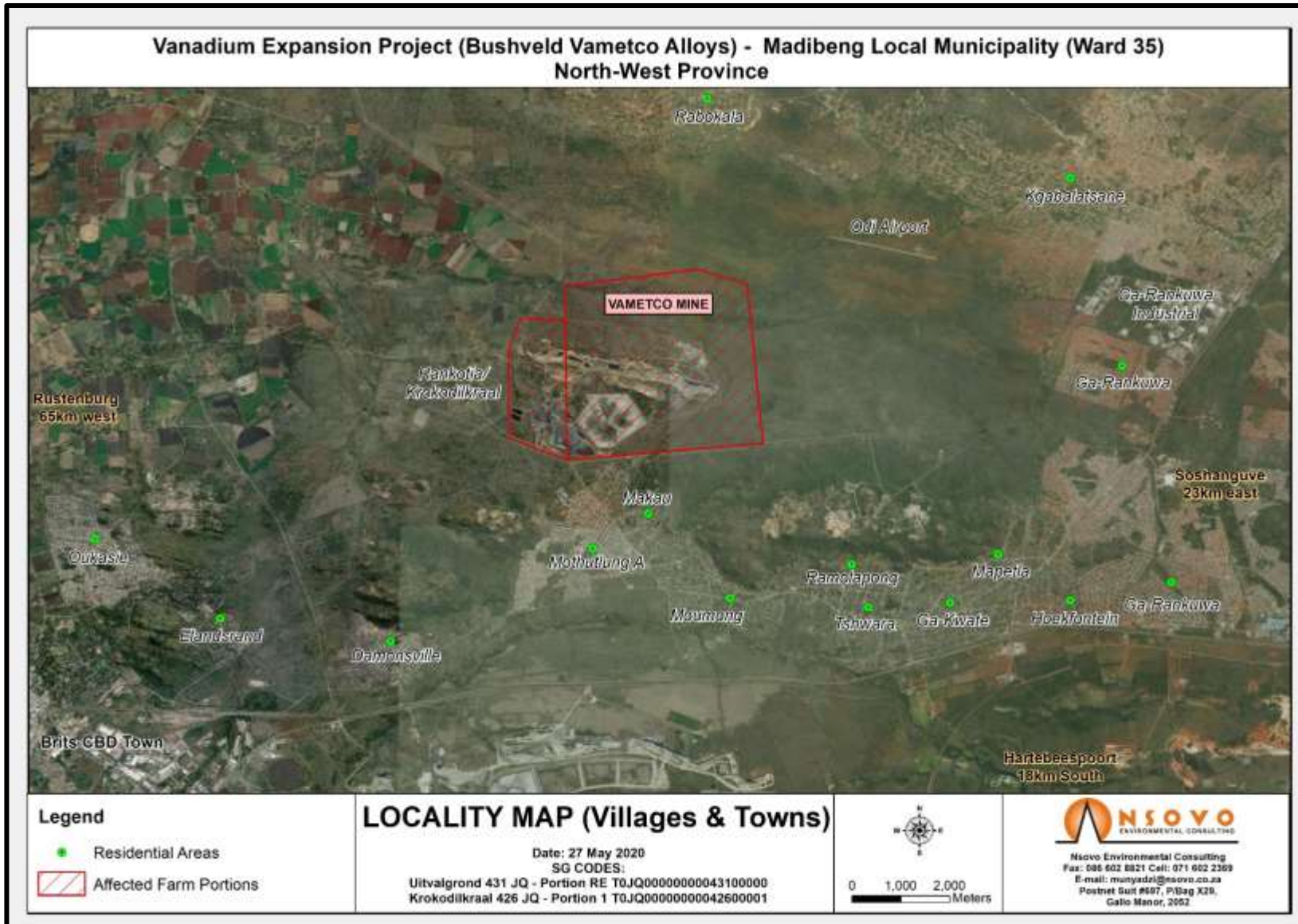


Figure 3: Residential areas and towns surrounding the study area

### 3.3.2 COMMERCIAL AND INDUSTRIAL

The main economic sectors within Madibeng Municipality are agriculture, mining, manufacturing, and tourism sectors which contribute considerably to the total Gross Geographic Product (GGP). These sectors are spread across the Municipality including Brits town, which is a more formal urban area characterised by vibrant economic nodes. Furthermore, these sectors have the potential to encourage and accommodate economic growth and development. South Africa is the world's third-largest chrome producer and includes the richest Platinum Group Metals Reserve (situated on the Merensky Reef). Manufacturing is the most dominant sector within the Municipality, with motor industry-related activities being predominant (Madibeng Local Municipality IDP, 2020).

### 3.3.3 MINING ACTIVITIES WITHIN THE STUDY AREA

There are several mining activities taking place within the Municipality that play a considerable role in the socio-economic development of the surrounding communities, thus contributing to income generation, improvement of the local economy, and employment creation for the local community. The mining sector within the Municipality comprises but is not limited to Platinum Group Metals, Chromium, and intensive granite and sand mining (IDP, 2018). There are also small-scale mining activities scattered throughout the Municipality. The mines that exist within the Madibeng Local Municipality, as per IDP (2017-2022), are presented in Table 6 below.

**Table 6: Mines within the Madibeng Local Municipality (IDP, 2018)**

- |                              |                             |
|------------------------------|-----------------------------|
| • Bushveld Vametco Alloy;    | • Kudu Granite;             |
| • Buffelsfontein Chrome;     | • Pandora;                  |
| • Eastern Platinum;          | • Protea Granite;           |
| • Elandskraal Chrome;        | • Xstrata Rhombus;          |
| • Glencore;                  | • Slab Granite; and         |
| • Heric Ferrochrome Mines;   | • African National Granite. |
| • International Ferrochrome; |                             |
| • Kelly Granite;             |                             |
| • Krokodilrivier Mines;      |                             |
| • Western Platinum;          |                             |

#### 4 A PLAN WHICH LOCATES THE PROPOSED ACTIVITY OR ACTIVITIES APPLIED FOR AS WELL AS ASSOCIATED STRUCTURES AND INFRASTRUCTURE AT APPROXIMATE SCALE

A plan which locates the proposed activities is presented in a map at a scale of 1:50 000, which is attached as Appendix A of this final EIA report. The following is the list of the proposed activities with their size and capacity and their exact coordinates are presented in Table 8 and shown in Figure 4:

**Table 7: The proposed activities with their size and capacity**

Description of the proposed activities	Size	Capacity
The expansion of the existing TSF or slimes dam towards the east of the mine to cater for additional slimes waste and will be situated adjacent to the proposed RWD.	TSF : ± 85ha	N/A
The expansion of a Magnetite Dump to the north (1) and south (2) of the mine. This expansion will be next to the existing magnetite dump of approximately 22ha.	MD 1 : ± 17ha MD 2 : ± 5ha Total : ± 22ha	N/A
The construction of PCD1 to service magnetite dump expansion and PCD2 the magnetite dump will be 2.65ha.	PCD1 : ± ha	92750m <sup>3</sup>
The development of the PCD to service plants, which will be 2.1ha.	PCD2 : ± 1ha	73500m <sup>3</sup>
Development of one new return water dam (5ha) to accommodate return/polluted water from the proposed and existing slimes and stormwater within the mine. This will be constructed adjacent to the proposed slimes dam.	RWD : ± 5ha	225 000 m <sup>3</sup>
Construction of a Barren Dam to store barren and mother liquor solution.	BD : ± 3ha	105 000m <sup>3</sup>
Development of a new WRD to reduce load and haul distance and to facilitate easy backfill.	WRD : ± 24ha	N/A

Table 8: Coordinates of the proposed activities

Proposed activity	Latitude coordinates	Longitude coordinates
<b>Magnetite Dump North Extension Corner Points</b>	<b>Latitude</b>	<b>Longitude</b>
Corner 1	25° 34' 43.799" S	27° 52' 44.815E"
Corner 2	25° 34' 28.833" S	27° 52' 58.242E"
Corner 3	25° 34' 37.217" S	27° 53' 02.182E"
Corner 4	25° 34' 52.798" S	27° 52' 54.614E"
<b>Magnetite Dump South Extension Corner points</b>	<b>Latitude</b>	<b>Longitude</b>
Corner 1	25° 35' 03.314" S	27° 52' 40.982E"
Corner 2	25° 35' 04.714" S	27° 52' 47.038E"
Corner 3	25° 35' 11.901" S	27° 52' 57.755E"
Corner 4	25° 35' 09.608" S	27° 52' 45.208E"
<b>Slime Dam Extension Corner Points</b>	<b>Latitude</b>	<b>Longitude</b>
Corner 1	25° 34' 32.644" S	27° 53' 29.856" E
Corner 2	25° 34' 32.851" S	27° 54' 10.727" E
Corner 3	25° 34' 44.035" S	27° 54' 21.139" E
Corner 4	25° 35' 07.482" S	27° 53' 19.893" E
<b>Pollution Control Dam 1 Development Corner points</b>	<b>Latitude</b>	<b>Longitude</b>
Corner 1	25° 34' 34.197" S	27° 52' 27.468" E
Corner 2	25° 34' 39.556" S	27° 52' 30.354" E

Proposed activity	Latitude coordinates	Longitude coordinates
Corner 3	25° 34' 41.039" S	27° 52' 25.599" E
Corner 4	25° 34' 36.706" S	27° 52' 23.658" E
<b>Pollution Control Dam 2 Development Corner points</b>	<b>Latitude</b>	<b>Longitude</b>
Corner 1	25° 34' 24.975" S	27°53' 00.851"E
Corner 2	25° 34' 25.130" S	27°53'14.182"E
Corner 3	25° 34' 28.081" S	27°53'13.891"E
Corner 4	25° 34' 28.063" S	27°52'58.776"E
<b>Return Water Dam Development Alternative 1 Corner points</b>	<b>Latitude</b>	<b>Longitude</b>
Corner 1	25° 34' 34.299" S	27°54'12.231"E
Corner 2	25° 34' 35.385" S	27°54'26.214"E
Corner 3	25° 34' 39.248" S	27°54'28.808"E
Corner 4	25° 34' 44.035" S	27°54'21.139"E



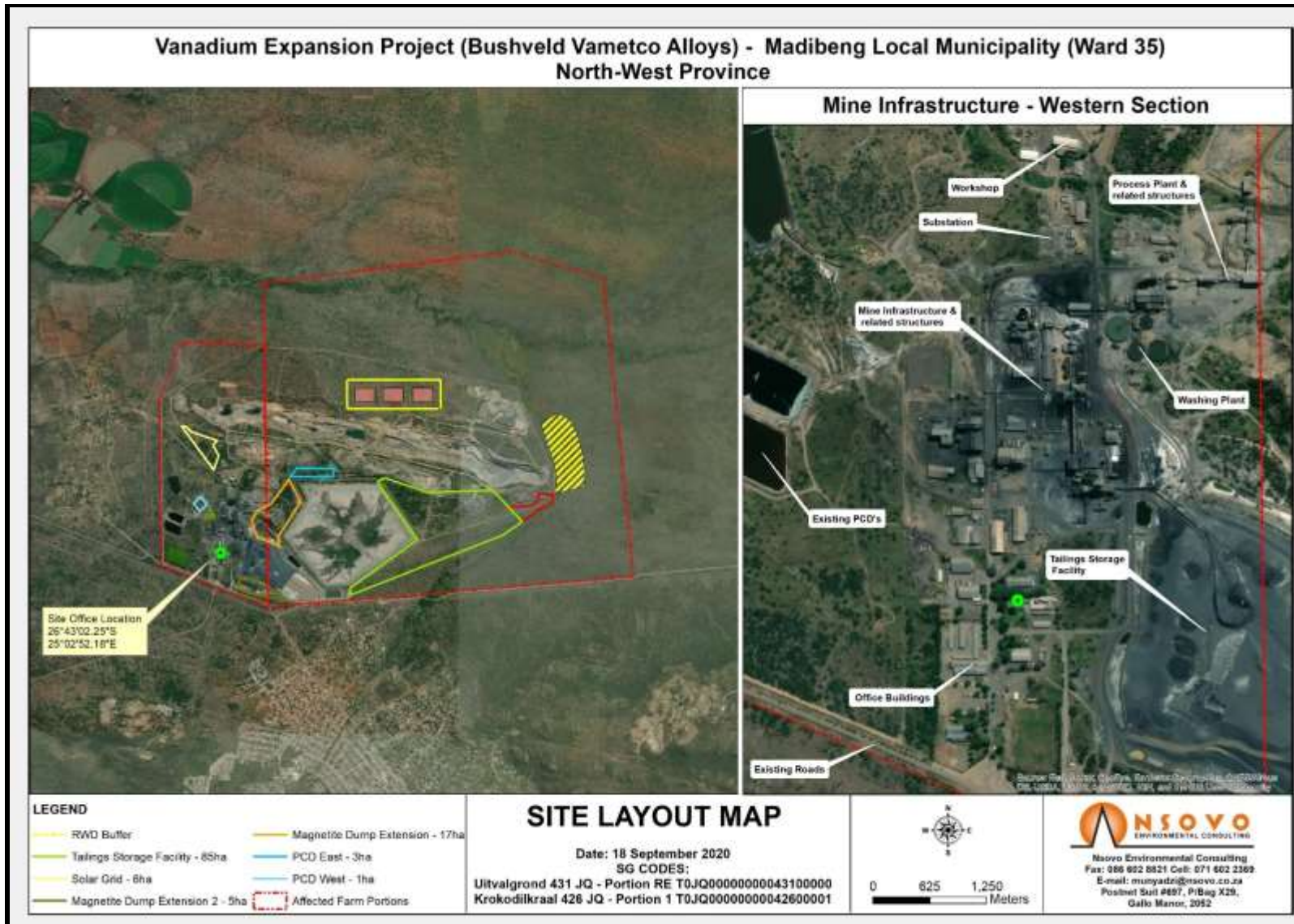


Figure 4: Layout which locates the proposed activities and associated infrastructure

## **5 A DESCRIPTION OF THE SCOPE OF THE PROPOSED ACTIVITY INCLUDING ALL LISTED AND SPECIFIED ACTIVITIES TRIGGERED AND A DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN, INCLUDING ASSOCIATED STRUCTURES AND INFRASTRUCTURE**

This section describes the proposed activities, which include the scope of the proposed project, mainly focusing on the listed activities which trigger the EIA process. It also describes the associated structures and infrastructure related to the proposed development.

### **5.1 A DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN INCLUDING ASSOCIATED STRUCTURES AND INFRASTRUCTURE**

#### **5.1.1 THE EXISTING STRUCTURES AND INFRASTRUCTURES WITHIN THE PROPOSED SITE**

The current operations at Vametco mine include opencast mining (including storm and seepage water quarries), processing plant, Class A waste disposal facility for magnetite, waste rock, and slimes dam, as well as other associated infrastructure, as illustrated in **Figure 5** below. The opencast operations supply ore to the vanadium processing plant within the mine.

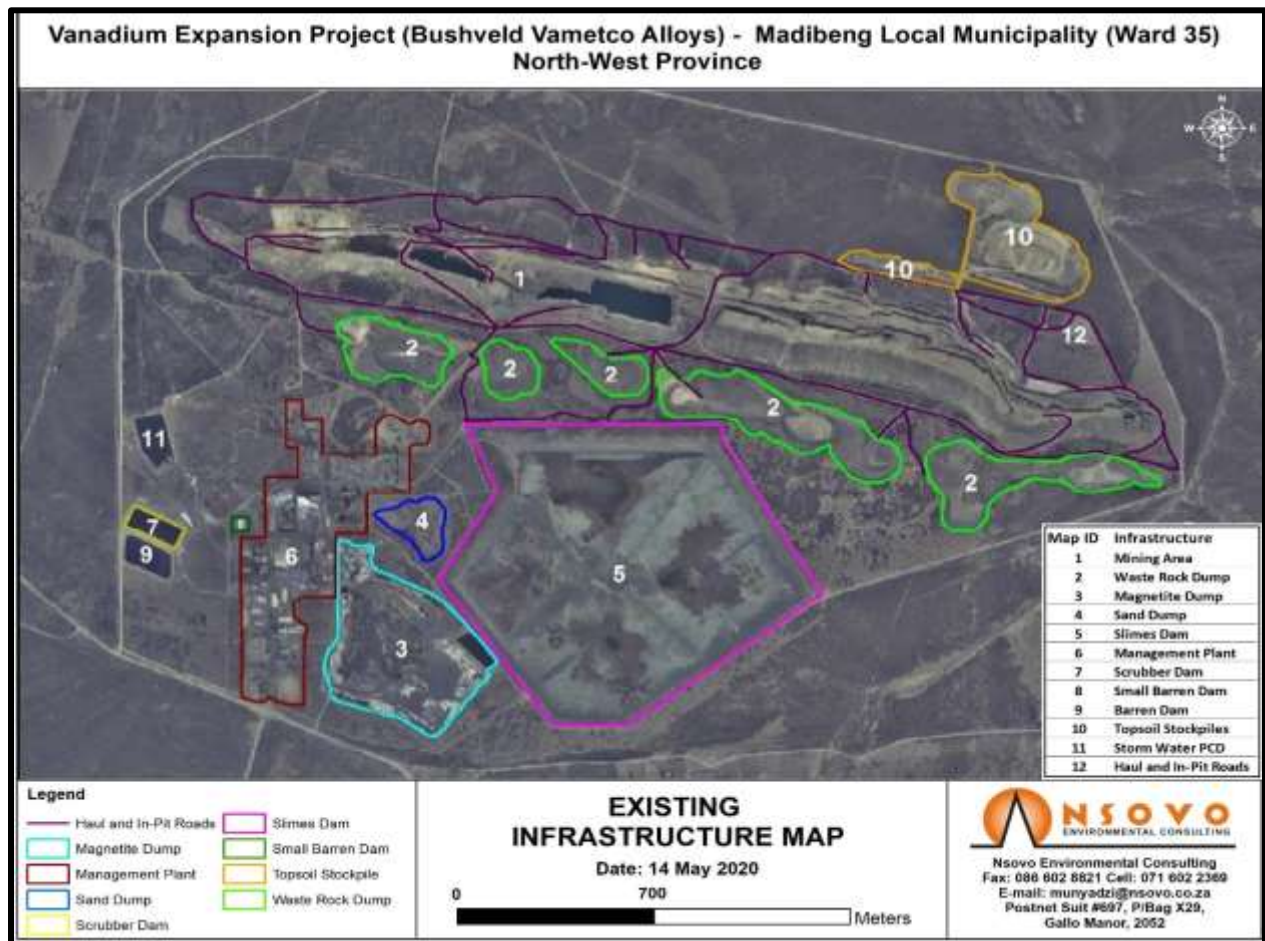


Figure 5: Layout of the existing structures and infrastructure

5.1.2 THE PROPOSED ACTIVITIES WITHIN THE MINE

In addition to the existing mining infrastructure illustrated in Figure 5 above, Vametco proposes to expand and develop other new infrastructure to increase production capacity. The proposed activities will be within their authorised MRA, and are described in Table 9 as follows:

Table 9: Summary of the proposed infrastructure

Proposed development of infrastructure	Proposed expansions of infrastructure
<ul style="list-style-type: none"> <li>The construction of two PCDs to service the magnetite dump expansion and plants. The PCD to service the magnetite dump will be ±2.65ha, while the PCD to service plants will be ±2.1ha. Development of one new return</li> </ul>	<ul style="list-style-type: none"> <li>The expansion of the existing slimes dam towards the east of the mine to cater for additional slimes waste.</li> <li>The expansion of the magnetite dump to the north and south of the mine.</li> </ul>

Proposed development of infrastructure	Proposed expansions of infrastructure
<p>water dam (<math>\pm 5</math>ha) to collect return/polluted water from the proposed and existing slimes dams, as well as stormwater.</p> <ul style="list-style-type: none"> <li>• Construction of a barren dam to store barren and mother liquor solution (dam to store the excess of 100 000m<sup>3</sup>)</li> <li>• Development of a new WRD to reduce load and haul distance and to facilitate easy backfill.</li> </ul>	

The construction phase activities to be undertaken are discussed hereunder:

#### 5.1.2.1 SITE WALK-DOWN

A site walk-down will be undertaken for the authorised activities to ensure that the identified sensitive areas are avoided, and disturbance prevented through the creation of buffer zones for conservation purposes where necessary.

#### 5.1.2.2 VEGETATION CLEARANCE

Vegetation clearance is necessary to allow for the development of the proposed activities, i.e., the new return water dam, pollution control dams, expansion of the slimes dam as well as magnetite dump. Clearance will be within the immediate footprint in preparation for construction, and it will be undertaken in accordance with the approved Environmental Management Programme (EMPr), permits, licenses, Municipal by-laws, Vametco's policies, and guidelines, as well as approved Method Statements.

#### 5.1.3 CONSTRUCTION OF RETURN WATER DAM

A Return Water Dam will be constructed to accommodate the polluted water from the slimes dam. The dam will cover approximately 5ha and will have a capacity of 225 000 m<sup>3</sup>.

#### 5.1.4 POLLUTION CONTROL DAM

Two PCDs will be developed, one to store the polluted water from the magnetite dump, which is 3ha with a capacity of 92750m<sup>3</sup> and the other to contain the contaminated and dirty water from the plant runoff, which is 1ha with the 73500m<sup>3</sup>. The total capacity of the 2 PCDs will be 166 250m<sup>3</sup>.

### 5.1.5 CONSTRUCTION OF BARREN DAM

The proposed project entails the construction of a ±3ha barren dam with a capacity of 105 000m<sup>3</sup> to store barren and mother liquor solution.

### 5.1.6 CONSTRUCTION OF WASTE ROCK DUMP

The proposed project also entails the development of a new WRD to reduce load and haul distance and to facilitate easy backfill.

### 5.1.7 EXPANSION OF THE MAGNETITE DUMP

The proposed project entails the expansion of the existing magnetite dump to the north of the mine by approximately 17ha and to the south of the mine by approximately 5ha to cater for additional magnetite waste and ensure proper management of mine waste, which will reduce the environmental impacts while ensuring compliance with the relevant legislation. Where necessary, suitable erosion control measures such as the construction of gabions and culverts to control stormwater will be implemented to reduce environmental contamination. Vametco proposes to use a Type-C liner system for the magnetite dump expansion to reduce soil and groundwater contamination through seepage of polluted water.

Generally, a Type-C liner system is highly recommended by the DHSWS and DMRE, as it meets the regulatory requirements for the magnetite expansion. The liner is recommended as it meets the requirements of GN R.63640, entitled “Norms and Standards for Disposal of Waste to Landfill,” and the prescribed liner design requirements for different “classes” of landfill sites, based on the type of waste, as classified under GN R. 635. These design requirements are illustrated in a blue arrow in **Figure 6**.

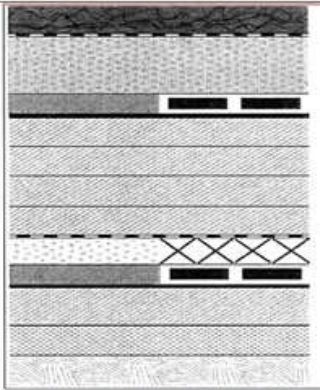
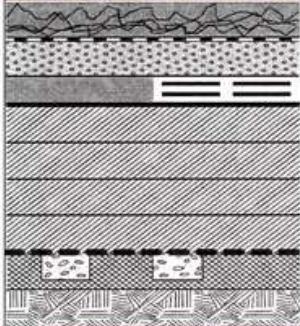
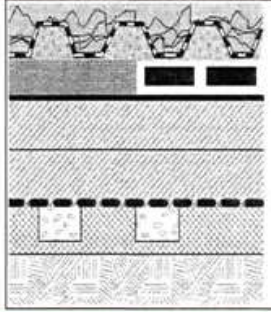
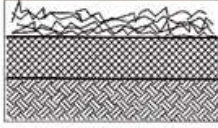
Waste Type	Liner Requirements	Landfill Class
<b>Type 0</b>	Disposal of Type 0 waste is not allowed. The waste must be treated and reassessed in terms of the <i>Norms and Standards for Assessment of Waste for Landfill Disposal</i> .	NA
<b>Type 1</b>	 <ul style="list-style-type: none"> <li>Waste body</li> <li>Geotextile filter</li> <li>200 mm Stone leachate collection system</li> <li>100 mm Protection layer of silty sand or a geotextile of equivalent performance</li> <li>2 mm HDPE geomembrane</li> <li>600 mm Compacted clay liner (in 4 x 150 mm layers)</li> <li>Geotextile filter layer</li> <li>150 mm Leakage detection system of granular material or geosynthetic equivalent</li> <li>100 mm Protection layer of silty sand or a geotextile of equivalent performance</li> <li>1.5 mm HDPE geomembrane</li> <li>200 mm Compacted clay liner</li> <li>150 mm Base preparation layer</li> <li>In situ soil</li> </ul>	Class A
<b>Type 2</b>	 <ul style="list-style-type: none"> <li>Waste body</li> <li>Geotextile</li> <li>150 mm Stone leachate collection system</li> <li>100 mm Protection layer of silty sand or a Geotextile of equivalent performance</li> <li>1.5 mm HDPE Geomembrane</li> <li>600 mm Compacted clay liner (in 4 x 150 mm layers)</li> <li>Under drainage and monitoring system and 150 mm Base preparation layer</li> <li>In situ soil</li> </ul>	Class B
<b>Type 3</b>	 <ul style="list-style-type: none"> <li>Waste body</li> <li>300 mm thick finger drain of geotextile covered aggregate</li> <li>100 mm Protection layer of silty sand or a geotextile of equivalent performance</li> <li>1.5 mm thick HDPE geomembrane</li> <li>300 mm clay liner (of 2 X 150 mm thick layers)</li> <li>Under drainage and monitoring system in base preparation layer</li> <li>In situ soil</li> </ul>	Class C
<b>Type 4</b>	 <ul style="list-style-type: none"> <li>Waste body</li> <li>150mm Base preparation layer</li> <li>In situ soil</li> </ul>	Class D



Figure 6: DWS Liner Requirements (DHSWS, Norms and Standards)

5.1.8 EXPANSION SLIMES DAM

The existing slimes dam will be expanded by approximately 85ha to cater for additional slimes waste capacity towards the east of the mine as depicted in **Figure 4** above.

### **5.1.9 REHABILITATION**

On completion of construction activities, the site will be rehabilitated as per the specifications of the EMP, approved Method Statements, and will meet the requirements of the Closure and Rehabilitation Plan. The rehabilitation activities will include:

- Removal of excess building material and waste;
- Repairing any damage caused by construction activities;
- Rehabilitating the area affected by temporary access roads;
- Reinstating existing roads; and
- Replacing topsoil and planting indigenous vegetation where necessary.

### **5.2 OTHER PROPOSED STRUCTURE AND INFRASTRUCTURE**

Vametco also proposes to construct a photovoltaic (PV) fixed-tilt solar park. However, this will not form part of this application. A different consultant is undertaking a separate EIA process and associated environmental study. The PV fixed-tilt solar park will have a capacity of 2.5 MW with a 1MW/4 MWh Vanadium Redox Flow battery storage system. The solar park will be approximately 5 hectares in size and will be undertaken within the approved MRA.

### **5.3 ALL LISTED AND SPECIFIED ACTIVITIES TRIGGERED AND BEING APPLIED FOR**

The proposed development triggers listed activities in terms of 2014 EIA Regulations as amended, National Environmental Management: Waste Act, 2008 (Act 59 of 2008), and National Water Act, 1998 (Act 36 of 1998). The listed activities applicable are listed and briefly described in Table 10 below:

**Table 10: Listed activities applicable to the proposed project**

Listed activities	Activity/Project description
<b>Applicable Activities Listed under Environmental Impact Assessment Regulations, 2014 as amended in April 2017, Listing Notice 1 (GN R983)</b>	
<p><b><u>GN R. 983 Item 12:</u></b></p> <p><i>“The development of—</i></p> <p>(i) <i>dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square meters; or</i></p> <p>(ii) <i>infrastructure or structures with a physical footprint of 100 square meters or more;</i></p> <p><i>where such development occurs—</i></p> <p>a) <i>in front of a development setback; or</i></p> <p>b) <i>if no development setback exists, within 32 meters of a watercourse, measured from the edge of a watercourse”.</i></p>	<p>The proposed expansion entails the following:</p> <ul style="list-style-type: none"> <li>• Development of two PCDs to contain and manage contaminated water from the magnetite dump facility and the plant. The PCD for the magnetite dump will be approximately 5ha and for the plant will be approximately 3ha.</li> <li>• Development of a Return Water Dam (5ha) to accommodate wastewater from the slimes dam or TSF.</li> <li>• Development of a barren dam to store barren and mother liquor solution (dam to store the excess of 100 000m<sup>3</sup>).</li> <li>• Development of a new WRD to reduce load and haul distance and to facilitate easy backfill.</li> </ul>
<p><b><u>GN R. 983 Item 27:</u></b></p> <p><i>“The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—</i></p> <p>(i) <i>the undertaking of a linear activity; or</i></p> <p>(ii) <i>maintenance purposes undertaken in accordance with a maintenance management plan”.</i></p>	<p>Approximately 10ha of indigenous vegetation will be cleared to provide space for the construction of the RWD, PCDs, and barren dam.</p>



Listed activities	Activity/Project description
<p><b><u>GN R. 983 Item 48:</u></b></p> <p><i>“The expansion of-</i></p> <p><i>(i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or</i></p> <p><i>(ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more;</i></p> <p><i>where such expansion occurs-</i></p> <p><i>(b) in front of a development setback; or</i></p> <p><i>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse”.</i></p>	<p>The proposed project entails the expansion of the following infrastructure or structures:</p> <ul style="list-style-type: none"> <li>• The existing slimes dam will be expanded by 85ha to cater to additional slimes waste capacity towards the east.</li> <li>• The existing magnetite dump by approximately 17ha to the north and 5ha to the south of the mine.</li> </ul>
<b>Applicable Activities Listed Under Environmental Impact Assessment Regulations, 2014 as amended in April 2017: Listing Notice 2 (GNR984)</b>	
<p><b><u>GN R. 984 Item 15:</u></b></p> <p><i>“The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—</i></p> <p><i>(i) the undertaking of a linear activity; or</i></p> <p><i>(ii) maintenance purposes undertaken in accordance with a maintenance management plan”.</i></p>	<p>The proposed slimes dam expansion will require vegetation clearance of approximately 85ha on the eastern side of the mine to cater for additional slimes wastes capacity.</p>
<b>Applicable Activities Listed under Environmental Impact Assessment Regulations, 2014 as amended in 2017: Listing Notice 3 (GNR985)</b>	
<p><b><u>GN R. 985 Item 14:</u></b></p> <p><i>“The development of—</i></p>	

Listed activities	Activity/Project description
<p>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or</p> <p>(ii) infrastructure or structures with a physical footprint of 10 square metres or more.</p> <p>where such development occurs—</p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.</p> <p><b>h. North West</b></p> <p>iv. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;</p> <p>v. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority”.</p>	<p>The proposed project entails the development of two PCDs, one RWD and barren dam with a combined physical footprint of more than 10 square metres within a wetland and other sensitive areas.</p>
<p><b>National Environmental Management: Waste Act No. 59 of 2008</b></p>	
<p><b><u>GNR 921 of November 2013, Category B: Activity 7</u></b></p> <p>“The disposal of any quantity of hazardous waste to land”.</p>	<p>The existing magnetite dump and slimes dam will be expanded to cater for the disposal of magnetite and slimes waste.</p>
<p><b><u>GNR 921 of November 2013, Category B: Activity 10</u></b></p>	<p>The following waste management facilities will be constructed:</p>

Listed activities	Activity/Project description
<p><i>“The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity)”.</i></p>	<ul style="list-style-type: none"> <li>• Two PCDs to accommodate stormwater and return water from the magnetite dump.</li> <li>• A return water dam to accommodate stormwater and return water from the existing and proposed slimes dam.</li> <li>• Barren dam to store barren and mother liquor solution.</li> </ul>

## 6 A DESCRIPTION OF THE POLICY AND LEGISLATIVE CONTEXT WITHIN WHICH THE DEVELOPMENT IS LOCATED AND AN EXPLANATION OF HOW THE PROPOSED DEVELOPMENT COMPLIES WITH AND RESPONSE TO THE LEGISLATION AND POLICY CONTEXT

### 6.1 LIST OF APPLICABLE ACTS AND REGULATIONS

The EIA Regulations of 2014, as amended, under Appendix 2 Section 1(e), requires a description of applicable legislations in the EIA Report. This section lists and describes the acts and legislation relevant to the proposed project and associated infrastructure. A list of the current South African environmental law, which is pertinent to the proposed development, is described in Table 11 below.

Municipal policies, plans, and by-laws, as well as Vametco's policies and world best practices, were considered during the undertaking of the EIA process. Table 11 below describes legislations that apply to the project; it is not an exhaustive analysis; however, it provides a guideline to the relevant aspects of each legislation.

**Table 11: Legislation pertaining to the proposed project**

Aspect	Relevant Legislation	Brief Description
Environment	<ul style="list-style-type: none"> <li>National Environmental Management: Act 1998, (Act No. 107 of 1998) as amended.</li> <li>Environmental Impact Assessment Regulations, December 2014 as amended</li> </ul>	<p>The overarching principles of sound environmental responsibility as reflected in the National Environmental Management Act, 1998 (Act No. 107 of 1998) apply to all listed projects. Construction and operation of activities must be conducted in line with the generally accepted principles of sustainable development, integrating social, economic, and environmental factors.</p> <p>The EIA process followed complies with the NEMA and the EIA Regulations of December 2014 as amended. The proposed development involves "listed activities," as defined by NEMA. Listed activities are activities that may potentially have detrimental impacts on the environment and therefore require an EA from the relevant Competent Authority, in this case, DMRE.</p>
Mining Rights		The Mine Health and Safety Act, 1996 (Act No. 29 of 1996) (MHSA) aims to provide for the protection of the health and

Aspect	Relevant Legislation	Brief Description
	The Mine Health and Safety Act, 1996 (Act No. 29 of 1996)	<p>safety of all employees and other personnel at the mines. The main objectives of the act are:</p> <ul style="list-style-type: none"> <li>• Protection of the health and safety of all persons;</li> <li>• Requires employers and employees to identify hazards and eliminate, control, and minimise the risks relating to health and safety at the mines;</li> <li>• Gives effect to the public international law obligations of the Republic that concern health and safety at all mines;</li> <li>• Provides for employee participation in matters of health and safety through health and safety representatives and the health and safety committees at the mines;</li> <li>• Provides for effective monitoring of health and safety conditions at the mines;</li> <li>• Provides for enforcement of health and safety measures at the mines;</li> <li>• Provides for investigations and inquiries to improve health and safety at mines; and</li> <li>• To promote:               <ul style="list-style-type: none"> <li>○ Culture of health and safety in the mining industry;</li> <li>○ Training in health and safety in the mining industry; and</li> <li>○ Co-operation and consultation on health and safety between the State, employers, employees, and their representatives.</li> </ul> </li> </ul>
Biodiversity	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	The purpose of the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA and the protection of species and ecosystems that warrant national protection. As part of its implementation strategy, the National Spatial Biodiversity Assessment was developed.
Protected Areas	National Environmental Management: Protected	The purpose of this Act is to provide for the protection, conservation, and management of ecologically viable

Aspect	Relevant Legislation	Brief Description
	Areas Act, 2003 (Act No. 57 of 2003)	areas representative of South Africa's biological diversity and its natural landscapes.
Heritage Resources	National Heritage Resources Act, 1999 (Act No. 25 of 1999)	The National Heritage Resources Act, 1999 (Act No. 25 of 1999) legislates the necessity for cultural and heritage impact assessment in areas earmarked for development, which exceed 0.5 ha. The Act makes provision for the potential destruction to existing sites, pending the archaeologist's recommendations through permitting procedures. Permits for this specific project will be administered by the North West Heritage Agency or the South African Heritage Resources Agency (SAHRA).
Air quality management and control	National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004)	<p>The objective of the Act is to protect the environment by providing reasonable measures for the protection and enhancement of air quality and to prevent air pollution. The Act makes provision for measures to control dust, noise, and offensive odours.</p> <p>Section 32 of The National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004) deals with dust control measures regarding dust control. The Minister or MEC may prescribe measures for controlling dust in specified places or areas, either in general or by specified machinery or in specified instances, the steps to be taken to prevent nuisance or other measures aimed at the control of dust. The National Dust Control Regulations (2013) provides for the management and monitoring of dust.</p>
Noise Management and Control	Noise Control Regulations in terms of the Environmental Conservation, 1989 (Act 73 of 1989)	The assessment of impacts relating to noise pollution management and control, where appropriate, must form part of the EMP. Applicable laws regarding noise management and control refer to the National Noise Control Regulations issued in terms of the Environment Conservation, 1989 (Act 73 of 1989).

Aspect	Relevant Legislation	Brief Description
Water Resources Management	National Water Act, 1998 (Act 36 of 1998)	<p>This Act provides for fundamental reform of the law relating to water resources and use. The preamble to the Act recognises that water resource management aims to achieve sustainable use of water for the benefit of all users and that the protection of the quality of water resources is necessary to ensure the sustainability of the nation's water resources in the interests of all water users.</p> <p>The proposed activities trigger the water uses listed in terms of this Act. Therefore, the necessary licence will be obtained in due course.</p>
Agricultural Resources	Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)	<p>The Act aims to provide for control over the utilization of natural agricultural resources to promote the conservation of the soil, water resources and vegetation and to combat weeds and invader plants. Section 6 of the Act makes provision for control measures to be applied to achieve the objectives of the Act.</p>
Human	The Constitution of South Africa, 1996 (Act No. 108 of 1996)	<p>The Constitution provides for an environmental right (section 24). The State is obliged "to respect, protect, promote and fulfil the social, economic and environmental rights of everyone..."</p> <p>The environmental right states that:        "Everyone has the right -</p> <p>a) To an environment that is not harmful to their health or well-being; and</p> <p>b) To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -</p> <ul style="list-style-type: none"> <li>• Prevent pollution and ecological degradation;</li> <li>• Promote conservation; and</li> </ul>

Aspect	Relevant Legislation	Brief Description
		<ul style="list-style-type: none"> <li>Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”</li> </ul>
Waste	National Environmental Management: Waste Act, 2008 (Act 59 of 2008)	<p>This Act provides fundamental reform of the law regulating waste management to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development. This Act also ensures the provision of national norms and standards for regulating the management of waste by all spheres of government. Further, it provides for specific waste management measures; licensing and control of waste management activities; remediation of contaminated land; compliance and enforcement; and for matters connected therewith.</p> <p>The proposed project entails the expansion and operation of the proposed magnetite dump facility and slimes dam facilities for the disposal of magnetite and slimes wastes.</p>
Minerals and petroleum resources	Mineral and Petroleum Resources Development Act, 2002 (28 of 2002)	<p>The objects of this Act are to –</p> <ol style="list-style-type: none"> <li>recognise the internationally accepted right of the State to exercise sovereignty over all the mineral and petroleum resources within the Republic;</li> <li>give effect to the principle of the State's custodianship of the nation's mineral and petroleum resources;</li> <li>promote equitable access to the nation's mineral and petroleum resources to all the people of South Africa;</li> <li>substantially and meaningfully expand opportunities for historically disadvantaged persons, including women and communities, to enter and actively participate in the mineral and</li> </ol>



Aspect	Relevant Legislation	Brief Description
		<p>petroleum industries and to benefit from the exploitation of the nation's mineral and petroleum resources;</p> <p>(e) promote economic growth and mineral and petroleum resources development in the Republic, particularly the development of downstream industries through the provision of feedstock, and development of mining and petroleum inputs industries;</p> <p>(f) promote employment and advance the social and economic welfare of all South Africans;</p> <p>(g) provide for security of tenure in respect of prospecting, exploration, mining, and production operations;</p> <p>(h) give effect to section 24 of the Constitution by ensuring that the nation's mineral and petroleum resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development; and</p> <p>(i) Ensure that holders of mining and production rights contribute towards the socioeconomic development of the areas in which they are operating.</p>

## 6.2 LIST OF APPLICABLE POLICIES AND GUIDELINES APPLICABLE TO THE PROJECT

Municipal policies, plans, and by-laws, and Vametco's policies and world best practices, were considered during the undertaking of the EIA process. The list of legislations that apply to the project is not an exhaustive analysis; however, it provides a guideline to the relevant aspects of each Act. Table 12 below provides a summarised list of applicable policies and guidelines, which are also applicable to the proposed activity and are to be considered in the assessment.

**Table 12: List of applicable policies and guidelines**

Aspect	Policy or Guideline	Brief Description
Municipal systems	Local Government: Municipal Systems Act (Act 32 of 2000)	Details all the systems issues that municipalities must be compliant with and allocate various functional requirements for various tiers of officials, as well as issues of municipal planning and performance management. This includes the review and comments of the Environmental Impact Assessment reports for development undertaken within the Municipality
Spatial Development Framework	North West Provincial Spatial Development Framework	Explains the spatial character of the province and details all the regional spatial issues. Consider what the PSDF explains as regional spatial context and include such in their SDFs.
Water	Water Services Act	Sets out the parameters and regulatory issues around the management of water and sanitation issues within the Municipality.
Air Quality	Madibeng Local Municipality: Air Quality management By-law	<p>The objectives of this by-law are to:</p> <ul style="list-style-type: none"> <li>• Give effect to the rights contained in Section 24 of the Constitution of the Republic of South Africa by controlling and managing air pollution within the area of the municipality's jurisdiction;</li> <li>• Provide in conjunction with any other applicable law, an effective legal and administrative framework within which the Municipality can manage and regulate activities that have a potential to adversely impact the environment, public health, and wellbeing of any persons or living organisms; and</li> <li>• Ensure that air pollution is avoided, or where it cannot be altogether avoided, mitigated, or minimized.</li> </ul>
Climate change	National Greenhouse Gas Emission Reporting Regulations	The purpose of the regulations is to introduce a single national greenhouse gas (GHG) reporting system, which will be used to inform policy formulation and help South Africa to meet its international obligations such as targets

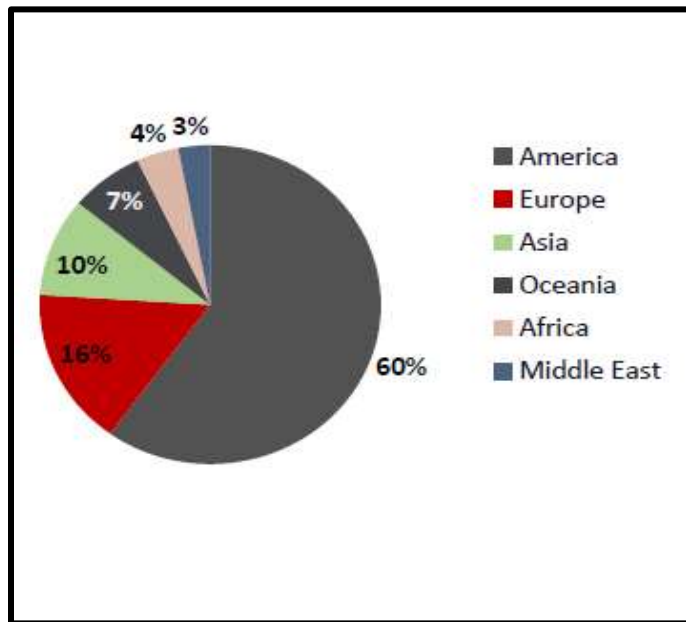
Aspect	Policy or Guideline	Brief Description
	(GG No. 40762, Notice 275)	set under the United Nations Framework Convention on Climate Change.
	South African National Climate Change Response White Paper	The South African National Climate Change Response White Paper (White Paper), published by the Department of Environmental Affairs (DEA, 2011), prioritises both climate change mitigation and adaptation in moving towards a climate-resilient and lower-carbon economy and society.
	United Nations Framework Convention on Climate Change (UNFCCC)	The UNFCCC is an international treaty formed by the United Nations in 1992. The objective of the treaty is to stabilise greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous anthropogenic interference with the climate system.

## 7 A MOTIVATION FOR THE NEED AND DESIRABILITY FOR THE PROPOSED DEVELOPMENT INCLUDING THE NEED AND DESIRABILITY OF THE ACTIVITY IN THE CONTEXT OF THE PREFERRED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE AS CONTEMPLATED IN THE ACCEPTED SCOPING REPORT

This section justifies the need and desirability of the proposed development with a focus on its associated benefits and importance to the locals, the region, and the country at large.

### 7.1 MOTIVATION FOR THE PROPOSED DEVELOPMENT

Vametco is an integrated mining and processing plant situated 8km to the north-east of Brits. It operates an open-cast mine supplying ore to its vanadium processing plant located within the same MRA. Vametco is one of South Africa's largest hosts of high-grade primary vanadium resources, with grades in situ ranging between 0.5% to 1.4% in magnetite  $V_2O_5$ . It is also the most extensive primary Vanadium resource base in the world, which produces and exports minerals across the globe; currently producing only Nitrovan, selling to steel mills across the globe. As a result, South Africa serves as the logical base for Vanadium Redox Flow Battery (VRFB) manufacturing, which includes multiple steps of mineral beneficiation, including converting vanadium into the electrolyte and assembling VRFBs locally. Many of the products are sold in the country and exported, which generates more income and foreign revenues, thus creating employment opportunities for local communities and the country at large. Refer to **Figure 7** below for Vametco's 2018 global customer base sales.



**Figure 7: Bushveld Vametco's 2018 global customer base sales (Bushveld Mineral Analysis, 2019)**

Vametco has identified the need to expand its mining operations to increase mining production capacity from 1.2 million to an average of 4 million tons per annum. Further, the mine is expected to reach a steady state of production at 3400 mtVp.a. in the current year (90% of its processing nameplate capacity of 3,750 mtVp.a.), increasing to more than 4200 mtVp.a. (85% of its processing nameplate capacity of 5,000 mtVp.a.), and this will increase the products to be exported outside the country which will, in turn, improve South Africa's economy. Subsequently, Vametco proposes to construct new infrastructure and expand the existing ones to ensure optimum mining operations, thereby increasing production. Consequently, this project aims to enhance the associated mining infrastructure and further responds to commodity demand. The proposed project will ensure the following:

- Reliable production and exportation of Vanadium products worldwide;
- Increase the mining production and thus create more stable job opportunities; and
- Enhancement of South Africa's socio-economic status.

## 7.2 BENEFITS OF THE PROJECT

It is recognised that mining activities are an essential component of South Africa's economic development. According to the Chamber of Mines of South Africa's Integrated Annual Review (2015), the mining sector accounted for 7.7% of South Africa's Gross Domestic Product (GDP). The proposed project is in Madibeng Local Municipality, wherein, the mining sector is one of the highest employment creators (IDP, 2018). Some of the world's richest platinum deposits and the largest chromate reserves are found in this Municipality. Other mining products include ferrochrome, stone and granite quarries, silica sand, and vanadium pentoxide. At the national level, the proposed project will increase Vanadium exports to other countries, which will contribute to the local economy through income generation and foreign

revenues, i.e., 60% of Vametco's product sales in 2018 were to the United States of America, where the price on average traded at \$10/kgV higher than in the European and Chinese markets (<https://www.bushveldminerals.com/vametco>). There will also be a less tangible but important benefit of positioning the Municipality ahead in terms of job opportunities.

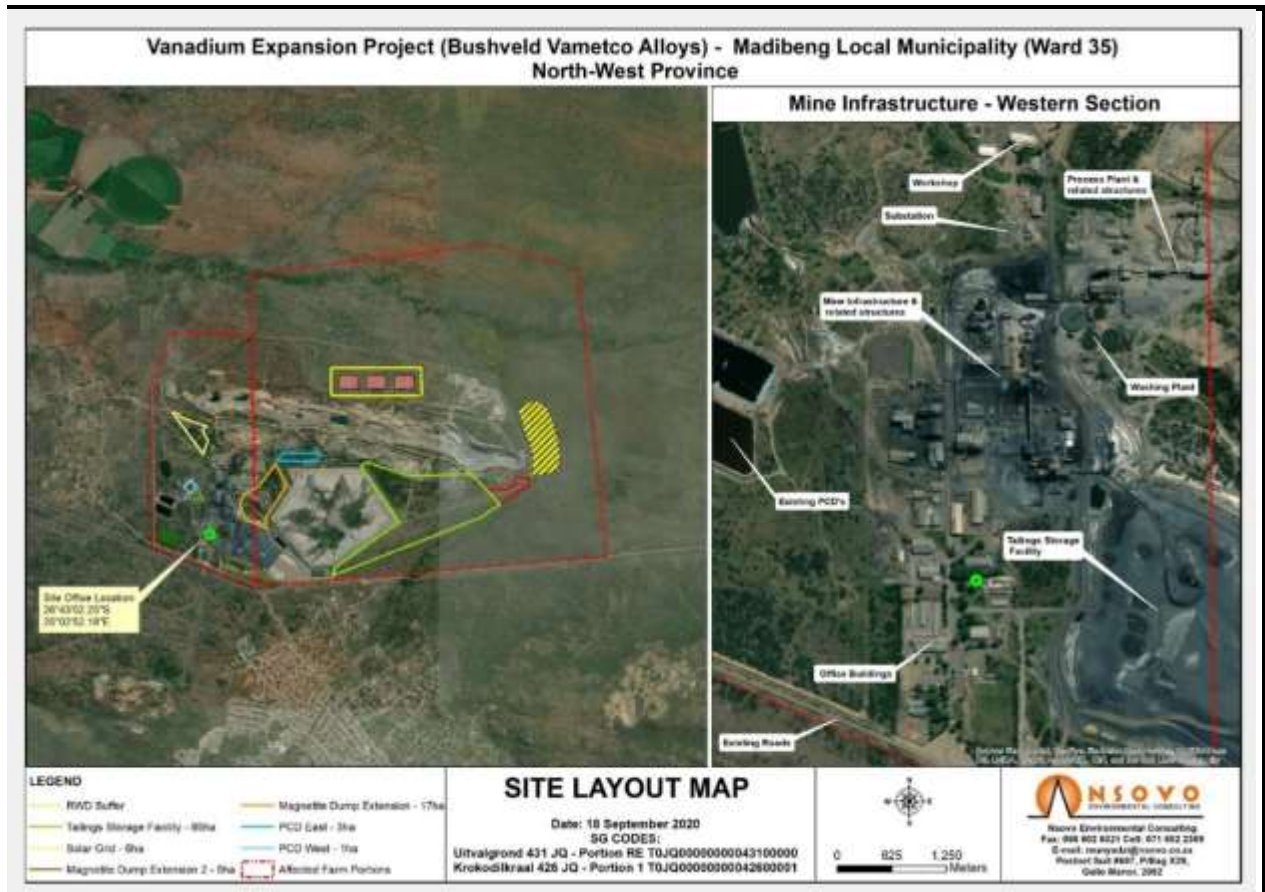
### 7.3 SUPPORTING STRATEGIES

At the regional level, the project will contribute to the improvement in the socio-economic status of the adjacent communities and the region at large. At the national level, the project will contribute to the generation of income and foreign revenues as most of Vametco's products are sold to other countries. The project will increase the socio-economic benefits, i.e., a possible increase in the number of employment opportunities for local communities.

## 8 A MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE AS CONTEMPLATED IN THE ACCEPTED SCOPING REPORT

The RWD is required to accommodate stormwater and return water from the two slimes dams to ensure environmental management as well as compliance with the legislation. Two alternatives were considered for the RWD (i.e., Alternative 1 – development of one large RWD of  $\pm 5$ ha and Alternative 2 – development of 2 RWDs of  $\pm 3$ ha each). Further, two alternatives for the barren dam are also considered.

All the polluted water from the plant goes to the stormwater dam resulting in unauthorised discharges of polluted water. Therefore, the PCDs must accommodate polluted water from the plant and magnetite dump to ensure compliance and prevent/reduce environmental contamination. Two different sites were considered for the development of two PCDs, and due to space constraints, there are no site alternatives for PCDs. However, site selection was determined through sensitivity mapping, whereby fewer sensitivity areas were considered. The development footprint within the approved site, as contemplated in the Scoping report, is depicted in **Figure 8** below:



**Figure 8: The Development Footprint within the approved site**

The expansion of the magnetite dump and slimes dam is required to accommodate magnetite and slimes waste to ensure proper containment of mine waste, environmental management as well as compliance with the relevant legislation. These expansions will be undertaken from the existing infrastructures, which does not necessitate consideration of the alternative. These activities will ensure that mine operations proceed efficiently and effectively as they will be complying with all applicable legislation.

As required by the Regulations, the No-go alternative has also been considered for this project, and it is positive and negative impacts are assessed in this report. All the planned activities will be undertaken within the authorised MRA.

Although not part of this project, it must be noted that the mine has considered other sources of energy, thus the proposed development of a solar park to allow for an energy mix and introduce more sustainable energy sources.

## **9 MAP DEPICTING THE DEVELOPMENT FOOTPRINT AND FULL DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE AS CONTEMPLATED IN THE ACCEPTED SCOPING REPORT**

The identification of alternatives is an important component of the EIA process. The identified alternatives are assessed in terms of environmental acceptability, technical as well as economic feasibility during the EIA process wherein the preferred alternative is highlighted and presented to the CAs.

In considering the preferred alternatives, various aspects were considered, and these include the degree of sensitivity of the site, technical viability, and to a certain extent, the economic viability. The proposed project is located within Vametco's authorised MRA. Therefore, no alternative site location was considered, however, the study considered different positions within the MRA for the proposed new developments. The project will consider other alternatives such as laydown and structural alternatives for the PCD, RWD, magnetite, and slime dumps, which will be found to be economically and environmentally viable compared to other options. The following section includes alternatives considered for the proposed project.

### **9.1 DETAILS OF DEVELOPMENT FOOTPRINT ALTERNATIVES CONSIDERED**

#### **9.1.1 SITE ALTERNATIVE**

The EIA Regulations require that alternatives be considered, and such would include technical, locality, structural, scheduling, etc. In this instance, alternatives considered are locations within the MRA for the proposed Return Water Dam, Pollution Control Dam, as well as the no-go alternatives. The following section includes a discussion on the alternatives considered.

##### **9.1.1.1 RETURN WATER DAM ALTERNATIVES**

The proposed project entails the development of an RWD to accommodate stormwater and return water from the existing slimes dam. Alternative 1 entails the development of one big RWD with an extent of 5ha and storage capacity of 225 000m<sup>3</sup> and Alternative 2 entails the development of three return water dams which will require an extent of 9ha and a buffer of 12ha and a storage capacity of 450 000m<sup>3</sup>. A comparative analysis of the proposed site alternatives of the Return Water Dam is presented in Table 13 and shown in **Figure 8**: A summary of specialist finding, and recommendation is presented in Table 14.

**Table 13: Comparative analysis of the Return Water Dam Alternatives**

Comparative analysis of Return Water Dam Alternatives	
Return Water Dam Alternative 1	Return Water Dam Alternative 2
Alternative 1 is situated within a small portion (30% coverage) of aquatic and terrestrial ESA.	Alternative 2 falls within a larger portion (50% coverage) of the aquatic and terrestrial ESA.
This alternative falls within Clay Thorn Bushveld (50% coverage), and it also covers a small portion (30%) of the Threatened Ecosystem (Marikana Thornveld).	The whole Alternative 2 (100%) falls within the Threatened Ecosystem known as Marikana Thornveld.
This alternative is situated in the North of the mine close to the Non-perennial River known as Kgowe River.	Alternative 2 is situated in the southwest of the mine far from the non-perennial river known as Kgowe River.
This alternative entails 30-40% coverage of NFEPA wetland. However, the wetland has been disturbed or transformed due to the mining activities.	This alternative is situated in an area where there is no NFEPA wetland.
This alternative will result in less clearance of indigenous vegetation as it requires less space compared to Alternative 2.	This alternative will result in more clearance of indigenous vegetation as it requires more space for construction compared to Alternative 1.
RWD Alternative 1 will utilise less space (5ha) resulting in less environmental degradation (i.e., during construction) and contamination (i.e., groundwater and Surface contamination because of polluted return water.	RWD Alternative 2 will utilise more space (approximately 9ha including its buffer) resulting in more environmental degradation and contamination.
Alternative 1 is situated close to the existing slimes dam ( $\pm 100\text{m}$ ) from the area where polluted and return water to be contained will be generated from.	Alternative 2 is situated far from the existing slimes dam ( $\pm 500\text{m}$ ) from the area where polluted and return water to be contained will be generated from.
The pipeline or trench to transport return water and stormwater from the two slimes dam will be shorter, and easy to install as it will be installed in a relatively plain terrain. This means that the shorter the trench, the less the impacts on the environment during the installation of the trench or pipeline.	The pipeline or trench to transport return water and stormwater from the two slimes dam will be longer and it will have to pass through the open-pit mining area. This means the longer the trench, the higher the impacts during the installation of the trench or pipeline.



**Table 14 : Summary of Specialist Findings**

Specialist	Description
Wetland	Return Water Dam Alternative 1 is regarded as the preferred option as it falls within the current mining footprint and would drain into the existing point if a failure occurs. Return Water Dam Alternative 2 is strongly not recommended as it falls directly within a watercourse, Riparian 2. The destruction of watercourse habitat is definite and the potential for pollution of watercourses downstream is regarded as high in case of accidental spillages.
Soil and land Capability	Alternative 1 is the preferred option because it requires a smaller footprint (5ha) while Alternative 2 requires a larger footprint (9ha) which overlaps on 3 land capability classes and traverses the arable and grazing soils. In addition, the impacts for Alternative 1 will be localised as the portion of it is located on disturbed soils while Alternative 2 will affect negatively soil suitable for cultivation.
Visual	Return Water Dam Alternative 1 is proposed to the east of the tailing's storage facility. The dam is on a lower level than the existing Slimes dam, and the visual impact on surrounding areas is expected to be low. Return Water Dam alternative 2 is proposed to the north of the existing slimes dam and is on a much lower level than the existing Slimes dam, and the visual impact on surrounding areas is expected to be low. Viewers from Makau, a small settlement to the south of the mine, may be affected visually by the dam by Alternative 1. While few viewers are looking onto the mine from the north, as it is mostly agricultural land, therefore this will have the least visual impact which makes Alternative 2 the preferred option. From the Visual Impact Assessment perspective, there is no major difference between Alternative 1 and 2 as both will have low impacts.
Heritage	From a heritage perspective, all the proposed alternatives for the development of the RWD are feasible. The disadvantage with Alternative 2 is that it requires a large footprint resulting in environmental degradation as compared to Alternative 1. There are approximately 30 formal graves with tombstones at the site for the proposed RWD Alternative 1. However, from the point of view, Alternative 1 remain feasible before the relocation of the graves to formal graveyard undertaken with suitably qualified heritage and archaeological specialist.
Terrestrial Biodiversity	The extent of the proposed RWD Alternative 2 will likely destroy the freshwater habitat associated with the unfenced area, which will likely cause the displacement of the avifaunal and amphibian SCC expected to utilise the habitat unit. It is highly recommended that the layout of this infrastructure be revised to limit the potential loss of amphibian SCC and displacement of foraging avifaunal SCC associated with the Magaliesberg IBA, located in proximity. As a result, Alternative 1 of the RWD is the most preferred compared to Alternative 2 of the RWD

	because of their impacts due to the high probability of the destruction of the Freshwater Habitat associated with the RWD Alternative 2.
Climate Change	The project's GHG emissions will contribute to anthropogenic climate change. Climate change is likely to be accelerated and extended as GHG emissions accumulate in the atmosphere. The magnitude of the impact can however be reduced, notably by reducing the quantity of GHG emissions.
Socio-economic	From a socio-economic point of view, the significance of positive socio-economic benefits associated with the proposed development exceeds the significance of negative socio-economic impacts. For example, the proposed mine expansion and prolonged life of the mine will result in sustainable jobs at the mine and short-term employment opportunities during construction. These include skilled, semi-skilled, and under-skilled labours which could consist of locals (in and around the mining area) as well as regional and national communities. There will always be negative socio-economic consequences associated with the project regardless of the efforts by the project proponent to minimise them.
Noise	The proposed activities will take place in the vicinity of existing mining activities and the environmental noise impact during the construction and decommissioning phases will be insignificant during summer and winter periods for all the proposed activities including two Barren Dam Alternatives. The noise impact will change during the operational phase where the noise intrusion will be low. This is based on a noise intrusion level of 5.0dBA and not the benchmark noise intrusion of 7.0dBA before a noise disturbance is created. Therefore, all the proposed alternatives of RWD are suitable for the project.
Traffic	The study area was defined based on the extent and type of the project activities, and the characteristics of the traffic expected to be generated as a result. The Traffic Specialist study assessed the traffic impacts associated with the overall proposed activities including the RWD Alternative 1 and 2. The impact, as determined by the defined study area, will be concentrated locally and the traffic influence outside the boundaries of the study area would be insignificant.
Air quality	The proposed construction activities including the movement of vehicles, levelling and compacting of surfaces, as well hauling of the materials (i.e., Waste Rocks, Tailings, Magnetite waste etc) will have implications on ambient air quality. The abovementioned activities would result in fugitive dust emissions containing Total Suspended Particulate (TSP giving rise to nuisance impacts as fallout dust). Also, fugitive dust (containing TSP, as well as PM10 and PM2.5 (dust with a size less than 10 microns, and dust with a size less than 2.5 microns giving rise to health impacts). It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity, the specific operations, and the prevailing meteorological conditions. However, all the proposed alternatives of the barren dam

	are feasible, but they need to adhere to the recommendations and mitigation measures of the Air Quality Specialist study ( <b>See attached Appendix 6 of Air Quality Impact Assessment Report</b> ).
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Based on the comparative analysis of the RWD site alternatives, Alternative 2 is not feasible because the open-cast mining will expand towards its location, and it also has more impacts on the environment compared to alternative 1.

#### 9.1.1.2 BARREN DAM ALTERNATIVES

The development of the barren dam considered two site alternatives whereby Alternative 1 entails the development of a barren dam with an extent of 1ha and storage capacity of 105 000m<sup>3</sup> and Alternative 2 entails the development of three will require an extended area of 3ha and storage capacity of 315 000m<sup>3</sup>. A summary of specialist finding, and recommendation is presented in Table 16 and the comparative analysis of the proposed site alternatives of the barren dam is presented in Table 17 and shown in **Figure 8**.

**Table 15: Summary of Specialist Findings**

Specialist	Description
Soil and land Capability	Based on the comparative analysis presented in Table 13, Alternative 1 has more advantages compared to Alternative 2 which makes Alternative 1 the preferred one. Alternative 1 is deemed preferred because is located within an infrastructural area while Alternative 2 is located within soils suitable for grazing land use. Alternative 2 is less preferred as it will result in more vegetation clearance leading to soil erosion and loss of land capability.
Wetland	From a watercourse perspective, there are no significant differences between Barren Dam Alternative 1 and Barren Dam Alternative 2. Proximity to Riparian 1 and required mitigation measures are also similar for both alternatives.
Visual	The proposed position for the Barren Dam alternative 1 is within the main mining facilities, the visual impact will be low, as the Barren Dam will blend in with the existing mining structures and will be associated with the mining landscape. This Barren Dam is situated well within the mine, and from a visual aspect, this alternative is the preferred position. The proposed position for the Barren Dam alternative 2 is to the west of the main mining facilities, the visual impact will be low, as the Barren Dam will blend in with the existing mining structures and will be associated with the mining landscape. This Barren Dam is closer to the boundary of the site and may be viewed by motorists and viewers from Rankotia which makes it a less preferred alternative.
Heritage	From a heritage perspective, all the proposed alternatives for the development of the Barren Dam are feasible. However, Alternative 1 is the preferred alternative because it is located within

Specialist	Description
	existing mining structures where the area is already disturbed. Alternative 2 is less preferred because it also entails a portion of virgin land that will require vegetation clearance.
Terrestrial Biodiversity	The proposed two alternatives for Barren Dams are both feasible but Alternative 1 is the most preferred because it requires less space, and it will be constructed over the old barren dam infrastructure (1ha) where the area is already disturbed. Alternative 2 is proposed to be constructed in the south-western corner of the focus area and it requires 3ha of the undisturbed area.
Noise	The proposed activities will take place in the vicinity of existing mining activities and the environmental noise impact during the construction and decommissioning phases will be insignificant during summer and winter periods for all the proposed activities including two Barren Dam Alternatives. The noise impact will change during the operational phase where the noise intrusion will be low. This is based on a noise intrusion level of 5.0dBA and not the benchmark noise intrusion of 7.0dBA before a noise disturbance is created. Therefore, all the proposed alternatives to barren dams are feasible.
Air quality	The proposed construction activities, movement of vehicles, levelling and compacting of surfaces, as well hauling of the materials (i.e., Waste Rocks, Tailings, Magnetite waste etc) will have implications on ambient air quality. The abovementioned activities would result in fugitive dust emissions containing Total Suspended Particulate (TSP giving rise to nuisance impacts as fallout dust). Also, fugitive dust (containing TSP, as well as PM10 and PM2.5 (dust with a size less than 10 microns, and dust with a size less than 2.5 microns giving rise to health impacts). It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity, the specific operations, and the prevailing meteorological conditions. However, all the proposed alternatives of the barren dam are feasible, but they need to adhere to the recommendations and mitigation measures of the Air Quality Specialist study.
Traffic	The study area (receiving environment) was defined based on the extent and type of the project activities, and the characteristics of the traffic expected to be generated as a result. The Traffic Specialist study assessed the traffic impacts associated with the overall proposed activities including the barren dam alternatives. The impact, as determined by the defined study area, will be concentrated locally and the traffic influence outside the boundaries of the study area would be insignificant.
Socio-economic	From a socio-economic point of view, the significance of positive socio-economic benefits associated with the proposed development exceeds the significance of negative socio-economic impacts. For example, the proposed mine expansion and prolonged life of the mine

Specialist	Description
	will result in sustainable jobs at the mine and short-term employment opportunities during construction. These include skilled, semi-skilled, and under-skilled labours which could consist of locals (in and around the mining area) as well as regional and national communities. There will always be negative socio-economic consequences associated with the project regardless of the efforts by the project proponent to minimise them.
Climate Change	The project's GHG emissions will contribute to anthropogenic climate change. Climate change is likely to be accelerated and extended as GHG emissions accumulate in the atmosphere. The magnitude of the impact can however be reduced, notably by reducing the quantity of GHG emissions.

**Table 16: Comparative analysis of barren dam alternatives**

Comparative analysis of barren dam alternatives	
Barren Dam Alternative 1	Barren Dam Alternative 2
This alternative does not fall within any of the Threatened Ecosystem (Marikana Thornveld).	This alternative falls within the Threatened Ecosystem known as Marikana Thornveld (40% coverage).
RWD Alternative 1 will utilise less space (1ha) resulting in less environmental degradation (i.e., during construction) and contamination (i.e., groundwater and surface contamination).	RWD Alternative 2 will utilise more space (3ha) resulting in more environmental degradation and contamination.
This alternative will result in reduced clearance of indigenous vegetation as it requires less space compared to Alternative 2.	This alternative will result in more clearance of indigenous vegetation as it requires more space for construction than Alternative 1.
Alternative 1 is situated close to the existing plant and already disturbed area.	Alternative 2 is situated within the area less disturbed with dense vegetation.
Impact will be localised since a portion of it is located on disturbed soils.	A larger footprint will be disturbed as well as soils suitable for cultivation.
Mostly located on grazing and wilderness soils.	Traverses arable and grazing soils
Overlaps on 2 land capability classes.	Overlaps on 3 land capability classes.

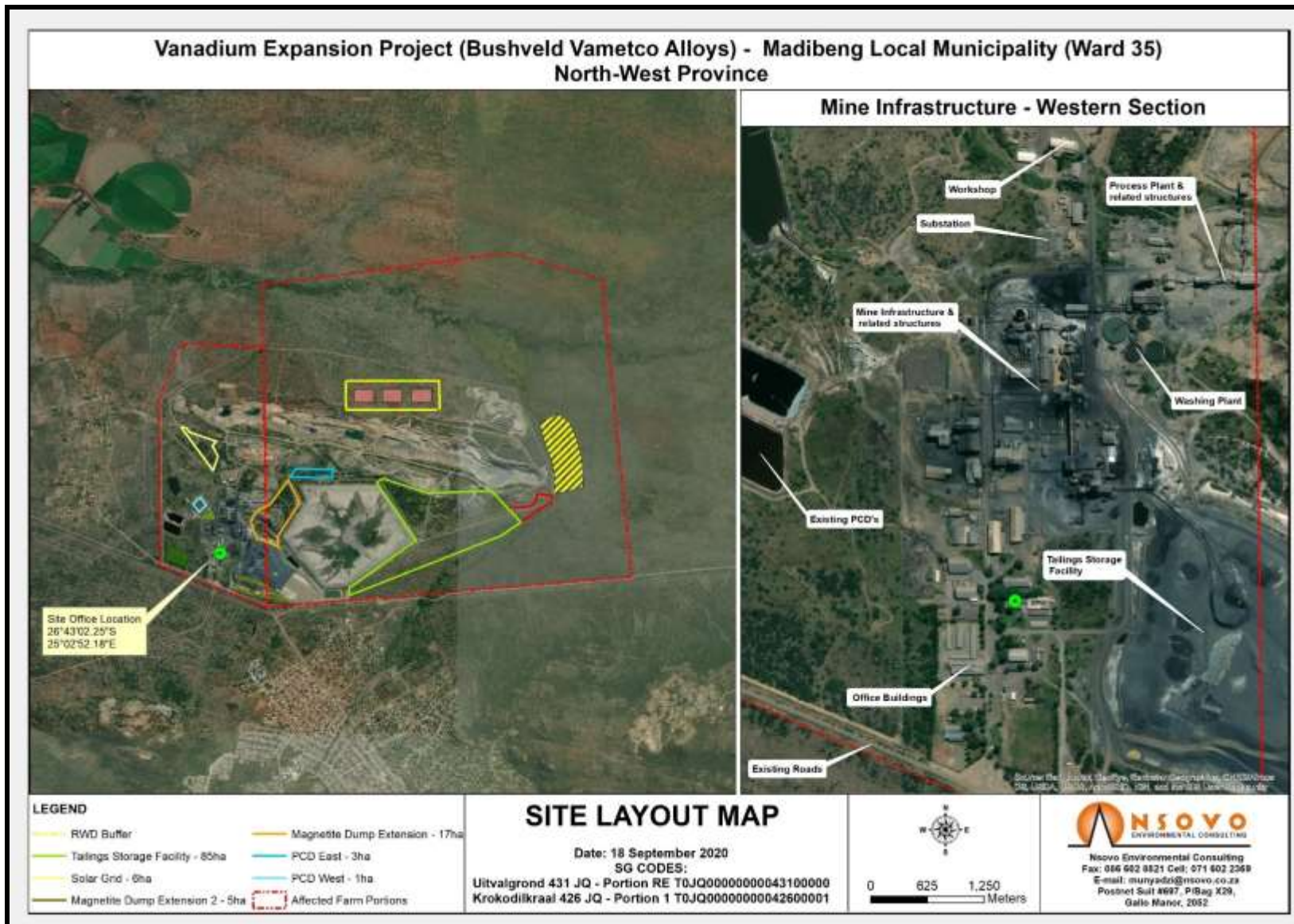


Figure 9: Location of the alternative sites for the proposed project

### 9.1.1.3 EXPANSION OF MAGNETITE DUMP AND SLIMES DAM

The proposed project entails expanding the magnetite dump and slimes dam for disposal of magnetite and slimes wastes. The current capacity of the Calcine dump is not adequate to cater for mine expansion and increased production, hence the need for expansion. The afore-mentioned existing infrastructure will be expanded; therefore, no site alternatives are considered.

### 9.1.1.4 DEVELOPMENT OF POLLUTION CONTROL DAMS AND WASTE ROCK DUMP

The site location for the proposed development of PCDs and waste rock dump falls within the approved MRA with space constraints; as such, there are no site alternatives considered for such developments. However, the identified and selected site location was based on the following motivation:

- The proposed PCDs will store polluted water from the magnetite dump and the plant. Therefore, the selected site locations are the most viable locations for PCDs due to their proximity to the magnetite dump and plant.
- The identified site location will also cater for additional space for expansions of the PCDs if required.
- The sites were found to be more suitable for the proposed development of waste rock dump and PCDs due to the availability of space required
- The location of the proposed waste rock dump was found to be more viable due to its proximity from the open pit, which will reduce load and haul distance and facilitate easy backfill.

### 9.1.2 NO-GO ALTERNATIVE

According to GN R.982 of the 2014 EIA Regulations as amended, consideration must be given to the option not to act in which an alternative is usually considered when the proposed development is envisaged to have significant adverse environmental impacts that mitigation measures cannot ameliorate effectively. Should the no-go option be adopted, the proposed mine operations expansion will not materialise. The planned production capacity increase mining production capacity from 1.2 million to an average of 4 million tons per annum would not be realised. This implies that there will be no increase in both, the products that are exported outside the country and the creation of employment opportunities, which is expected to yield positive spinoffs for the locals, the province, and the country at large. In addition, the local economy will be negatively affected and the Madibeng Municipality's GGP. Further, the no-go alternative will result in the loss of foreign revenues from the planned exportation of vanadium products.

## 9.2 DETAILS OF THE PUBLIC PARTICIPATION PROCESS UNDERTAKEN IN TERMS OF REGULATION 41 OF THE REGULATIONS, INCLUDING COPIES OF THE SUPPORTING DOCUMENTS AND INPUTS

The NEMA EIA Regulations require that during the EIA process, the Organs of State, together with Interested and Affected Parties (I&APs), be informed of the application and allowed to comment.

Public Participation Process (PPP) is any process that involves the public in problem-solving and decision-making; it forms an integral part of the Scoping and EIA process. The PPP provides I&APs with an opportunity to provide comments and raise issues of concern or to make suggestions that may result in enhanced benefits for the project.

The primary purpose of the PPP report is as follows:

- To outline the PPP that was undertaken;
- To synthesise the comments and issues raised by the key stakeholders, I&APs; and
- To ensure that the EIA process addresses the issues and concerns raised.

Chapter 6, Regulation 39 through 44 of the 2014 EIA Regulations stipulates how the PPP should be conducted as well as the minimum requirements for a compliant process. These requirements include but not limited to:

Fixing a notice board at or on the fence of-

- (i) The site where the activity to which the application relates is or is to be undertaken; and
- (ii) A place conspicuous to the public at the boundary of the site.

- Placing an advertisement in
  - Two of the local newspaper within or around the proposed site.

### **9.2.1 PUBLIC PARTICIPATION PRINCIPLES**

The principle of Public Participation holds that those who are affected by a decision have the right to be involved in the decision-making process (i.e., the public's contribution will influence the decision). One of the primary objectives of conducting the PPP is to provide Interested and Affected Parties (I&AP) with an opportunity to express their concerns and views on issues relating to the proposed project. The principles of public participation are to ensure that the PPP:

- Communicates the interests of and meet the process needs of all participants.
- Seek to facilitate the involvement of those potentially affected.
- Involves participants in defining how they participate.
- Is as inclusive and transparent as possible, it must be conducted in line with the requirements of Regulation 39 through 44 of the EIA Regulations as amended.

### **9.2.2 APPROACH AND METHODOLOGY**

The public participation approach adopted in this process is in line with the process contemplated in Regulation 39 through 44 of the EIA Regulations as amended, in terms of NEMA, which provides that I&APs must be notified about the proposed project. Further, the approach was amended to align with the requirements of I the COVID-19 Regulations



published in Annexures 2 and 3 of Government Notice No 43412 of 5 June 2020 and the Public Participation Plan was submitted to the DMRE.

### 9.2.2.1 PRE-APPLICATION CONSULTATION

Pre-application meetings were undertaken with the competent authorities responsible for the authorising the project as follows:

**Table 17: Details of Consultation with DMRE**

Organisation	Date
Department of Mineral Resources and Energy	21 <sup>st</sup> of January 2020
Department of Human Settlement Water and Sanitation	04 <sup>th</sup> of September 2020

### 9.2.2.2 IDENTIFICATION OF INTERESTED AND AFFECTED PARTIES

Interested and Affected Parties (I&APs) identified include pre-identified stakeholders (government department), landowners and the public. Notification and request for comments will be submitted to the following key stakeholders:

• North West Department of Mineral Resources;
• North West Department of Rural, Environment and Agricultural Development;
• North West Department of Water and Sanitation;
• North West Department of Transport and Public Works;
• North West Heritage Resources Agency;
• South African Heritage Resource Agency;
• Wildlife and Environmental Society of South Africa;
• Madibeng Local Municipality;
• Bojanala District Municipality;
• Landowners; and
• Community representatives.

The notifications were sent to stakeholders as well as I&APs via emails to inform them of the availability of the draft Scoping Report for review and comment on the 12th of November 2020. This notification will also be sent for the

availability of the draft EIR for 30-day review and comments on the 30<sup>th</sup> of June 2021 through the newspaper advertisement. Proof will be included in the Final EIR.

### **9.2.2.3 PUBLIC PARTICIPATION DATABASE**

In accordance with the requirements of the EIA Regulations under Section 24 (5) of NEMA, Regulation 42 of GN R. 326 (as amended), a register of I&APs must be kept by the Public Participation Practitioner. In fulfilment of this requirement, such a register has been compiled, and details of I&APs including, their comments are being updated throughout the project cycle. The database is attached as **Appendix D1**.

### **9.2.2.4 SITE NOTICES**

During the Scoping phase, A2, size notices were fixed at different conspicuous locations within and around the proposed project study area and the identified locations include but not limited to the Bushveld Vametco Mine (main entrance gate, canteen, and mine hall), Rankotia primary school, Mothutlung clinic, police station, and public library and Shoprite Usage. During the EIA phase, A2 size notices will be placed at the same locations to inform the public of the project and the availability of draft EIR for review and comments. Photographic evidence will be included in the Final EIR.

### **9.2.2.5 PLACEMENT OF AN ADVERTISEMENT IN THE LOCAL NEWSPAPER AND AVAILABILITY OF EIR**

During the Scoping phase, an advertisement was placed on two local newspapers (Platinum Weekly Newspaper on the 13<sup>th</sup> of November 2020 and Brits Pos on the 20<sup>th</sup> of November 2020) to inform I&APs of the proposed project, availability of the Scoping Report, and public meetings. During the EIA phase, an advert was placed on the Platinum Weekly Newspaper on the 19<sup>th</sup> of May 2021 and Brits Pos on the 19<sup>th</sup> of May 2021. The Draft EIR will be placed for review and comment at the Mothutlung Public library and Nsovo website ([www.nsovo.co.za](http://www.nsovo.co.za)), for 30 days review. Proof of newspaper adverts will be included in the Final EIR.

### **9.2.2.6 PUBLIC MEETINGS**

As part of the public participation process, public and focus group meetings were conducted accordingly during the Scoping phase, and more sessions will be held during the EIA phase as scheduled and presented in Table 14 below. However, in line with the requirements of the COVID-19 Regulations, public engagement will take a different approach. In the interest of the health and safety of our communities, all engagements, including meetings, be virtual. Therefore, when necessary, zoom meetings will be scheduled accordingly. The schedule will be placed at conspicuous places and advertised on the local paper.

During the EIA phase, additional measures will be put in place to encourage participation, and this will be in line with the requirements of the COVID-19 Regulations. Meetings will be scheduled, and it is proposed that the number of participants in public meetings is strictly controlled, and virtual meetings (zoom meetings) will be conducted on the 21<sup>st</sup> of July 2021. The login details to the meeting are presented as follows:

Meeting ID	Meeting Password	Date
796 6858 3879	09nUn7	21 <sup>st</sup> July 2021

### 9.2.2.7 PLACEMENT OF THE DRAFT EIA REPORT FOR REVIEW AND COMMENT

In line with the COVID-19 Regulations published on 5th of June 2020, which encourages people to stay at home, the draft EIA reports will be distributed via email to various stakeholders, and the hard copy placed at the Vametco gate for 30 days review and comment from the 02<sup>nd</sup> of July 2021 to the 02<sup>nd</sup> of August 2021. The reports will be made available on the Nsovo website, which is [www.nsovo.co.za](http://www.nsovo.co.za), the proof of the availability of draft EIR will be attached in the Final EIR.

### 9.3 SUMMARY OF THE ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES AND AN INDICATION OF THE MANNER IN WHICH THE ISSUES WERE INCORPORATED OR THE REASONS FOR NOT INCLUDING THEM

No comments and issues raised on the project thus far from the I&APs. Comments and issues received during the EIA phase will be put together in the C&R report and submitted to DMRE. The template of the C&R report is attached as **Appendix D2**.

### 9.4 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE ALTERNATIVES FOCUSING ON THE GEOGRAPHICAL, PHYSICAL, BIOLOGICAL, SOCIAL, ECONOMIC, HERITAGE AND CULTURAL ASPECTS

This section outlines parts of the socio-economic and biophysical environment that could be affected by the proposed development. The potential effects of the project on the human environment, socio-economic conditions, physical, cultural resources and interactions between the project and the environment are described below.

#### 9.4.1 SOCIO-ECONOMIC DESCRIPTION

This section presents the socio-economic aspects focusing on the Province and Municipalities within which the proposed study area is located.

##### 9.4.1.1 PROVINCIAL DESCRIPTION OF THE PROPOSED PROJECT

The North West Province is in the north of South Africa, and it borders two of South Africa's provinces viz Gauteng to the east and the Free State to the south of the country. The North West Province covers 104 882km<sup>2</sup> and has a population of 3 748 436 (IDP, 2018). Mahikeng (previously known as Mafikeng) is the province's capital city and lies near the Botswana border and forms a single urban area with its neighbouring town, Mmabatho ([www.municipalities.co.za](http://www.municipalities.co.za)). The main towns within the province include Potchefstroom, Klerksdorp, Brits, Rustenburg, Klerksdorp, and Lichtenburg.

Mining is the major contributor to the North West economy and represents almost a quarter of South Africa's mining industry. The Rustenburg and Brits districts produce more platinum than any other single area in the world. The North West Province also produces a quarter of South Africa's gold; other commodities include granite, marble, fluorspar, and diamonds. In addition, the province has several tourist attractions, including the internationally famous Sun City, the Pilanesberg National Park, the Madikwe Game Reserve, and the Rustenburg Nature Reserve.

#### **9.4.1.2 DISTRICT MUNICIPALITY WITHIN WHICH THE STUDY AREA IS LOCATED**

The North West Province is divided into four district municipalities, viz. Bojanala Platinum, Dr Kenneth Kaunda, Dr. Ruth Segomotsi Mompati and Ngaka Modiri Molema. The proposed project will be undertaken within the Bojanala Platinum District Municipality, which is a Category C Municipality. The Municipality shares a border with the Waterberg District Municipality to the north, Dr. Kenneth Kaunda District Municipality to the south, the City of Tshwane Metro to the east, West Rand District Municipality to the south-east, and Ngaka Modiri Molema District Municipality to the west ([www.municipalities.co.za](http://www.municipalities.co.za)).

The major towns within the Bojanala Platinum District Municipality include Brits, Derby, Hartbeesfontein-A, Hartbeespoort, Koster, Madikwe, Marikana, Mooiooi, Phatsima, Rustenburg, Swartruggens, and Tlhabane. The main economic sectors within this municipality are mining, community service, finance, trade, transport, and manufacturing.

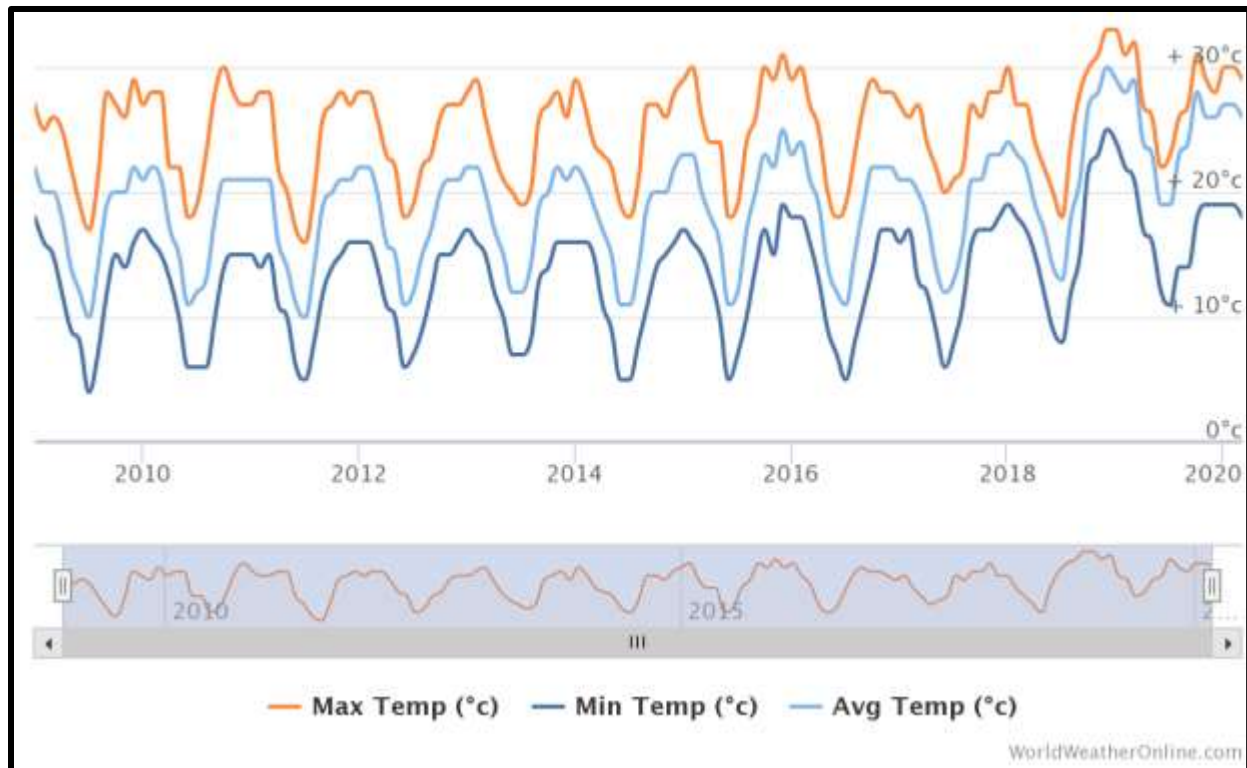
#### **9.4.1.3 LOCAL MUNICIPALITY WITHIN WHICH THE PROPOSED STUDY AREA IS LOCATED**

The Bojanala Platinum District Municipality comprises five local municipalities which are Kgetlengrivier, Madibeng, Moses Kotane, Moretele, and Rustenburg. However, the project will be located within the Madibeng Local Municipality.

Madibeng is a Category B Municipality situated between the Magaliesberg and Witwatersrand, and it is 60km and 50km from Rustenburg and north of Pretoria, respectively. It is positioned along the Heritage Route, linking the World Heritage Site with the Pilanesberg and Madikwe Game Reserves. Mining, manufacturing, agriculture, and tourism are the main economic sectors within the Municipality. Further, mining is the predominant economic activity, and the Hartebeespoort Dam is the second most visited place after the Waterfront in Cape Town (IDP, 2018).

#### **9.4.2 CLIMATIC CONDITION OF THE PROPOSED AREA**

The study area is in the Highveld climatic region, which is a summer rainfall area. The temperature classifications for the region are hot in summer and mild to warm in winter, with significant diurnal fluctuations. The local climate can be described as semi-arid high-veld conditions with hot summers and moderate dry winters. **Figure 9** indicates the average temperatures between 2010 and 2020, which fluctuate between approximately 0°C and +30°C and +10 °C do occur, respectively ([www.worldweatheronline.com](http://www.worldweatheronline.com)).



**Figure 10: Brits Maximum, minimum and average temperature from 2009-2020 (WorldWeatherOnline.com)**

The relative humidity within the proposed project site ranges from a minimum of 27% to a maximum of 81% with dry atmospheric conditions dominating. The average annual rainfall of 150mm is experienced in the area, and rainfall occurs predominantly in summer and autumn while the least amount of rain falls in the months of winter and spring. Summer temperatures are typically warmer, resulting in convection, water vapor evaporation, and condensation completing the atmospheric water cycle processes. Precipitation in the form of showers and thundershowers are the products of condensation of atmospheric water vapor ([www.worldweatheronline.com](http://www.worldweatheronline.com)).

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### 9.4.3 GEOLOGY WITHIN THE STUDY AREA

#### 9.4.3.1 REGIONAL GEOLOGY

The Bushveld Complex of South Africa is one of the most intensively studied layered igneous intrusions on Earth and it intruded Pretoria Group meta-sedimentary rocks of the Transvaal Supergroup approximately 2,060 million years ago. It extends over an area of 65 000 km and reaches up to 8 km in thickness. It is by far the largest known layered igneous

intrusion in the world and contains most of the world's resources of chromium, (Platinum Group Metals) PMGs and vanadium. Vanadium mineralisation occurs in vanadium-bearing titaniferous magnetite-rich layers that make up part of the Upper Zone of the Rustenburg Layered Suite of the Bushveld Complex. The magnetite-rich layers are concordant, continuous along strike and down-dip, although thickness variability occurs. The layered sequence of mafic rocks, known as the Rustenburg Layered Suite, comprises five distinct zones, which are:

- Marginal Zone;
- Lower Zone;
- Critical Zone;
- Main Zone; and
- Upper Zone.

The Upper Zone is identified by the occurrence of cumulus magnetite above the Main Zone. Both the Main Zone and the Upper Zone of the Rustenburg Layered Suite occur on the MRA. The layers are east-west striking and north dipping, with an average dip of 19°. The lithology associated with the Main Zone is gabbro, norite, and locally anorthosite, and pyroxenite layers. The lithologies in the Upper Zone that occur on the northern part of the property include magnetite-bearing gabbro, norite, diorite, as well as anorthosite, and magnetite layers.

#### **9.4.3.2 LOCAL GEOLOGY**

The study area is situated within the Bushveld Complex, more specifically, within the Rustenburg Layered Suite with intrusive rocks comprising of Bierkraal Magnetite Gabbro and the Pyramid Gabbro-norite dominating the study area and surroundings. The Gabbro's weather to form well-structured soils such as the Vertics found within the study area.

#### **9.4.4 TOPOGRAPHY OF THE STUDY AREA**

The topography of the area has relatively flat slopes with discrete occurrences of mountainous regions to the south-east from where the tributaries to the Rosiespruit originate. The ground surface is gently sloping toward the Rosiespruit in the north. The elevation model for the site indicates the current influence that the Vametco site has on the surface topography with the waste management facilities rising above the general topography (**Figure 10**).

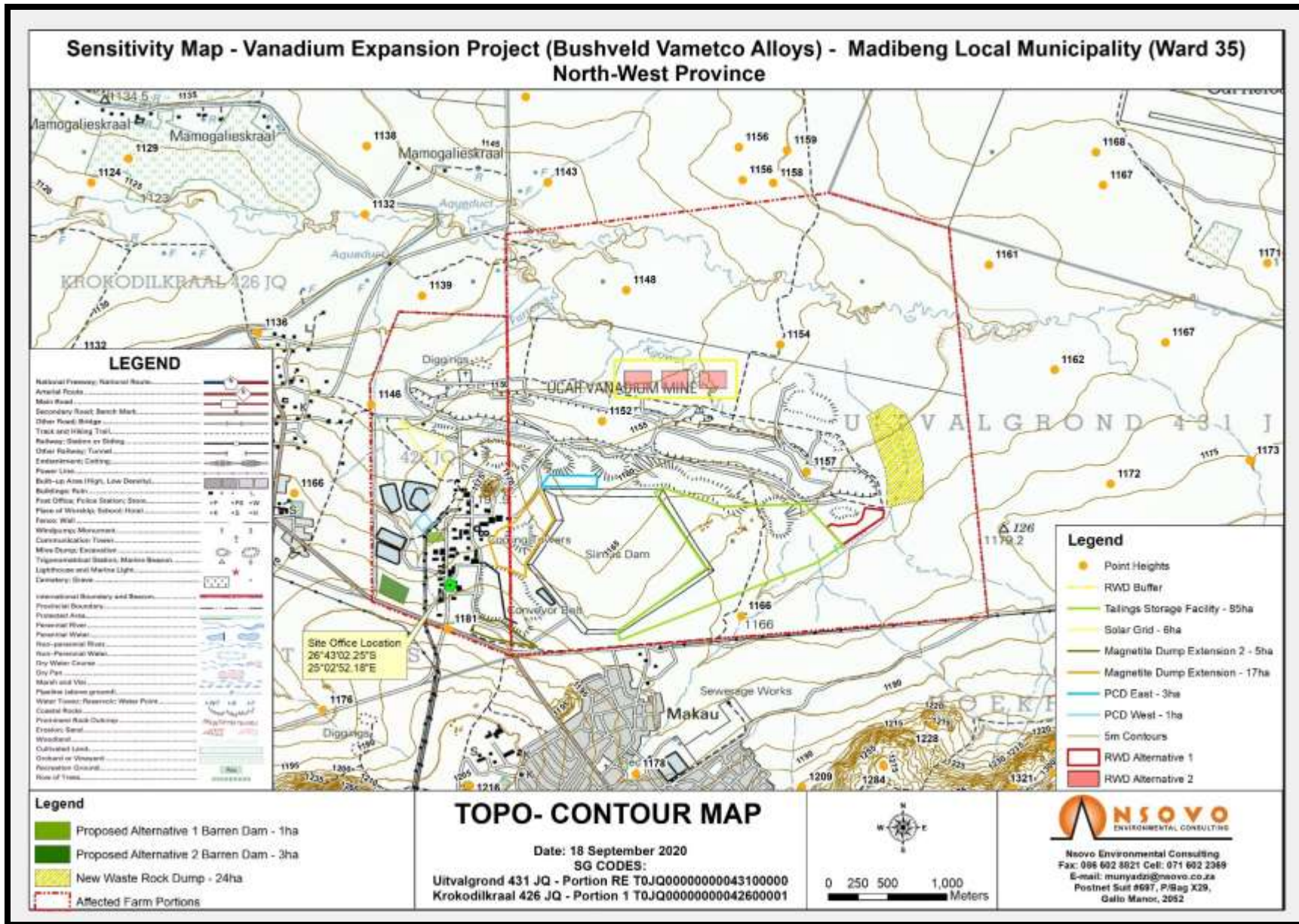


Figure 11: Topography map of the area

## 9.4.5 HYDROLOGY AND WETLANDS

### 9.4.5.1 HYDROLOGY

The proposed project area falls within the Limpopo Water Management Area (WMA) (formerly known as the Crocodile West Marico WMA) within the Crocodile River Catchment. The Crocodile River drains from south to north to the Limpopo River approximately 200km downstream. The project site is in quaternary catchment A21J upstream of Roodekoppies Dam within the catchment of the Rosespruit (**Figure 11**). The Rosespruit is one of the three tributaries of the Crocodile between the Hartbeespoort Dam and the Roodekoppie Dam. Further, the quaternary catchment A21J represents 1.05% of the drainage area of the Limpopo catchment.

The proposed project site is in the mid-section of the Rosespruit catchment on what was previously a drainage pathway of a stream, which was known as the Kgowe. The stream was diverted around the site with the East Furrow, which captures the flows that would have traversed the Vametco project site. The East furrow constitutes a berm with a trench that drains back into the natural/original course downstream of the open pit before emptying into the Rosespruit.

Vametco has a monitoring program consisting of a network of 22 surface water and 56 groundwater monitoring points. Of the 22 surface water sample locations, 11 were selected for understanding the Vametco Project baseline water quality. These include dirty water containment, streams, and flume/discharge points. Considering the 2011 and 2012 water monitoring period, the surface water from the dams, and other sources of pollution, the samples from pollution sources exceed Class II of the SANS241:2016 and, therefore, cannot be usable for drinking uses. These indicated elevated levels in almost all parameters sampled except for pH, and Al and occasionally F-, Na, Ca, K, Fe, and Mn. The receptor surface watercourses, i.e., Rosespruit, present Class I water quality and a few parameters within Class II, namely, TDS, EC, Fe, and Mn.

Based on the July 2017 – June 2018 water monitoring period, water quality trends results indicate that there are high concentrations of variables upstream and downstream of the mine property, and it indicates that the source pollution is attributed to other external activities. The impact of the existing Vametco activities on the in-stream surface water quality is reflected in the upstream (REM 4) and downstream (REM 7 and REM 8) monitoring points. These points indicated high concentrations of V, Na, SO<sub>4</sub><sup>2-</sup> and iron. As expected, the monitoring points downstream of the Mothutlung sewage discharge, (i.e., REM 4, REM 7, REM5) have concentrations of Fe and nutrients (NO<sub>3</sub><sup>2-</sup>, NH<sub>4</sub><sup>+</sup> and PO<sub>4</sub><sup>3-</sup>) exceeding the limits imposed on the IWUL. From the process description, the water at the slimes dam is anticipated to be clean, but the water quality has indicated elevated concentrations of the parameters TDS, Na, SO<sub>4</sub>, Cr, Ca, Mg, NH<sub>4</sub><sup>+</sup>, Si, TA, PO<sub>4</sub><sup>3-</sup>, Cl<sup>-</sup>.



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The flood lines determined post-development indicate that existing mining and beneficiating activities expansion, including the proposed infrastructure expansion, are outside the flood lines and the 100m buffer zone.

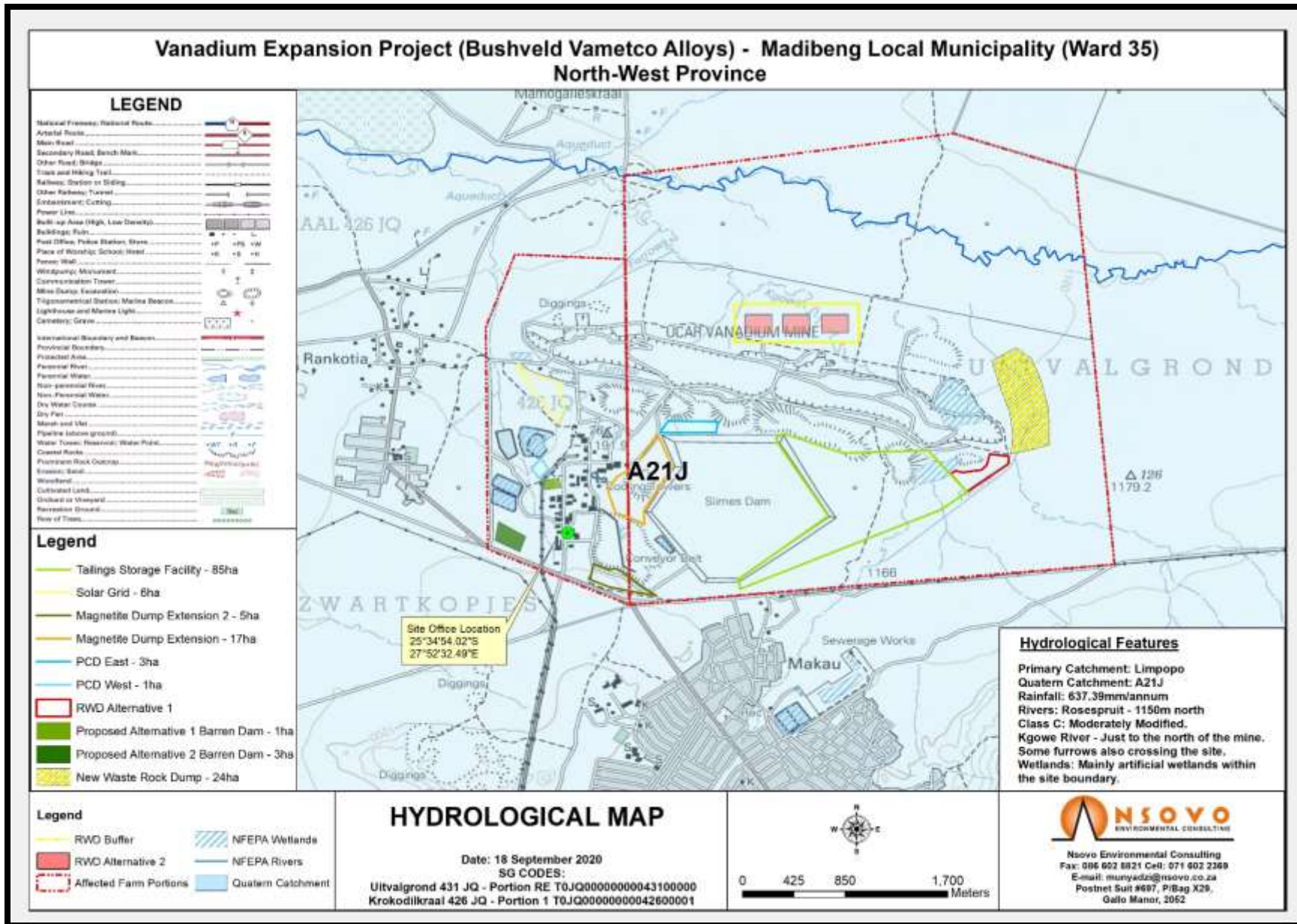


Figure 12: Hydrological map of the proposed location

## 9.4.5.2 WETLANDS

### 9.4.5.2.1 Delineated wetland

One hydro-geomorphic unit (HGM), comprising one HGM type, a channelled valley bottom wetland, was delineated and classified within the study area and 500m surrounding the study area. In addition, several riparian watercourses were also delineated within and surrounding the study area (**Figure 12 and 13**). The wetlands within the study area serve to improve habitat within and potentially downstream of the study area through the provision of various ecosystem services. Many of these functional benefits, therefore, contribute directly or indirectly to increase biodiversity within the transformed study area as well as downstream of the study area through provision and maintenance of appropriate habitat and associated ecological processes.

### 9.4.5.2.2 Wetland Vegetation Group

According to Nel et al. (2011), the study area falls within the Central Bushveld Group 2 wetland vegetation group; further, according to Macfarlane et al. (2014), the Central Bushveld Group 2 wetland vegetation group is regarded as being Vulnerable.

Due to the nature of historic and current land uses within the catchment, species composition within the wetland is expected to have changed relative to the perceived natural condition of the wetlands, especially because of overgrazing practices. This was also evident in the supporting recharge areas dominated by natural veld that has been overgrazed.

### 9.4.5.2.3 Present Ecological Status

Based on the assessment of the individual drivers of the wetlands, the Present Ecological State (PES) for HGM 1 was determined to be representative of a Category C (moderately modified).

The PES of the riparian zones was assessed using the Riparian Vegetation Response Assessment Index (VEGRAI) level 3 and the findings of the VEGRAI vegetation assessment revealed that riparian habitat (Riparian 1) on the western periphery of the study area was seriously modified because of historic topographic manipulation, the building of dams and changes in the associated catchment (E class). Riparian 2 was largely modified due to being cut off from its upstream hydrological support (Riparian 3a and 3b) through the establishment of the mine several decades ago and resultant changes that ensued thereafter (especially impacting on water quantity). Riparian 3a and 3b have been cut-off from its downstream section Riparian 2 as well as through a municipal channel that was constructed, originating in the vicinity of the sewage works. Water quality is likely to be severely affected because of poor discharge quality water from the sewage works and algal blooms that were observed. Riparian area 4 is relatively still intact, with the largest impact being overgrazing as per all other riparian units.

#### **9.4.5.2.4 Ecological Importance and Sensitivity**

The Ecological Importance and Sensitivity (EIS) assessment was undertaken, and it was established that the valley bottom wetland, HGM 1, was regarded as having a moderate Hydrological and Functional Importance because of the relatively moderately intact nature and various important ecosystem services it provides. The moderate Ecological Importance and Sensitivity assigned to HGM 1 can be attributed to the relatively intact hydrological and geomorphological nature associated with the wetland and its associated catchment

#### **9.4.5.2.5 National Freshwater Ecosystem Priority Areas**

No Freshwater Ecological Priority Areas wetlands or wetland clusters were located within the study area or kilometres from the study area.

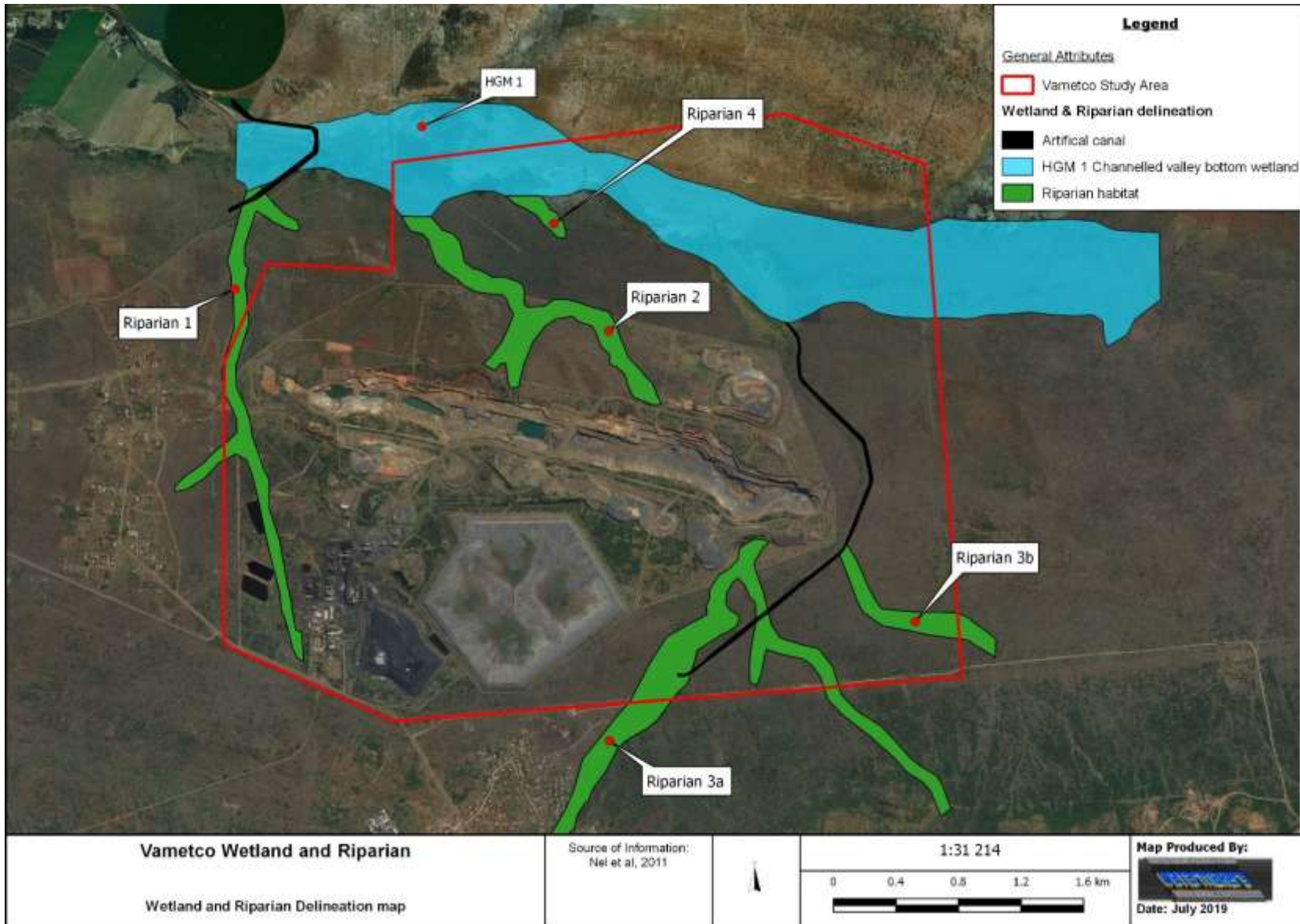


Figure 13: Delineated wetlands and riparian habitat within the study area and within 500m from the study area (Watermakers, 2020)

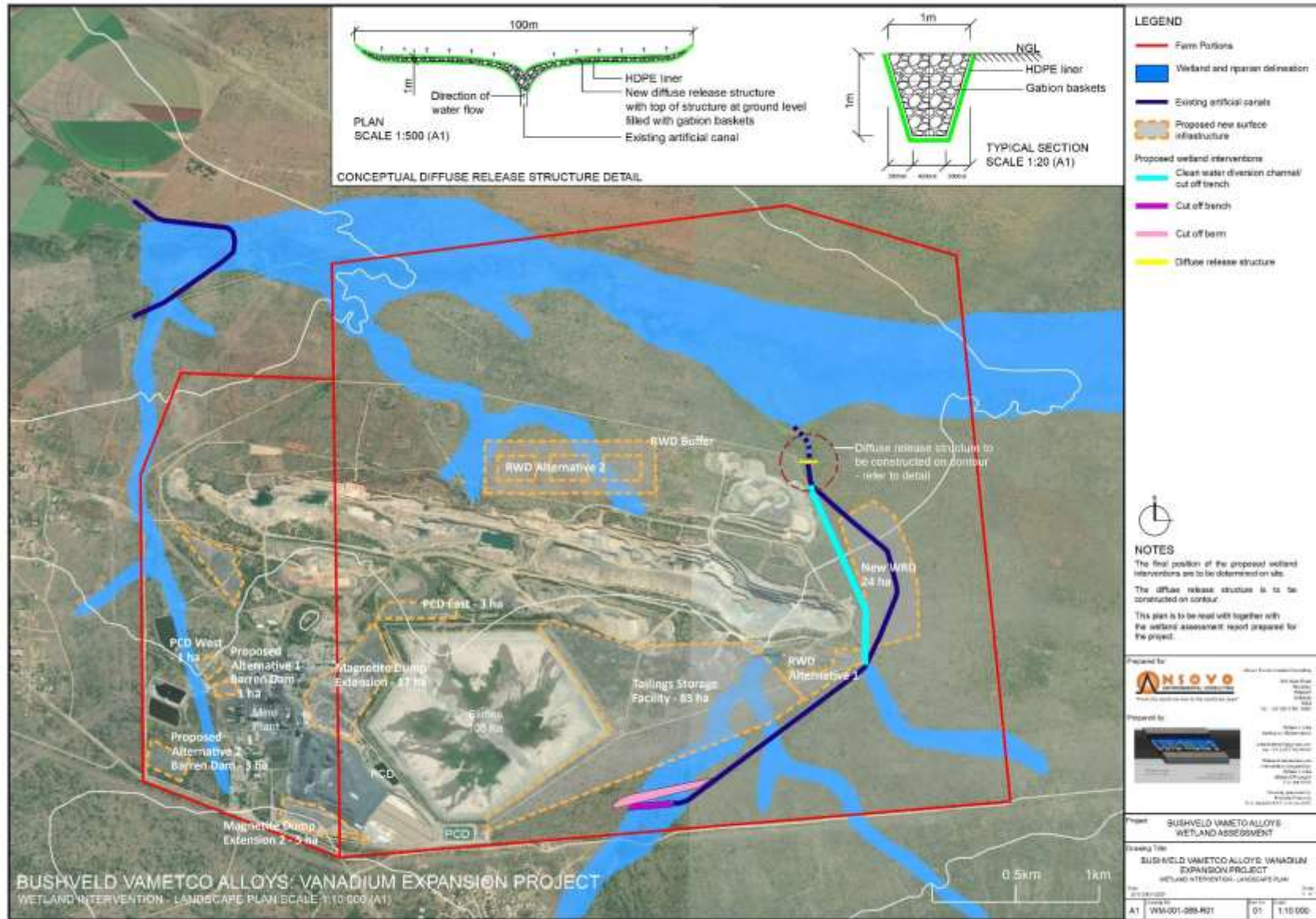


Figure 14: Delineated wetlands and riparian habitat with the proposed activities (Watermakers, 2020)

## 9.4.6 HYDROGEOLOGY

### 9.4.6.1 HYDRO CENSUS

The hydrogeology report highlighted that a hydro census investigation was conducted around the study area to measure the water levels of any production and/or monitoring boreholes. During the hydro census survey, a total of eighteen (18) boreholes were identified and inspected and the following observations were made:

- Most of the visited boreholes are used for groundwater monitoring (Water level and water quality purposes);
- None of the visited boreholes was equipped with pumps;
- Groundwater level ranges between 2.83 mbgl (VGM-6) and 14.53 mbgl (VGM-24); and
- Most of the boreholes are in good working condition.

### 9.4.6.2 GROUNDWATER USE

Groundwater resources are widespread but limited, with borehole yields generally <0.5 l/s. Groundwater occurrence is better developed along aquifers associated with the contact zones of the dolerite intrusions, where yields of 0.5 – 2.0 l/s are likely to occur. The aquifer represents an important source for base flow into the streams draining the area. The hydrogeology of the area can be described in terms of the saturated and unsaturated zones.

The National Groundwater Archive (NGA) was consulted to obtain available borehole information within a 2 km radius from the study area, and a total of nine groundwater levels were obtained. The following information can be concluded based on groundwater level data:

- Groundwater level range between 10 and 22, 56 mbgl; and
- The study area is characterised by a shallow groundwater table.

Refer to **Appendix C5** for the Geohydrological Assessment Report.

## 9.4.7 SITES OF ARCHAEOLOGICAL AND CULTURAL SIGNIFICANCE

Before the development of the Vametco mine, the current mining area was occupied by two communities that were relocated in or around 1974. These communities were residing on Farm Uitvalground 431 IQ. The Rankotea Village was located west of the mine on Farm Krokodilkraal 426 JQ and Makau village was moved to the eastern side of the mine. Both these communities were relocated around 1974 to make way for the mining development. Refer to **Figure 14** below for the Heritage map.

Sections of the site earmarked for the proposed development are degraded from previous and current land uses such as access road, boreholes, and Eskom distribution power line. The general landscape of the proposed site is not

associated with historical events such as white settler migration and colonial wars. Further, no monument or listed specific historic sites were identified at the proposed development sites.

A graveyard has been recorded near the proposed site and is used by the Rankotea community. The identified cemetery has approximately 1200 graves and is not directly affected by the proposed mining expansion project. Further, the graves are marked and well maintained by both the community and the mine. Approximately 30 formal graves with tombstones were recorded at the site proposed for the tailings dam. These graves will be directly affected by the proposed development (both expansion and the new Return Water Dam).



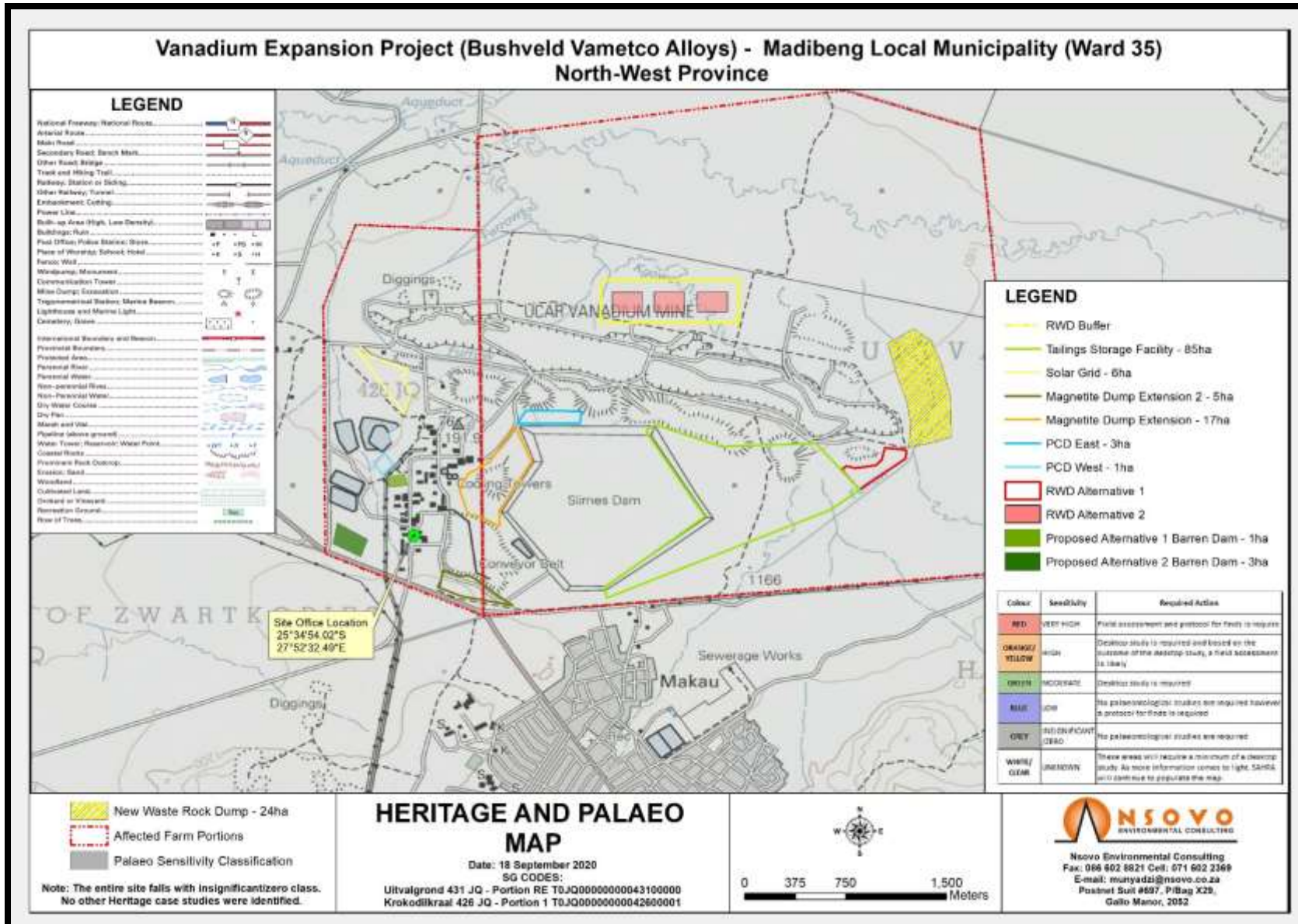


Figure 15: Heritage and palaeontology map

## 9.4.8 SENSORY ASPECTS

### 9.4.8.1 NOISE

In terms of the Noise Regulations, a noise disturbance is created when the prevailing ambient noise level is exceeded by 7.0dBA or more. Noise, however, becomes audible when the prevailing ambient noise level is exceeded by 5.0dBA.

Two aspects are important when considering the potential impacts of a project:

- The increase in the noise levels and;
- The overall noise levels will be created by trucks and other mining activities.

The purpose of the environmental noise study was to determine the environmental baseline noise levels along the boundaries of the Vametco mine and the hauling route and abutting noise receptor. Noise readings were also done at the different noise sources at the processing plant. The following are noise sources in the vicinity of and the boundaries of the study area:

- Plant activities;
- Seasonal agricultural activities;
- Traffic noise along the feeder roads;
- Distant traffic noise from the abutting feeder roads;
- Insects;
- Birds; and
- Wind.

The residents in the vicinity of the mine are exposed to industrial type noise levels due to existing mining operations and traffic noise from vehicles to and from the mining area. The wind direction, distances between the mining activities (point and linear noise sources), and the residential areas play an important role in how the sound will be propagated. During the assessment, the noise projections were made at stable conditions with no winds. The distances between the noise sources and the receptors, topography, vegetation, noise level at the noise source, and the wind direction are all variables that may have an impact on how the sound will be propagated to and perceived by the noise receptor/s. Table 16 indicates distances between the proposed mine expansion areas and the residential areas.

**Table 18: Distances (in meters) between the mine expansion areas and the residential areas.**

Position	Plant upgrade	PCD North	PCD West	Slimes dam expansion	Magnetite dump North	Magnetite dump south	Storm water Dam	Existing slimes dam
Mothutlung-A	1 833	1 517	1 884	1 286	1 436	705	2 005	1 478
Rakontea	1 395	2 139	1 015	3 244	1 683	1 706	4 102	3 393
Lerulaneng	5 825	5 290	5 939	5 512	5 884	6 619	5 392	5 572

Position	Plant upgrade	PCD North	PCD West	Slimes dam expansion	Magnetite dump North	Magnetite dump south	Storm water Dam	Existing slimes dam
Kgabalatsane	8 052	7 284	8 399	6 846	7 981	8 650	5 990	6 572
Garankuwa	10 717	10 384	11 560	9 113	10 586	11 341	8 445	9 308
Ga-Kwate	8 883	8 371	8 335	6 410	7 846	7 643	5 862	6 494
Moumong	5 346	4 986	5 727	3 835	5 055	4 836	3 703	4 060

The measuring points for the study area were selected to be representative of the prevailing ambient noise levels for the study area and include all the noise sources such as existing mining activities, distant traffic, domestic activities, and agricultural activities but exclude traffic noise which was intermittent in the vicinity of the measuring points. A noise survey was done along the boundaries of the mining area and at the plant. The measuring points along the boundaries and the access route for the export Vanadium are illustrated in **Figure 15** and **16** below.



**Figure 16: Measuring points for the study area – boundaries and residential area**



**Figure 17: Measuring points at the plant**

The arithmetic averages throughout the study area are as follows:

- Villages – 35.6dBA during the day and 34.7dBA during the night; and
- Vicinity of feeder roads – 54.0dBA during the day and 49.9dBA during the night.

The cumulative noise level of the machinery and equipment will be 64.9dBA at 60m and 40.8dBA at 960m from the construction area if all the machinery operates within a radius of 30m at one time. This will seldom happen, and the cumulative noise level will, therefore, be lower.

The environmental noise impact during the construction and decommissioning phases will be insignificant during the summer and winter periods. The noise impact will change during the operational phase, where the noise intrusion will be moderate and low. This is based on a noise intrusion level of 5.0dBA and not the benchmark noise intrusion of 7.0dBA before a noise disturbance is created.

#### **9.4.8.2 VISUAL ASPECTS**

Visual appreciation or dislike is subjective, and thus, what is aesthetically pleasing to some can be displeasing to others. The visual analysis of a landscape, the impact of new developments, as well as structures tend to be complicated, and it is evident from previous experience that when dealing with the reaction to landscape changes, a broad diversity of opinion exists.

In this regard, mining is one of the vital land uses and contributes significantly to the visual degradation of parts of the study area. Since Vametco is an existing mine, the visual impact already exists and is associated with the mining landscape. Within the receiving environment, specific viewers (visual receptors) experience different opinions of the visual resource and value it differently. They will be affected because of alterations to their views due to the proposed project. The visual receptors included in the Visual Impact Study are:

- Residents;
- Tourists; and
- Motorists.

#### **9.4.8.2.1 Landscape character**

The natural landscape is degraded, with minimal pristine landscape remaining. There is some vacant undeveloped land that was previously cultivated, as well as land used for subsistence farming. Mining in the area is widespread and is one of the key land-uses and contributes significantly to the visual degradation of the study area. The landscape character changes through the study area and there is a change in elevation and topographical features. Landscape types are distinguished by differences in topographical features, vegetation communities and patterns, land use, and human settlement patterns (Swanwick, 2002). The broad-scale vegetation type that has been identified in the study area is the Marikana Thornveld. Central Sandy Bushveld and Norite Koppies Bushveld are other vegetation types that have been identified near the site.

#### **9.4.8.2.2 Visual character**

The overall landscape varies from the agricultural landscape, which is undulating to flat, to degraded, polluted landscapes around homesteads and towns. Large mines present a negative effect on the visual character of the landscape. Granite Koppies are present around the study area but have been environmentally degraded by mining.

#### **9.4.8.2.3 Visual value**

Visual value relates to those attributes of the landscape or elements in the landscape that people attach values that though not visually perceivable, still contribute to the value of the visual resource. These visual values are derived from ecological, historical, social, and cultural importance and are described in terms of their uniqueness, scarcity, and naturalness and conservation status. The importance of the visual value of a landscape or element in the landscape is measured against its value on an international, national, and local level.

Very few parts of the study area have been left undisturbed, and it is very little to no unspoiled pristine landscape remaining. These areas, however, remain under pressure and are vulnerable due to human settlement expansion and mining activities.

#### 9.4.8.2.4 Visual characteristics of project components

The extension of the Magnetite dumps will start with low mounds, increasing in height as material increases. The expansion to the north of the existing dump will be  $\pm 16.6$  ha and the height is expected to be  $\pm 4.78$ m. The southern expansion will be  $\pm 4.46$  ha and the height will be  $\pm 1.69$ m. The visual impact will increase over time. The access/haul roads may have a visual impact.

The new PCDs will be constructed to the north of the proposed new Magnetite West 1 and 2 dumps, and North 1 and 2 dumps and are at a lower level to the existing slimes dam and will have a low visual impact on surrounding areas. The new large RWD is proposed for the new Magnetite 1 and 2 dumps on the west, the existing slimes dam and the extension 1 and 2 of the slimes dam. These are on a lower level of the existing Slimes dam, and the visual impact on surrounding areas is expected to be low.

The study area is moderately populated, with a lower population in the rural settlements and farming communities, to higher populations in the towns. The residents close to the mine are in Mothothlung and Makua and may experience a low degree of visual intrusion.

The entire study area is considered to have low tourism potential, mostly because of the environmental degradation caused by the mining developments and human settlements. There is also no major thoroughfare to prominent tourist destinations. The temporary exposure to possible unsightly views of the construction camps and the associated activity will be minimal and localised. The proposed new developments will only have an impact on tourists near the mine, mostly along main transportation routes.

The major route in the study area is the R566 connecting the towns, mines, and farms, but does not pass the mine directly. The secondary road network in the study area carries a much lower volume of motorists. Most of the roads are gravel roads that are used by the residents. The motorists' visual exposure to the new extensions of the mine will be brief and the severity of the visual impact will be of low significance.

#### 9.4.9 BIODIVERSITY

According to the Mining and Biodiversity Guidelines (2013) most of the study area is classified as High Biodiversity Importance, while the natural areas associated with the active mining and infrastructure areas are classified as Moderate Biodiversity Importance.

According to the Biodiversity Specialist Study (2019): Terrestrial Database, two portions within the study area is considered as an Ecological Support Area 1 (ESA 1) and thus important Hill and Ridge Habitat. It was evident from the satellite imagery that these areas correspond largely with the active mining and infrastructure areas, however, the Rocky Outcrop Habitat Unit is situated within this ESA. Aquatic dataset identified several watercourses considered

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ESA 1 and 2 areas and these have been selected as ESAs as it has been modelled as wetlands. Refer to **Figure 17** for watercourses considered as Ecological Support areas.

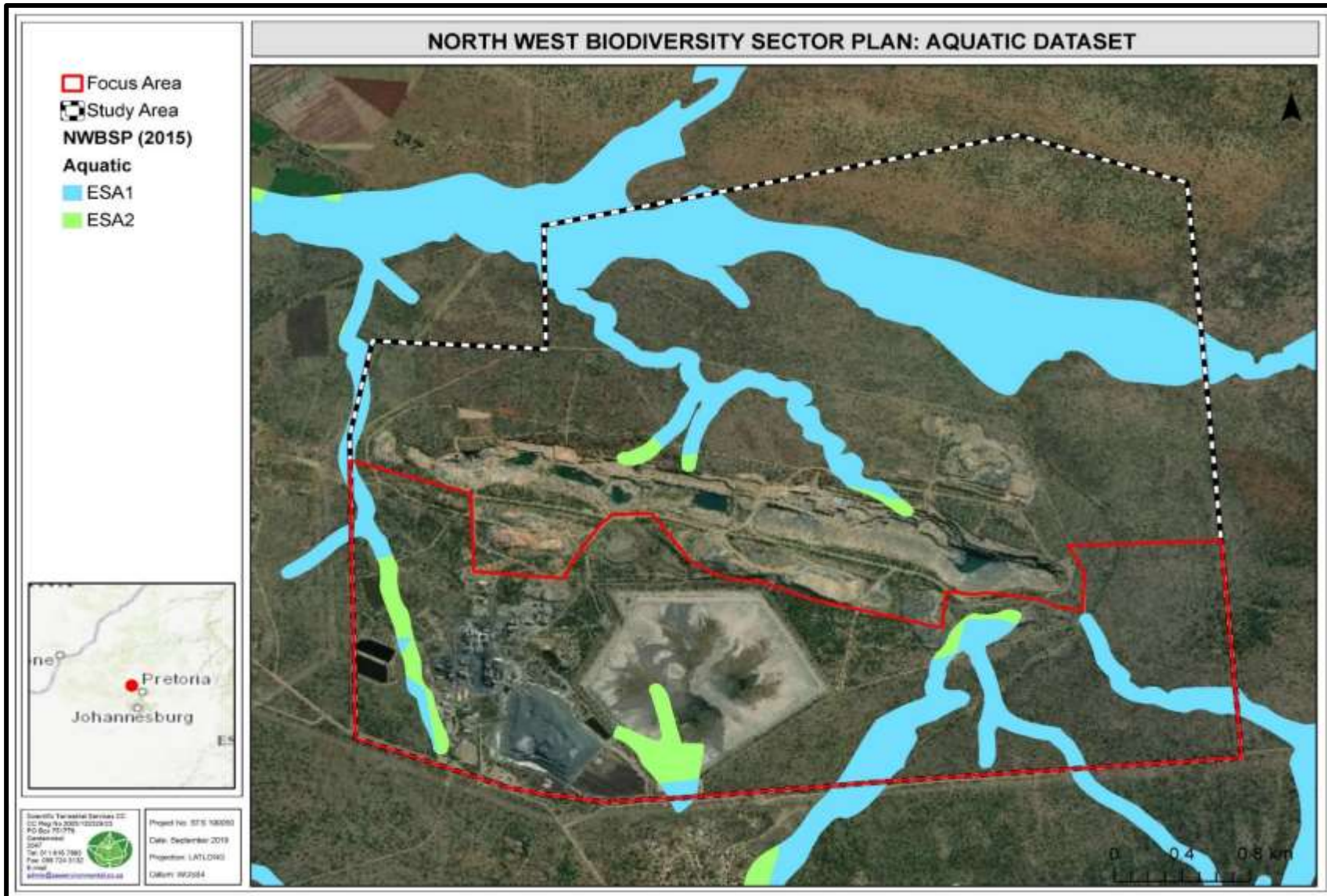


Figure 18 Watercourses considered as Ecological Support Areas according to the NWBSP Aquatic dataset, 2015



#### 9.4.9.1 FLORA

Four habitat units were identified within the focus area. These are the Degraded Marikana Thornveld, Rocky Outcrop Habitat, Freshwater Habitat and Transformed Habitat, and range moderately high to low ecological importance and sensitivity. The Rocky Outcrop Habitat provides habitat for species adapted to shallow soils and is an important hill/ridge habitat, and subsequently classified as an ESA according to the NWBSP (2015). This habitat unit further comprises a moderately high floral species composition, particularly considering the limited footprint area. The regionally protected floral Species of Special Concern (SCC) *Scadoxys puniceus* was recorded within this habitat unit during the 2012 assessment, with suitable habitat for protected species such as *Gladiolus* spp. and *Sclerocarya birrea* subsp. *caffra* present within this habitat unit. The Degraded Marikana Thornveld and Freshwater Habitat Units were highly degraded because of edge effects from mining and other anthropogenic activities such as cattle grazing and dumping of rubble.

This has resulted in the degradation of these habitat units through bush encroachment and AIP proliferation in areas. These habitat units however still provide habitat for regionally and nationally protected floral species such as *Ammocharis coranica*, *Gladiolus* spp, *Crinum* spp, and *Sclerocarya birrea* subsp. *caffra*. From a floral perspective, these habitat units are of Intermediate importance. The Transformed Habitat unit has been completely altered from its reference state and cannot be considered representative of the Marikana Thornveld. Except for a single individual of *Adansonia digitata* (Baobab), planted within an ornamental garden, it is unlikely that this habitat unit will provide habitat for floral SCC. The Transformed Habitat is, therefore, of low floral importance. **Figure 18** below illustrates the vegetation types within and around the study area.

#### 9.4.9.2 FAUNA

Four faunal habitat units were identified, and these are the Degraded Marikana Thornveld, Freshwater Habitat, Rocky Habitat, and the Transformed Habitat Unit. The Degraded Marikana Thornveld associated with the active mining area, although fragmented due to current mining activities still promote the occurrence of common avifauna and a high abundance of small mammal signs. The Rocky and Freshwater Habitat Units provides a niche habitat to faunal species, foraging and refuge for several possible faunal SCC. No faunal SCC was observed during the field assessment, however, various faunal SCC is expected to occur within the focus area and these include *Felis silvestris* (African Wild Cat, LC), *Felis nigripes* (Black-footed Cat, VU), *Cloetis percivali* (Short-eared Trident Bat, CR), *Eidolon helvum* (Straw-coloured Fruit Bat, NT), *Myotis tricolor* (Temminck's Hairy Bat, NT), *Atelerix frontalis* (Southern African Hedgehog, NT), *Poecilogale albinucha* (African Striped Weasel, LC), *Circus ranivorus* (African Marsh Harrier, VU), *Ciconia nigra* (Black Stork, NT), *Gyps coprotheres* (Cape Vulture, CR), *Falco biarmicus* (Lanner Falcon, NT), *Falco naumanni* (Lesser Kestrel, VU), *Falco peregrinus* (Peregrine Falcon, NT), *Eupodotis caffra* (*Eupodotis senegalensis*) (White-Bellied Korhaan, VU), *Pyxicephalus adspersus* (African Bullfrog, NT) and *Python natalensis* (South African Python, LC). Further, mammals associated with the unfenced area are deemed to have been affected by anthropogenic activities such as informal hunting/trapping which has caused dispersal.

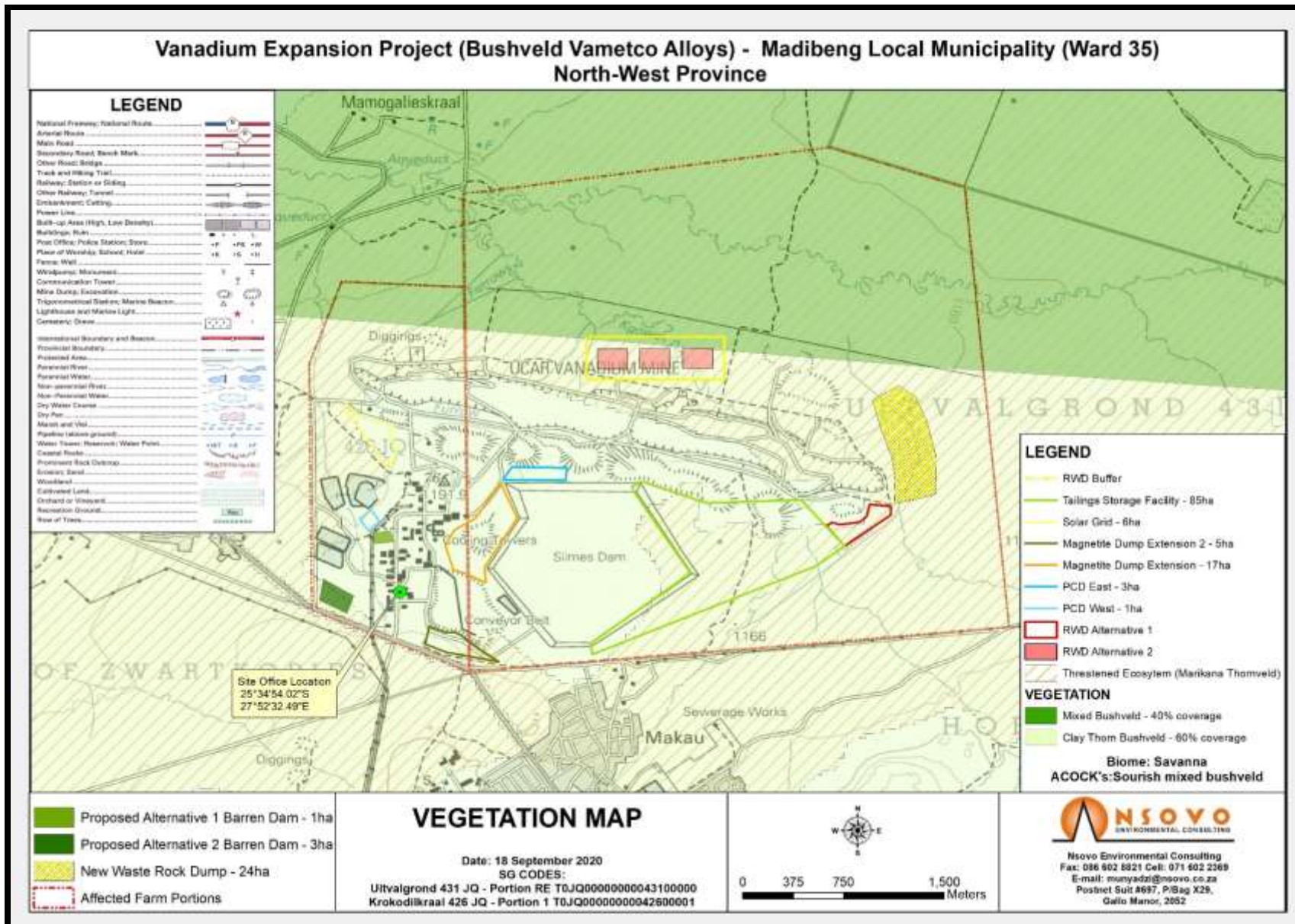


Figure 19: Vegetation map of the proposed study site

#### 9.4.10 SOIL AND LAND CAPABILITY

The study area largely traverses a Vertic and Anthropic catena with Rensburg, Rustenburg/Acardia, and Witbank soil forms being the dominant soil forms within the total surveyed landscapes, occupying 29.26%, 19.91%, and 28.71% respectively. Vertic soils such as Rensburg, Rustenburg/Acardia have some limiting factors for cultivation under normal circumstances such as:

- Waterlogging conditions;
- High clay content; and
- The shallow effective depth, which limits the root penetration of deep-rooted plants.

The dominant land uses within the study area are mining, grazing and wilderness. In addition, a small residential area within which subsistence farming is practiced was also observed to the west of the study area. However, no commercial cultivated agriculture occurs within the immediate vicinity. Large scale irrigated commercial agriculture only occurs approximately 1.4 km west of the study area. The rest of the surrounding areas are comprised of residential and wilderness land uses.

Based on the field data collection and supporting desktop studies, the soils within the focus area where the proposed mining development will occur can be broadly described as “unsuitable” due to historic and current mining activities. The bulk of the proposed development is located within areas that have either been previously mined or disturbed to the degree that there has no bearing on agricultural production. Also, the unimpacted soils in the immediate surrounding of the proposed mining development are not ideal for cultivation attributed to their physical characteristics mentioned above.

Out of the total surveyed area, only 13.29% is deemed suitable for cultivation. The rest of the soils, at best, are suited for pastures and wildlife; however, they can be cultivated under serious management interventions. It should be noted that no mining activities are planned on prime agricultural soils. Therefore, the direct impact is not foreseen. The indirect impact is also deemed unlikely on these soils due to their proximity to the current and proposed mining activities. Table 15 presents the dominant soils, with a relative description of soil horizons as well as associated land capability; further, the dominant soils.

**Table 19: Dominant soil forms and their respective land capability**

Soil Form	Land Capability	Areal Extent (ha)	Sum of the Extent (ha)	Percentage (%)
Hutton	Arable (Class I)	87.61	105.23	6.59
Shortlands		17.62		
Valsrivier	Arable (Class III)	24.04	107.12	6.70
Swartland		83.08		

Soil Form	Land Capability	Areal Extent (ha)	Sum of the Extent (ha)	Percentage (%)
Rensburg	Grazing (Class V)	467.59	467.59	29.26
Arcadia/Rustenburg	Grazing (Class VI)	304.85	318.16	19.91
Mispah		13.31		
Cullinan	Wilderness (Class VIII)	73.65	523.83	32.78
Witbank		450.18		
<b>Total soil material</b>			<b>1521.93</b>	<b>95.24</b>

The land capability of the identified soil forms ranged between Class I and VIII due to land use limitations related to anthropogenic activities and low soil workability potential of the dominant soils. The high clay content and wedge soil structure of related soils (i.e., Arcadia/Rustenburg, Rensburg) leads to inadequate internal drainage, limiting their land capability to the marginal potential for arable land use under normal circumstances. These soils are, therefore, considered to have little contribution to regional and national agricultural production. However, small pockets of prime agrarian soils (i.e., Hutton and Shortlands) were also found within the study area. These soils are considered to have a significant potential contribution to the regional and national agricultural production grid.

It should be noted that no mining activities are planned on prime agricultural soils; therefore, a direct impact is not foreseen. The indirect impact is also deemed unlikely on these soils due to their proximity to the current and proposed mining activities. The extent of the agriculturally important soils within the study area is limited to support viable commercial cultivated agriculture.

The overall potential loss of land capability is anticipated to be relatively low, considering the dominant soil forms occurring within the study area due to the marginal agricultural potential of these soils. Due to historic and current mining activities, a loss of agricultural potential within the Witbank and Cullinan soils has occurred, reducing the land capability within these areas to wilderness land uses. Based on the international soil classification system, these soil forms (Witbank and Cullinan) are classified as Anthrosols. Witbank and Cullinan soils are already in a deteriorated state and require rehabilitation.

#### 9.4.11 TRAFFIC

Access to the Vametco mine is provided directly off the main road to Mothutlung, with separate access provided for heavy vehicles. The intersections between the Mothutlung Road and these accesses are priority stop-controlled, with free-flow traffic conditions on the Mothutlung Road. Access to the facility is controlled using security control points located approximately 65 m and 35 m from the above intersections for the main entrance and the heavy vehicle access. This allows for a stacking distance of 10 cars at the main access, and 2 15 m side tipper trucks (typically used at Vametco mines) at the entrance for heavy vehicles if a problem at the access control point is experienced. An informal

stacking area is also available for heavy vehicles on the opposite side of the heavy vehicle access along the Mothutlung Road.

Considering the expected number of vehicle trips to be generated because of the proposed production expansion at Vametco mine, as well as the expected distribution of these trips on the surrounding road network, the following existing roads were deemed relevant for this study:

- Main Mothutlung Road: This road can be classified as a Class 4b road (commercial collector road) and is expected to fall under the jurisdiction of the local municipality. Access to Vametco Holdings is gained directly off this road. The Main Mothutlung Road links the small settlement of Rankotea, located to the west of the study site, and Mothutlung, located to the south of the study site, with the main road leading to Damonsville and Moumong (discussed below); and
- Damonsville Road: This road can be classified as a Class 3 road (minor arterial road) and is also expected to fall under the jurisdiction of the local municipality. The Damonsville Road links Mothutlung with Damonsville and Brits to the west and Moumong and Ga-Kwate to the east. It also links these and other smaller townships in the area with other provincial routes, such as the R566 and M21, which provides access to the broader region and other provinces.

According to the *TMH 17 Volume 1, South African Trip Data Manual South African Trip Data Manual (3)*, mining activities generates an insignificant number of vehicle trips on the external (i.e., public) road network (a maximum of 1 trip per 100 employees during peak traffic hours). To obtain more site-specific data, current vehicle trips generated by the Vametco mine were surveyed. The survey was conducted at the access intersections and the additional key study intersection (Main Mothutlung Road / Main Access Road to Vametco Holdings, Main Mothutlung Road / Heavy Vehicle Access Road to Vametco Holdings, and Main Mothutlung Road / Damonsville Road). The survey also provided traffic data to determine the current traffic demand in the study area. From this survey, it was determined that the peak traffic hours for Vametco Holdings occurred between 06h00-07h00 for the AM peak hour and between 16h15-17h15 for the PM peak hour, with the AM peak hour being the critical peak. The traffic volumes at the heavy vehicles access did not have notable peak traffic hours. Only a slight peak in traffic volumes was noted between 08h00-09h00, with little variation in volumes throughout the day. The survey also indicated that the peak traffic hours at the study intersection in Mothutlung occurred between 06h30-07h30 for the AM peak hour and between 16h45-17h45 for the PM peak hour, with the PM peak hour being the critical peak. The traffic currently generated by Vametco Holdings during the critical peak traffic hours is indicated in **Table 18**.

**Table 20: The traffic currently generated by Vametco Holdings during the critical peak traffic hours**

Peak hour	Vehicle Trips Generated (Vehicles / hour)		
	In	Out	Total
Main Access	112 (81%)	27 (19%)	139

AM (06h00 – 07h00)	19 (14%)	117 (86%)	136
PM (16h15 – 17h15)			
Heavy Vehicle Access	4 (57%)	3 (43%)	7
AM (08h00 – 09h00)	1 (14%)	6 (86%)	7
MD (13h30 – 14h30)			

Public transportation and non-motorised transport assessments were carried out as part of this study. Public transport in the study area is mainly provided by minibus taxis and busses. Taxis and busses were observed travelling along both the Main Mothutlung Road and the Damonsville Road, as well as transporting passengers to and from Vametco Holdings. Due to its remote location, no provision for non-motorised transport is made to and from the mine. The need for such facilities is not deemed necessary due to taxis/shuttles and busses transporting passengers directly to and from the site.

#### 9.4.12 CLIMATE CHANGE

Mining is a sector that is particularly vulnerable to climate change. Changing climatic conditions will have direct (operational and performance-based) and indirect (securing of supplies and rising energy costs) impacts on the mining sector. The mining and metals sector faces several sustainable development challenges, including the impacts of a changing climate. Due to the wide geographic distribution of mining operations, climate change, including temperature and precipitation shifts and more frequent and severe extreme weather events, will have complex impacts on the sector. Climactic conditions will affect the stability and effectiveness of infrastructure and equipment, environmental protection and site closure practices, and the availability of transportation routes.

However, climate change is unlikely to have a major direct impact on the mining industry, for which regulations and management strategies are already in place to manage factors such as water usage, water conservation, and demand strategies, and environmental issues relating to rehabilitation and the provision of rehabilitation guarantees. While a lack of access to water may affect some mining projects, most mining processes do not generally require potable water. Where high-quality water is required, some mines are already installing water treatment units. The scientific opinion suggests that the continued emission due to human activities of greenhouse gases, principally carbon dioxide and methane, may bring about significant and long-term changes to the functioning of the earth's atmosphere. Of considerable uncertainty still are the possible impacts and damage attributable to such climate change, although indications are that their scale could be significant.

### 9.5 THE IMPACTS AND RISKS IDENTIFIED FOR EACH ALTERNATIVE, INCLUDING THE NATURE, SIGNIFICANCE, CONSEQUENCE, EXTENT, DURATION AND PROBABILITY OF THE IMPACTS

The impacts and risks identified during the impact assessment by EAP and specialist, including nature, significance, consequences, extent, duration, and probability of such impacts are presented in this section. Information contained herein was also based on input from the specialist.

## **9.6 THE METHODOLOGY USED IN DETERMINING AND RANKING THE NATURE, SIGNIFICANCE, CONSEQUENCE, EXTENT, DURATION AND PROBABILITY OF POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS ASSOCIATED WITH THE ALTERNATIVES**

The assessment of impacts is largely based on the Department of Environmental Affairs and Tourism's (1998) Guideline Document: Environmental Impact Assessment Regulations. The assessment will consider impacts arising from the proposed activities of the project both before and after the implementation of appropriate mitigation measures.

The impacts are assessed according to the criteria outlined in this section. Each issue is ranked according to the extent, duration, magnitude (intensity) and probability. From these criteria, a significance rating is obtained, the method and formula are described below. Where possible, mitigation recommendations have been made and are presented in tabular form.

The criteria given in Table 17 was used to conduct the evaluation. The nature of each impact was assessed and described in relation to the extent, duration, intensity, significance, and probability of occurrence attached to it.

**Table 21: Methodology used in determining the significance of potential environmental impacts**

### **Status of Impact**

The impacts are assessed as either having a:  
negative effect (i.e., at a `cost' to the environment),  
positive effect (i.e., a `benefit' to the environment), or  
Neutral effect on the environment.

### **Extent of the Impact**

- (1) Site (site only),
- (2) Local (site boundary and immediate surrounds),
- (3) Regional (within the Madibeng Local Municipality),
- (4) National, or
- (5) International.

### **Duration of the Impact**

The length that the impact will last for is described as either:

- (1) immediate (<1 year)
- (2) short term (1-5 years),
- (3) medium term (5-15 years),
- (4) long term (ceases after the operational life span of the project),
- (5) Permanent.

### **Magnitude of the Impact**

The intensity or severity of the impacts is indicated as either:

- (0) none,
- (2) Minor,
- (4) Low,
- (6) Moderate (environmental functions altered but continue),
- (8) High (environmental functions temporarily cease), or
- (10) Very high / Unsure (environmental functions permanently cease).

### **Probability of Occurrence**

The likelihood of the impact occurring is indicated as either:

- (0) None (the impact will not occur),
- (1) improbable (probability very low due to design or experience)
- (2) low probability (unlikely to occur),
- (3) medium probability (distinct probability that the impact will occur),
- (4) high probability (most likely to occur), or
- (5) Definite.

### **Significance of the Impact**

Based on the information contained in the points above, the potential impacts are assigned a significance rating (S). This rating is formulated by adding the sum of the numbers assigned to extent (E), duration (D) and magnitude (M) and multiplying this sum by the probability (P) of the impact.

$$S=(E+D+M)P$$

### **The significance ratings are given below**

- (<30) low (i.e., where this impact will not have a direct influence on the decision to develop in the area),
- (30-60) medium (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- (>60) high (i.e., where the impact must have an influence on the decision process to develop in the area).

## **9.7 POSITIVE AND NEGATIVE IMPACTS THAT THE PROPOSED ACTIVITY AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND ON THE COMMUNITY THAT MAY BE AFFECTED FOCUSING ON THE GEOGRAPHICAL, PHYSICAL, BIOLOGICAL, SOCIAL, ECONOMIC, HERITAGE AND CULTURAL ASPECTS**

The proposed activities and alternatives will have both positive and negative impacts on the environment and the community. Such impacts may include physical, social, or economic impacts and others.

### **9.7.1 POSITIVE AND NEGATIVE IMPACTS OF THE MAGNETITE DUMP AND SLIMES DAM**

The table below shows the negative and positive impacts associated with the magnetite dump and slimes dam expansion as follows:

**Table 22: Positive and negative impacts of extension of the Magnetite dump and slimes dam and development of the waste rock dump**



Magnetite dump and slimes dam expansion	
Negative impacts	Positive impacts
<ul style="list-style-type: none"> <li>The expansion of the existing magnetite dump and slimes dam and development of the waste rock is anticipated to cause destruction of the freshwater habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Accommodate the disposal of the slimes and magnetite reducing the environmental contamination.</li> <li>Allow for compliance with the requirements of the waste management legislation.</li> <li>Development of a new Waste Rock Dump (WRD) to reduce load and haul distance and facilitate easy backfill.</li> </ul>
<ul style="list-style-type: none"> <li>The proposed activities will likely cause the displacement of the avifaunal and amphibian SCC expected to utilise the habitat unit.</li> </ul>	
<ul style="list-style-type: none"> <li>It will result in the loss of rocky outcrops, which provide habitat for species adapted to shallow soils and are an important hill/ridge habitat.</li> </ul>	
<ul style="list-style-type: none"> <li>The possible deterioration of surface and groundwater water quality because of the proposed development and expansions.</li> </ul>	
<ul style="list-style-type: none"> <li>Alteration of hydrology characteristics of the catchments through altered drainage paths and the loss of catchment yield due to the removal of vegetation for the proposed development and expansion project and construction of diversion berms.</li> </ul>	
<ul style="list-style-type: none"> <li>Increase of air pollution through the generation of dust from the magnetite dump, slimes dam, and waste rock dump.</li> </ul>	
<ul style="list-style-type: none"> <li>It will increase the visual impact of the landscape for the residents and other local receptors.</li> </ul>	

### 9.7.2 POSITIVE AND NEGATIVE IMPACTS ASSOCIATED WITH THE PCD AND RWD

The table below shows the negative and positive impacts associated with the PCD, RWD and Barren dam development as follows:

**Table 23: Negative and positive impacts of the development of the PCD, RWD and Barren Dam**

Development of the PCD, RWD and Barren Dam	
Negative impacts	Positive impacts
<ul style="list-style-type: none"> <li>The development of the PCD, RWD and Barren Dam will result in pollution of water resources due to mobilisation of sediments, excavations, removal, and disturbances to vegetation, mobilisation of mineral and metal compounds. Contamination of recharge, interflow, and responsive zones.</li> </ul>	<ul style="list-style-type: none"> <li>PCD and RWD will accommodate the polluted or contaminated water and return water from the existing and proposed slimes dam as well as the plant and barren dam will store barren and mother liquor solution thus reducing the pollution of the environment.</li> </ul>
<ul style="list-style-type: none"> <li>Runoff from the construction of the PCD, RWD and barren dam will cause sedimentation on the delineated wetland and result in increased erosion due to clearing of natural vegetation and earthworks related activities.</li> </ul>	<ul style="list-style-type: none"> <li>Currently, all the polluted water from the plant goes into the stormwater dam, causing unauthorised discharged of contaminated water. However, the proposed development will ensure proper management of waste; and with the Water Use Licence in place, the mine will be able to comply with the requirements of the NWA.</li> </ul>
<ul style="list-style-type: none"> <li>The proposed developments will result in the destruction of hydric soils, hydrophytic vegetation, and changes to hillslope hydrology.</li> </ul>	
<ul style="list-style-type: none"> <li>Inadequate operational control of the PCD, RWDs and barren dam or waste facility could lead to overflow of wastewater resulting in pollution of both surface and groundwater;</li> </ul>	<ul style="list-style-type: none"> <li>Allow for compliance with the requirements of the waste management legislation.</li> </ul>
<ul style="list-style-type: none"> <li>Deterioration of surface and groundwater water quality due to the construction and operation of the PCDs, RWDs and barren dam</li> </ul>	

### 9.7.3 POSITIVE AND NEGATIVE IMPACTS OF THE NO-GO ALTERNATIVE

The table below presents the positive and negative impacts associated with No-Go Alternative on the environment and community.

**Table 24: The positive and negative impact of the No-Go Alternatives were also considered**

Negative	Positive
<ul style="list-style-type: none"> <li>The identified benefits which will be brought by the proposed project will not be realised i.e., there will be no increase in job creation.</li> </ul>	<ul style="list-style-type: none"> <li>There will be no destruction of the freshwater habitat.</li> </ul>
<ul style="list-style-type: none"> <li>Continuous non-compliance with the requirements of the legislation with regards to water use. The planned PCD is critical for WUL compliance as currently, all the polluted water from the plant goes into the stormwater dam, causing unauthorised discharged of contaminated water.</li> </ul>	<ul style="list-style-type: none"> <li>No sedimentation of wetland and increased erosion.</li> </ul>
<ul style="list-style-type: none"> <li>Poor waste management because of the over capacitated magnetite dump and slimes dam.</li> </ul>	<ul style="list-style-type: none"> <li>The flora and fauna will not be disturbed.</li> </ul>
<ul style="list-style-type: none"> <li>There will be a continuation of impacts on water resources, including wetlands because of poor waste management from the magnetite dump.</li> </ul>	<ul style="list-style-type: none"> <li>There will be no destruction of wetlands and or riparian habitat.</li> </ul>

### 9.8 THE POSSIBLE MITIGATION MEASURES THAT COULD BE APPLIED AND LEVEL OF RESIDUAL RISK

The proposed activities will have impacts on both the environment and community. However, the possible mitigation measures were proposed by the EAP and specialist and are indicated in Section 14 below. The EMPr attached as **Appendix G** also highlights the measures proposed to manage the potential impacts.

The attached EMPr is an amended EMPr that takes into consideration the proposed activities as well as already authorised activities.

### 9.9 IF NO ALTERNATIVES, INCLUDING ALTERNATIVE LOCATIONS FOR THE ACTIVITY WERE INVESTIGATED, THE MOTIVATION FOR NOT CONSIDERING SUCH

The EIA Regulations require that alternatives be considered, including technical, locality, structural, scheduling alternatives etc. In this instance, alternatives were not considered for the proposed magnetite dump and slimes dam because it entails the expansion of the existing infrastructure, i.e., expansion of the slimes dam and expansion of the magnetite dump.

The purpose of the two PCDs is to service the magnetite dump and the plants. Therefore, it must be constructed next to the magnetite dump and plants. The proposed PCD that will service the magnetite dump will be **2.65ha**, while the one that will service plants will be **2.1ha**. Should site alternatives be considered for the PCDs, these would be located far from the existing infrastructure, as there are space constraints close to the magnetite dump and plants. As a result, the only suitable locations for the PCDs are the open spaces next to the magnetite dump and the plants (**as indicated in Figure 4**). Considering alternative locations would mean that the proposed PCDs would not serve the purpose they are intended for, placed away from the existing infrastructure.

Although there are no site alternatives for the proposed PCD and WRD, the site selection was based on the following motivation:

- The proposed PCDs will store polluted water from the magnetite dump and the plant. Therefore, the selected site locations are the most viable locations for PCDs due to their proximity to the magnetite dump and plant.
- The identified site location will also cater for additional space for expansions of the PCDs if required.
- The sites were found to be more suitable for the proposed development of waste rock dump and PCDs due to availability of space required
- The location of the proposed waste rock dump was found to be more viable due to its proximity from the open pit which will reduce load and haul distance and facilitate easy backfill.

#### **9.10 A CONCLUDING STATEMENT INDICATING THE PREFERRED ALTERNATIVES, INCLUDING THE PREFERRED LOCATION OF THE ACTIVITY**

Two locations alternatives are under consideration for the proposed barren dam, and this includes Alternative 1 which entails the development of a barren dam with an extent of 1ha and Alternative 2 which entails the development of three return water dam with an extent size of 3ha each (total 9ha). All the necessary specialists provided input that informed the comparative analysis of the two site alternatives. Alternative 1 is situated outside the Threatened Ecosystem (Marikana Thornveld) whereas Alternative 2 is situated within Marikana Thornveld. However, both alternatives are feasible and will be studied further and an informed decision taken.

The proposed project considered two site alternatives for the proposed return water dam whereby Alternative 1 will utilise the extent area of 5ha and is situated within a small portion (30% coverage) of aquatic and terrestrial ESA. Alternative 2 will require an extent of 9ha and will be situated within a larger portion (50% coverage) of the aquatic and terrestrial ESA compared to Alternative 1. Alternative 2 is situated within an area proposed for open pit mining expansion and this makes it a less feasible alternative.

Consequently, the EIA phase assessed the following alternatives:

- Barren dam site Alternative 1 and 2.

- Return water dam Alternative 1; and
- No Go Option.

### 9.10.1 SITE SELECTION MATRIX

The site selection matrix was undertaken for the RWD and barren dam alternatives as well as the development of the PCDs. This site selection matrix entailed the sensitivity mapping whereby the proposed development site was selected based on the area with less sensitive features such as wetlands, streams, and rivers. The site selection was also influenced by the Department of Environment, Forest, and Fisheries screening tool (Attached as **Appendix G**), as well as site visits, are undertaken.

Furthermore, the site selection matrix also included input from the specialist studies conducted within the proposed site. This includes the selection of the site based on an archaeological study undertaken by a suitably qualified heritage specialist whereby the site without the archaeological features was selected. Table 22 presents the advantages and disadvantages of the site alternatives while **Figure 20** indicates sensitive features within the proposed area.

Table 25: Comparative analysis of the Return Water Dam Alternatives

Comparative analysis of Return Water Dam Alternatives	
Return Water Dam Alternative 1	Return Water Dam Alternative 2
Alternative 1 is situated within a small portion (30% coverage) of aquatic and terrestrial ESA.	Alternative 2 falls within a larger portion (50% coverage) of the aquatic and terrestrial ESA.
This alternative falls within Clay Thorn Bushveld (50% coverage) and it also covers a small portion (30%) of the Threatened Ecosystem (Marikana Thornveld).	The whole Alternative 2 (100%) falls within the Threatened Ecosystem known as Marikana Thornveld.
This alternative is situated in the North of the mine close to the Non-perennial River known as Kgowe River.	Alternative 2 is situated in the southwest of the mine far from the non-perennial river known as Kgowe River.
This alternative entails 30-40% coverage of NFEPA wetland. However, the wetland has been disturbed or transformed due to mining activities.	This alternative is situated in an area where there is no NFEPA wetland.
RWD Alternative 1 will utilise less space (5ha), resulting in less environmental degradation (i.e., during construction) and contamination (i.e., Groundwater and surface contamination because of polluted return water).	RWD Alternative 2 will utilise more space (approximately 8ha including its buffer) resulting in more environmental degradation and contamination.

<p>This alternative will result in less clearance of indigenous vegetation as it requires less space than Alternative 2.</p>	<p>This alternative will result in more clearance of indigenous vegetation as it requires more space for construction compared to Alternative 1.</p>
<p>Alternative 1 is situated close to the existing slimes dam (<math>\pm 100\text{m}</math>) from the area where polluted and return water to be contained will be generated.</p>	<p>Alternative 2 is situated far from the existing slimes dam (<math>\pm 500\text{m}</math>) from the area where polluted and return water to be contained will be generated.</p>
<p>The pipeline or trench to transport return water and stormwater from the two slimes dam will be shorter and easy to install as it will be installed in plain terrain. This means that the shorter the trench, the less the impacts on the environment during the installation of the trench or pipeline.</p>	<p>The pipeline or trench to transport return water and stormwater from the two slimes dam will be longer and will have to pass through the open-pit mining area. This means the longer the trench, the higher the impacts during the installation of the trench or pipeline.</p>

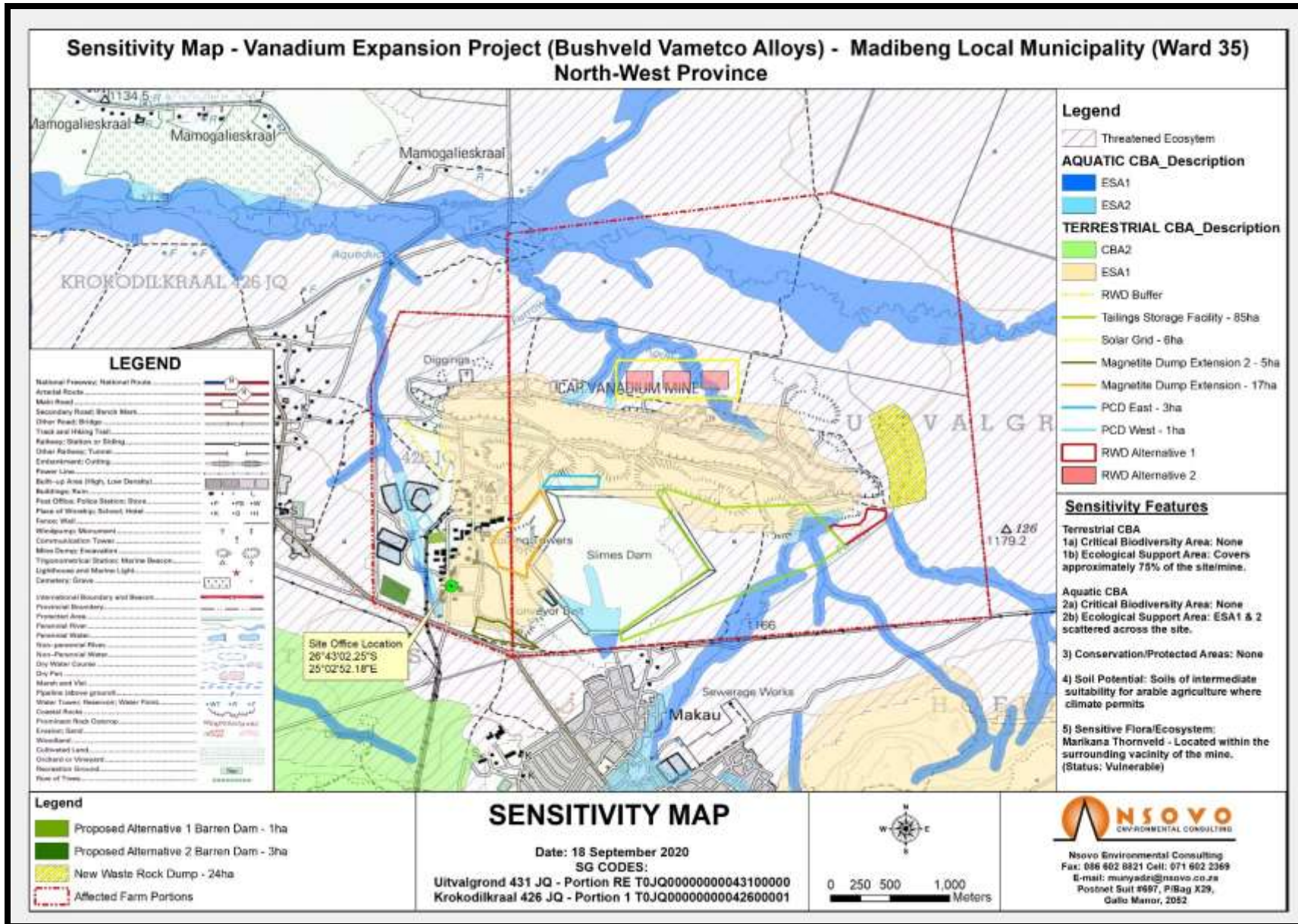


Figure 20 : A map indicating the sensitivity features within the proposed area

The table below summarises the findings of the specialists and EAP regarding the overall impact significance associated with the proposed study area as and this information was used as part of the selection matrix. The EIA phase report will provide more detail.

**Table 26: Summary of Specialist Findings**

Specialist	Discussion of the findings
Wetland	<p>The footprint of new infrastructure and the expansion of the mine activities could encroach on or destroy wetland habitats. Furthermore, removing natural vegetation and hydric soils will lead to the degradation of the surrounding wetland areas through the initiation of erosion processes and increased runoff of sediment into watercourses, particularly during the period of high rainfall. However, the mining expansion does not pose an impact further than the historic footprint on any of the riparian or wetland habitat. All activities proposed are to take place within the existing fenced off mining area.</p> <p>Further, the wetland impact assessment undertaken within the proposed study area identified the following issues as the major potential impacts during the construction, operation, and decommissioning phases:</p> <ul style="list-style-type: none"> <li>• Construction and operation impacts           <ul style="list-style-type: none"> <li>○ Destruction of wetlands;</li> <li>○ Sedimentation of wetlands;</li> <li>○ Increased erosion; and</li> <li>○ Pollution of water resources.</li> </ul> </li> <li>• Decommission phase impacts           <ul style="list-style-type: none"> <li>○ Loss of wetland function</li> <li>○ Decreased downstream water quality</li> </ul> </li> </ul> <p>However, several general and specific mitigation measures were proposed to reduce negative impacts on wetlands and incorporate some potentially positive impacts of the proposed development. Therefore, it is anticipated that the proposed project will not have major impacts on wetlands as wetland impacts associated with the proposed project were rated medium during both construction and operation phases.</p>



Specialist	Discussion of the findings
Heritage	<p>Sections of the site earmarked for the proposed development are degraded due to the existing land uses such as access road, boreholes, and Eskom distribution power lines across the entire project receiving area. The proposed development will be additional to in-situ developments already in the project area. There is no evidence suggesting any potential of recovering archaeological remains during earthmoving activities.</p> <p>Further, there are contemporary graves recorded, which are currently for and used by the Rankotea community. These graves are approximately 1200 in numbers, marked and maintained by both the community and the Vametco mine. However, the proposed project will not affect such graves. Further, approximately 30 formal graves with tombstones were recorded at the site proposed for the tailings dam. These graves will be directly affected by the proposed development (both expansion and the new Return Water Dam).</p>
Hydrology	<p>The identified impacts associated with surface water for the proposed project include reducing the availability of surface water resources to downstream/down-gradient water users due to changes in water quantity or flow regime into the Rosespruit River through diversion and physical obstruction from mining infrastructure. In addition to impacts, there will be changes in Rosespruit and tributaries system water quality due to contaminants contained in releases from the mine (indirectly via seepage or via overflow and dirty stormwater runoff).</p> <p>From the hydrologist perspective, the Vametco expansion project is not anticipated to result in new significant impacts on the current hydrological status if the proposed plant remains within the serviced and disturbed area and relevant mitigation measures are implemented.</p>
Noise	<p>The environmental noise impact during the construction and decommissioning phases will be insignificant during the summer and winter periods. The noise impact will change during the operational phase where the noise intrusion will be low to moderate, and. This is based on a noise intrusion level of 5.0dBA and not the benchmark noise intrusion of 7.0dBA before a noise disturbance is created.</p> <p>The potential environmental noise intrusion levels can be controlled through approved acoustic screening measures, state of the art equipment, proper noise management principles, and compliance with the Noise Regulations of 1994. The proposed environmental noise management plan must be in place during all the phases of the mining establishment to identify any noise increase on a pro-active basis and to address the problem accordingly.</p>

Specialist	Discussion of the findings
	<p>The proposed Vametco mine expansion project will be in line with the environmental noise standards and guidelines. All the mitigatory noise measures are in place and that the Noise Impact Management Plan (NIMP) and Noise Monitoring Plan (NMP) for the Vametco mine are adhered to.</p>
Geohydrology	<p>The area is characterised by Gabbro and Norite rocks of the Upper Zone of the Rustenburg Layered Suite with the aquifer system classified as a Minor Aquifer. Therefore, a moderate level of protection is required to reduce the degradation of the aquifer. The groundwater flow direction emulated the topography, flowing in a westerly direction in the western part of the study area. Groundwater is mainly used for domestic and stock watering purposes use in the area as deduced from the hydro census. The level of groundwater protection based on the Groundwater Quality Management Classification is considered medium. The hydrogeological impacts of the proposed expansion activities are considered medium to low based on the risk assessment.</p>
Visual	<p>Previous human-induced activities and interventions have impacted significantly on the original landscape character. In this case, mining and existing infrastructure, including power lines, roads, mine dumps, etc., can be classified as landscape disturbances and elements that cause a reduction in the condition of the affected landscape type and negatively affect the quality of the visual resource. Within the receiving environment, specific viewers (visual receptors) experience different views of the visual resource and value it differently. They will be affected because of alterations to their views due to the proposed project.</p> <p>The visual receptors included in this study area are discussed as follows:</p> <p><b>Visual Impact on Residents:</b></p> <p>The study area is moderately populated, with a lower population in the rural settlements and farming communities, to higher populations in the towns. The communities close to the mine include Mothothlung, Rankotea, Lerulaneng, and Makua and may experience a low degree of visual intrusion.</p> <p><b>Visual Impact on Tourists:</b></p> <p>The entire study area is considered to have low tourism potential, mostly because of the environmental degradation caused by the mining developments and human settlements. There is also no major thoroughfare to prominent tourist destinations. The temporary exposure to possible unsightly views of the construction camps and associated activities will be minimal and localised. The proposed new developments will only have an impact on tourists</p>

Specialist	Discussion of the findings
	<p>near the mine, which will mostly be along the main transportation routes. The severity of the visual impact of the mining activities on tourists will be low, causing a low visual impact.</p> <p><b>Visual Impact on Motorists:</b></p> <p>The major route in the study area is R566 connecting the towns, mines, and farms, but not passing the mine directly. The secondary road network in the study area carries a much lower volume of motorists. Many of the roads are gravel roads, which are mostly utilised by the residents. Motorists' visual exposure to the new expansions to the mine will be brief and the severity of the visual impact will be low.</p> <p>Most of the study area has moderate to low landscape character sensitivity due to the developed landscape, environmental degradation, minimal pristine condition of the landscape, moderate visual quality, and minimal tourism value. During winter, a low visual screening is afforded by the landscape. The site falls within the summer rainfall zone and during the winter months, plants are dormant and low growing.</p>
Terrestrial Biodiversity	<p>During the field biodiversity (flora and fauna) impact assessment, four habitat units have been identified within the focus area, i.e., the Degraded Marikana Thornveld, Freshwater Habitat, Rocky Outcrop, and Transformed habitat.</p> <p>From a floral perspective, the habitat units range from moderately high to low ecological importance and sensitivity based on the habitat integrity, floral diversity, SCC and regionally and naturally protected floral species. Also included is the presence of a unique landscape and the conservation significance of the habitat.</p> <p>Based on the impact assessment of potential impacts on floral habitat, diversity, and SCC associated with the study area, it is evident that during the construction and operational phases, the perceived impact on floral SCC, habitat and diversity is of high to medium significance before the implementation of mitigation measures. With mitigation measures fully implemented, all impacts can be reduced to medium-low, low, and very-low significance levels.</p>

Specialist	Discussion of the findings
	<p>Based on the impact assessment of potential impacts on faunal habitat, diversity and SCC associated with the study areas, it is evident that during the various phases, before mitigation, the perceived impact on faunal SCC, habitat, and diversity is of high to medium significance. With mitigation measures fully implemented all impacts can be reduced to lower significance levels.</p>
<p>Soil and land Capability</p>	<p>During the various phases of the proposed mining associated development, which includes planning, mining, and related infrastructure, as well as closure phases, various impacts are anticipated. The anticipated impacts include soil erosion, soil compaction, and soil contamination. Soil compaction is expected to be more severe without mitigation measures in place due to the physical composition of Vertic soils as they contain a high content of expanding clay (smectite group) minerals. All soil forms occurring within the study area have an equal chance of being accidentally contaminated by various toxicants used during the mining operation. These impacts mentioned above are expected to be moderate -negative without mitigation and low with mitigations.</p> <p>If mitigation measures are implemented, the overall impact footprint of the proposed mining associated development will be reduced to acceptable levels from land use and land capability point of view. The cumulative impact on land use will be the conversion of land into mining infrastructure areas resulting in the loss of potential grazing land and wilderness during the life of the mine. The degraded areas within the footprint, with specific mention of historic and current mining activities, can be rehabilitated in an integrated manner as part of the closure of the project, and this project can, therefore, leave a positive legacy in the area.</p>
<p>Traffic</p>	<p>The traffic impact assessment was conducted within and around the study area to:</p> <ul style="list-style-type: none"> <li>• Determine current traffic conditions on the surrounding road network (within a defined study area);</li> <li>• Determine the volume of traffic currently generated by Vametco mine;</li> <li>• Quantify the impact the proposed project is expected to have on the surrounding road network;</li> <li>• Determine whether it is necessary to mitigate the expected impact, and</li> <li>• Recommend measures to mitigate such an impact.</li> </ul>

Specialist	Discussion of the findings
	<p>It was concluded that the proposed project would have an insignificant traffic impact on the surrounding road network. Traffic impact significance scores of 18 and 24 were calculated for the construction and operational phases of the proposed project, respectively. As such, there are no traffic problems or congestion expected because of project activities. Therefore, the project can be authorized from a traffic engineering perspective.</p>
Socio-economic	<p>The socio-economic aspects have both positive and negative impacts. The positive socio-economic benefits associated with the proposed development far outweigh the negative impacts identified. For example, the proposed mine expansion operations at Vametco will result in sustainable jobs at the mine and will increase employment opportunities over the medium and long term. These include skilled, semi-skilled, and under-skilled labourers who could consist of locals (in and around the mining area) as well as regional communities. The proposed project will have more positive impacts than negative impacts; therefore, the project can be authorized from a specialist socio-economic perspective.</p>

**10 A FULL DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY, ASSESS AND RANK THE IMPACTS ACTIVITY AND ASSOCIATED STRUCTURES AND INFRASTRUCTURE WILL IMPOSE ON THE PREFERRED DEVELOPMENT FOOTPRINT ON THE APPROVED SITE AS CONTEMPLATED IN THE SCOPING REPORT THROUGH THE LIFE OF THE ACTIVITY INCLUDING THE FOLLOWING:**

**10.1.1 A DESCRIPTION OF ALL ENVIRONMENTAL ISSUES AND RISKS THAT WERE IDENTIFIED DURING THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS**

Potential environmental impacts identified during the EIA phase are described in Table 20 below. This is not an exhaustive list, but it provides insight into the potential impacts associated with the proposed project.

**Table 27: Potential environmental impacts identified during the EIA phase**

Issue	Nature	Description
Employment	Positive-No mitigation required	The proposed project entails the expansion of the mining operations, which will result in the increase of employment opportunities, including skilled and semi-skilled personnel in the local community during the construction as well as operational phases. This impact will be positive and provincial in extent.
Air Pollution	Neutral	Potential air pollutants during construction may be dust emanating from site preparation and excavations during construction. As a result, it is anticipated that before implementation mitigation measures, the impact will be local in extent, and short term. Additional mitigation measures, such as dust suppression, can also reduce the impact to become site-specific.
Avifauna	Negative	The Magaliesberg Important Bird or Biodiversity Area (IBA) is situated approximately 4.5 km south of the study area, which increases the likelihood of avifaunal SCC foraging within the focus area. No avifaunal SCC were observed at the time of the assessment, which may be due to the time of year the assessment was undertaken (early spring), paired with the short duration of the assessment. Several avifaunal species are expected to occur within or utilise the focus area namely: <i>Circus ranivorus</i> (African Marsh Harrier, VU), <i>Ciconia nigra</i> (Black Stork, NT), <i>Gyps coprotheres</i> (Cape Vulture, CR), <i>Falco biarmicus</i> (Lanner Falcon, NT), <i>Falco naumanni</i> (Lesser Kestrel, VU), <i>Falco peregrinus</i> (Peregrine Falcon, NT) and <i>Eupodotis cafra</i> (White-Bellied Korhaan).
Visual Impact	Negative	The visual impact of an object in the landscape decreases quickly as the distance between the observer, and the object increases. The visual impact at 1km is approximately a quarter of the impact viewed from 500m, and the visual impact at 2km is one-eighth of the impact viewed from 500m. Therefore, objects appear insignificant in any landscape beyond 5km.

Issue	Nature	Description
		<p>The visibility of the proposed infrastructure will be a function of several factors, including landform, vegetation, views and visibility, genius loci (or sense of place), visual quality, existing and future land use, landscape character and scale. The proposed activity will change the visual character of the site; however, it must be noted that there are already existing mine waste dumps, PCD and slimes dam located within the vicinity of the proposed project site. Local variations in topography and man-made structures could cause local obstruction of views in certain parts of the viewshed. Given the topography of the study area, the impact can be considered definite, long term, local in extent but low significance.</p>
Fauna	Negative	<p>Based on the faunal assessment, only common faunal species were observed at the time of the assessment, although several faunal SCC are expected to frequent the area for foraging purposes. The proposed Slimes Dam Expansion Area 1 will destroy the associated Rocky Habitat unit, which may be harbouring the reptile SCC <i>Python natalensis</i> (South African Python, LC). In addition, the proposed RWD will likely cause the destruction of the associated Freshwater Habitat unit, which may be providing habitat for amphibian SCC and foraging avifaunal SCC. Due to the extent of the proposed activities, habitat fragmentation of the unfenced area is highly likely, as the Degraded Marikana Thornveld acts as a migration corridor for faunal species.</p>
Flora	Negative	<p>Potential ecological impacts resulting from the proposed expansion will stem from a variety of different activities and risk factors associated with the preconstruction, construction, operational and closure phases of the project. The construction of PCD and RWD as well as expansion of magnetite dump and slimes dam may have a negative impact on intact vegetation as it will need to be cleared. Increased erosion risk will occur due to the loss of plant cover and soil disturbance during the construction phase. Stripping of vegetation will increase the risk of erosion. This may impact downstream riparian and wetland habitats if a lot of silt enters the drainage systems.</p>



Issue	Nature	Description
		<p>The development will contribute to the cumulative fragmentation of the landscape and will potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations.</p>
Noise	Negative	<p>In South Africa, the assessment of noise levels in the environment is governed by the South African Bureau of Standards (SABS) noise standard 0103 – ‘The measurement and rating of environmental noise with respect to annoyance and speech communication’ (SABS 1994). Additional SABS standards cover the measurement of noise over different distances from the source (SABS 0357 – ‘The calculation of sound propagation by the Concave method’), and standards for different sectors (e.g., industry).</p> <p>The residents in the vicinity of the Bushveld Vametco mine are exposed to the industrial type of noise levels due to existing mining operations and traffic noise from vehicles to and from the mining area. The wind direction, distances between the mining activities (point and/or linear noise sources) and the residential areas play an important role in how the sound will be propagated. The noise projections were done in stable conditions with no winds.</p> <p>There will be an upward shift in the immediate environmental noise levels during the construction phase temporarily and a more permanent basis during the operational phase in the vicinity of the different mine expansion activities. The noise increase at the abutting residential properties will however not exceed the prevailing ambient noise levels during the construction, operational and decommissioning phases as it will be below the threshold value of 7.0dBA. According to the SABS 0103 acceptable noise levels at daytime is 45dBA, and a noise intrusion is disturbing if it exceeds 7dBA or more. The proposed development will not have a significant noise increase as the noise will not exceed the threshold and has been identified as potentially low due to its nature.</p>

Issue	Nature	Description
Waste	Negative	<p>Naturally, the inhabitation of the land will result in the accumulation of various forms of waste in the area. The aesthetic value of the area will decrease if such waste is not collected and disposed of appropriately. Waste material will be generated during the construction and operational phases. During the construction phase, waste may accumulate from the worker's campsite or litter left around the work area by the construction staff. Other waste substances may accumulate from cement bags amongst other construction material. During the operational phase, wastewater generated from the operation of the mine will be stored and managed through the proposed PCDs, slimes dams as well as the RWD. The impact of waste is definite and will last for the duration of the construction phase as well as the operational phase, although reduced.</p>
Soil	Negative	<p>The proposed development is anticipated to contribute to the loss of topsoil because of erosion and possible contamination of soil resources by dust and hydrocarbons due to the excavation activities. The proposed development is anticipated to also contribute to the loss of arable land.</p> <p>Other impacts on soils will include:</p> <ul style="list-style-type: none"> <li>• Change of soil surface and sub-surface hydrology, depleting or reducing replenishment of moisture of lower-lying habitats depending on hillslope seeps;</li> <li>• Change in soil chemistry of all lower-lying habitats affected by acid leachate, causing a die-off of indigenous plants and loss of resources to fauna; and</li> <li>• Degradation of soil moisture reserves as well as water resources in more sensitive habitats, such as riparian areas.</li> </ul>
Heritage	Negative	<p>There are several heritage structures and graves which are not within the footprint of the proposed development, i.e., Rankotea graves.</p>

Issue	Nature	Description
		<p>Further, approximately 30 formal graves with tombstones were recorded at the site proposed for the tailings dam. These graves will be directly affected by the proposed development (both expansion and the new Return Water Dam). Further, should any unmarked burials be exposed during construction, affected families must be tracked and consulted. Relevant rescue/relocation permits must be obtained from SAHRA and the North-West Department of Health before any grave relocation takes place.</p>
Wetlands	Negative	<p>There are valley bottom wetlands within the study area, which are potentially supported by subsurface water flows including a lateral seepage component from the adjacent hillslope to the north as well as return flows via the vadose zone, which will enhance the importance of the wetlands for streamflow regulation albeit to a small extent. These wetlands serve to improve habitat within and potentially downstream of the study area through the provision of various ecosystem services. Many of these functional benefits contribute directly or indirectly to increased biodiversity within the study area as well as downstream of the study area through the provision and maintenance of appropriate habitat and associated ecological processes. To ensure that the water resources within the study area are managed properly and protected, a Water Use Licence Application is being undertaken with the Department of Human Settlement Water and Sanitation. The wetland associated impacts include the following:</p> <ul style="list-style-type: none"> <li>• Destruction of wetlands;</li> <li>• Sedimentation of wetland and increased erosion;</li> <li>• Pollution of water resources;</li> <li>• Loss of wetland function;</li> <li>• Decreased downstream water quality;</li> <li>• Loss of or displacement of fauna;</li> <li>• Loss of ecological structures and function of habitats; and</li> </ul>

Issue	Nature	Description
		<ul style="list-style-type: none"> <li>• Increase in alien invasive plants.</li> </ul>
Surface Water	Negative	<p>The proposed activities are associated with the surface water impacts within the study area and the impacts include the following:</p> <ul style="list-style-type: none"> <li>• Reduced availability of surface water resources to downstream/down-gradient water users due to changes in water quantity or flow regime into the Rosespruit through diversion and physical obstruction from the mine; and</li> <li>• Changes in the Rosespruit and tributaries system water quality due to contaminants contained in releases from the mine (indirectly via seepage or via overflow and dirty stormwater runoff).</li> </ul> <p>The impacts anticipated during the construction and operational phases include deterioration of water quality because of the following:</p> <ul style="list-style-type: none"> <li>• Clearing the surface and site preparations will result in the loss of soil and exposure of soil surfaces to erosion factors. Rainfall events result in the runoff from exposed areas carrying increased sediment;</li> <li>• Potential uncontrolled spills of contaminants such as fuel and oils, and subsequent washing away of these into the surface water resources;</li> <li>• Accidental spills, overflows, contaminated runoff; the improper material deposition onto the waste disposal facility;</li> <li>• Inadequate operational control of the slimes dam RWD or waste facility PCD could lead to overflow; and</li> <li>• Erosion of fine material during the operation of the waste disposal facility and erosion of spillage material onto the road surfaces.</li> </ul>

Issue	Nature	Description
Groundwater Pollution	Negative	<p>During the construction phase for the proposed RWD, PCD and expansion of the slimes dam as well as magnetite dump and other associated infrastructure, the following potential impacts on groundwater may result from the on-project site activities:</p> <ul style="list-style-type: none"> <li>• Potential contamination of groundwater due to hydrocarbon spillages and leaks from construction vehicles and waste;</li> <li>• A slight reduction of recharge to groundwater due to the compaction of the ground surface; site clearing of footprints and other construction-related activities;</li> <li>• Decrease in water quality because of potential hydrocarbon spillages as well as seepage from the proposed development and expansion of magnetite dump and slimes dam;</li> <li>• Increased infiltration;</li> <li>• Change in the geochemistry; and</li> <li>• Monitoring changes.</li> </ul>
Socio-economic Environment	Negative/Positive	<p>The socio-economic aspects have both positive and negative impacts associated with the proposed project. The significance of positive socio-economic benefits associated with the proposed project exceeds the significance of negative socio-economic impacts. For example, the proposed mine expansion operations at Vametco will result in sustainable jobs at the mine and will increase employment opportunities over the medium, and long term. These include skilled, semi-skilled and skilled labours which could consist of locals (in and around the mining area) as well as regional and national communities.</p>
Climate	Neutral	<p>Climate change is unlikely to have a major direct impact on the mining industry, for which regulations and management strategies are already in place to manage factors such as water usage, water conservation and demand strategies and environmental issues relating to rehabilitation and the provision of rehabilitation guarantees. While lack of access to</p>

Issue	Nature	Description
		water may affect some mining projects, most mining processes do not generally require potable water. Where high-quality water is required, some mines are already installing water treatment units.
Topography	Neutral	The topography of the study area is relatively flat and the proposed activities (i.e., construction of PCD, calcine disposal facility, return water dam etc.) will not have a significant impact on the topography.
Tourism	Neutral	The entire study area is considered to have low tourism potential, mostly because of the environmental degradation caused by the mining developments and human settlements. Although the local municipality where the project will be undertaken has an attractive tourist destination i.e., Hartbeespoort dam, there is no major thoroughfare to a prominent tourist destination close to the mine. The proposed new developments will only have an impact on tourists near the mine, which will be mostly along main transportation routes. The severity of the visual impact of the mining activities on tourists will be low.
Traffic	Neutral	It is anticipated that the proposed expansion will have an insignificant traffic impact on the surrounding road network. No traffic problems or congestion are expected because of the project activities because mining is already existing.
Geology	Negative	The proposed mining expansion operations will not have a significant impact on geology. Therefore, no mitigation measures are proposed for this impact as mining permanently destroys the geological strata. The mine should make optimal utilisation of the resources, which forms part of the mining rights area, and should remain within the limits of the designated MRA.

### 10.1.2 AN ASSESSMENT OF THE SIGNIFICANCE OF EACH ISSUE AND RISK AND AN INDICATION OF THE EXTENT TO WHICH THE ISSUE AND RISK COULD BE AVOIDED OR ADDRESSED BY THE ADOPTION OF MITIGATION MEASURES

The following section presents the impacts and the significance as rated by the specialists as well as the EAP. The Tables below highlight the significance of the identified impacts for the construction, operational, decommissioning, rehabilitation, and closure phases of the project.

The ratings are assessed with and without mitigation and colour coded as follows to indicate the significance:

<b>High</b>
<b>Medium</b>
<b>Low</b>

### 10.1.2.1 IMPACT ON WETLANDS

The wetland impact assessment identified surface water pollution, including sedimentation and increased erosion, loss of wetland and riparian functionality, and decreased downstream water quality as the major potential impacts during the construction and operational phases. The wetland impacts were rated medium during the construction and operation phase without mitigation measures and low with the implementation of the appropriate mitigation measures. Further, several general and specific mitigation measures were proposed to reduce negative impacts and incorporate some potentially positive impacts of the proposed development.

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
<b>Impact on wetland during construction and operation phase</b>							
Destruction and degradation of wetlands	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	3 (Medium)	39 (Medium)
	Yes	Negative	2 (Local)	3 (Medium term)	4 (Low)	2 (Low)	18 (Low)
Sedimentation of wetlands and increased erosion	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	3 (Medium)	39 (Medium)
	Yes	Negative	2 (Local)	3 (Medium term)	4 (Low)	2 (Low)	18 (Low)
Pollution of water resources	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	3 (Medium)	39 (Medium)
	Yes	Negative	2 (Local)	3 (Medium term)	4 (Low)	2 (Low)	18 (Low)
<b>Mitigation Measures</b>							



Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
<ul style="list-style-type: none"> <li>All soils within the footprint of the mining area must be appropriately separated and stored.</li> <li>Avoid mining activities in the wetland areas identified as far as possible through proper planning, demarcation, and appropriate environmental training;</li> <li>If there are any changes to the proposed mining expansion lay-out a wetland ecologist should re-evaluate potential impacts and mitigation measures</li> <li>A wetland specialist must be appointed to guide engineers for the detailed designs if lay-out plans change to include water course crossings which is not currently proposed;</li> <li>Management has the responsibility to inform members of staff of the need to be vigilant against any practice that will have a harmful effect on wetlands;</li> <li>Any proclaimed weed or alien species that germinate during the operational period shall be cleared by hand before flowering;</li> <li>The re-release of clean water from clean and dirty water separation infrastructure must be diffused and not reach wetland habitat as concentrated flows where it will have severe negative impacts on especially the valley bottom wetlands.</li> <li>The stormwater plan must include adequate attenuation facilities to ensure that peak flows do not cause negative impacts on wetlands;</li> <li>The design of drainage systems must ensure no contamination, eutrophication, or increased erosion of the wetland areas. Drainage systems should be maintained regularly to minimize the runoff of harmful chemical substances into the wetland areas;</li> <li>The construction of surface stormwater drainage systems during the operational phase must be done in a manner that will protect the quality and quantity of the downstream system;</li> <li>Caution must be taken to ensure building materials are not dumped or stored within the proximity of the delineated wetlands.</li> </ul>							
<b>Impacts on wetland during decommission phase</b>							
The wetland impacts were rated medium during decommission phase without mitigation measures and low with the implementation of the appropriate mitigation measures.							
Decreased downstream water quality.	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	3 (Medium)	39 (Medium)
	Yes	Negative	2 (Local)	3 (Medium term)	4 (Low)	2 (Low)	18 (Low)

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
<b>Mitigation Measures</b>							
<ul style="list-style-type: none"> <li>An appropriate wetland and riparian monitoring program must be implemented prior to the start of the construction phase.</li> <li>Appropriate wetland rehabilitation design and implementation must ensure that wetland functionality is restored.</li> <li>The re-release of clean water from clean and dirty water separation infrastructure must be diffused and not reach the wetland as concentrated flows. It will have severe negative impacts on the valley-bottom wetland soils. The stormwater plan must include adequate attenuation facilities to ensure that peak flows do not cause negative impacts on wetlands, more specifically as a guideline.</li> <li>Post-development flows for frequent, average every afternoon type storm event 6 mm over 2 hours, will not exceed pre-development flows.</li> <li>Post-development velocities associated with the 1:5-year return event storm will be within 25% of predevelopment velocities.</li> </ul>							

**10.1.2.2 HYDROLOGY**

The Identified hydrological impacts for the proposed expansion were rated medium without the mitigation measures and low with the mitigation measures. The table below present the impact ratings associated with the hydrological features.

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
<b>Impact on Hydrology during construction</b>							
Deterioration of water quality	No	Negative	2 (Local)	2 (Short Term)	4 (Low)	3 (Medium)	24 (Low)
	Yes	Negative	1 (Site)	2 (Short Term)	2 (Minor)	2 (Low)	10 (Low)

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Altered hydrology characteristics of the catchments	No	Negative	2 (Local)	3 (Medium Term)	2 (Minor)	2 (Low)	14 (Low)
	Yes	Negative	2 (Local)	3 (Medium Term)	2 (Minor)	1 (Minor)	7 (Low)
<b>Mitigation measures</b>							
<ul style="list-style-type: none"> <li>Dust suppression and erosion control measures must be implemented and ensure that clean and dirty water separation is collected for reuse.</li> <li>The construction must be preferable during the dry season.</li> <li>Ensure free drainage of the clean stormwater to the catchment.</li> <li>Reuse the dirty water as much as is possible.</li> </ul>							
<b>Impacts during the operational phase</b>							
Impact during operational phase include the deterioration of water quality because of the following: <ul style="list-style-type: none"> <li>Accidental spills, overflows, contaminated runoff; the improper material deposition onto the waste disposal facility; and</li> <li>Inadequate operational control during the operation of the slimes dam, RWD, PCD, and magnetite dump facility, which could lead to overflow.</li> </ul>							
Deterioration of water quality	No	Negative	3 (Regional)	4 (Long Term)	6 (Moderate)	3 (Medium)	39 (Medium)
	Yes	Negative	2 (Local)	3 (Medium Term)	4 (Low)	2 (Low)	18 (Low)
Operation of the waste facilities, Baghouses and Scrubber system	No	Negative	2 (Local)	4 (Long Term)	2 (Minor)	3 (Medium)	24 (Low)
	Yes	Negative	2 (Local)	4 (Long Term)	2 (Minor)	3 (Medium)	24 (Low)
<b>Mitigation Measures</b>							

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
<ul style="list-style-type: none"> <li>Stormwater management measures such as diversion berms, trenches, and PCDs should be monitored and maintained regularly. This should be done preferably during the dry season and then after significant storm events.</li> <li>Mine roads should be well signposted, and speed limits observed. This will assist in preserving mine roads and preventing soil from being washed into watercourses.</li> <li>Terracing and proper deposition onto the waste disposal facilities should be maintained.</li> <li>A possible solution will be to reuse dirty water as much as possible on site instead of abstraction from the catchment or to treat contaminated water to acceptable standards and then discharge to the catchment.</li> <li>The loss of contained water to the catchment will be minimal however, may affect downstream water users.</li> </ul>							
<b>Impacts on hydrology during decommission phase</b>							
<p>The Impacts during decommission phase entails the deterioration of water quality because of the following:</p> <ul style="list-style-type: none"> <li>Accidental spillages caused by decommissioning activities; and</li> <li>Dust deposition and soil erosion could result in siltation of the surface water resources during rehabilitation.</li> </ul> <p>The proposed site is limited in extent and is located on an impacted footprint; therefore, the magnitude of the impact will be moderate, and significance will be medium.</p>							
Deterioration of water quality	No	Negative	3 (Regional)	3 (Medium Term)	6 (Moderate))	3 (Medium)	36 (Medium)
	Yes	Negative	2 (Local)	3 (Medium Term)	4 (Low)	2 (Low)	18 (Low)
<b>Mitigation Measures</b>							
<ul style="list-style-type: none"> <li>Ensure erosion control measures are in place and collect eroded water for settling until the vegetation has grown to create an acceptable cover</li> </ul>							

### 10.1.2.3 IMPACT ON NOISE

The environmental noise impact during the construction and decommissioning phases will be insignificant during the summer and winter periods. The noise impact will change during the operational phase, where the noise intrusion will be moderate to low. The table below shows the impacts ratings (rated low – medium) of noise associated with the proposed project.

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
<b>Construction phase</b>							
Site clearing and grubbing of the footprint	No	Negative	2 (Local)	3 (Medium Term)	6 (Moderate)	3 (Medium)	33 (Medium)
	Yes	Negative	2 (Local)	3 (Medium Term)	4 (Low)	2 (Low)	18 (Low)
Activities at processing plant	No	Negative	2 (Local)	3 (Medium Term)	6 (Moderate)	3 (Medium)	33 (Medium)
	Yes	Negative	2 (Local)	3 (Medium Term)	4 (Low)	2 (Low)	18 (Low)
Construction of the infrastructure at the different areas	No	Negative	2 (Local)	3 (Medium Term)	6 (Moderate)	3 (Medium)	33 (Medium)
	Yes	Negative	2 (Local)	3 (Medium Term)	4 (Low)	2 (Low)	18 (Low)
Civil construction activities	No	Negative	2 (Local)	3 (Medium Term)	6 (Moderate)	3 (Medium)	33 (Medium)
	Yes	Negative	2 (Local)	3 (Medium Term)	4	2 (Low)	18 (Low)
<b>Mitigation measures</b>							

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
<ul style="list-style-type: none"> <li>• Earthwork activities to be done during daytime working hours unless there is no heavy-duty machinery which may create a noise problem.</li> <li>• Building activities to be done during daytime working hours unless there is no heavy-duty machinery which may create a noise problem.</li> <li>• Building activities to be done during daytime working hours only.</li> <li>• All equipment that will be used will have to comply with the manufacturers' specifications.</li> <li>• Noise monitoring to be done to ensure that the 85.0dBA threshold value will not be exceeded.</li> </ul>							
<b>Noise Impacts during the operational phase</b>							
Noise increase within the boundary of the mine and at the abutting residential areas during the construction phase were rated medium without mitigation measures and low with the implementation of the mitigation measures.							
Processing plant activities	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	3 (Medium)	39 (Medium)
	Yes	Negative	2 (Local)	5 (Permanent)	4 (Low)	3 (Medium)	33 (Medium)
Crushing activities at the northern decline shaft	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	2 (Low)	26 (Low)
	Yes	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	3 (Medium)	39 (Medium)
ROM	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	2 (Low)	26 (Low)
	Yes	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	3 (Medium)	39 (Medium)
Hauling of material to the plant	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	2 (Low)	26 (Low)
	Yes	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	3 (Medium)	39 (Medium)

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Hauling of waste rock to the waste rock dump	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	2 (Low)	26 (Low)
	Yes	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	3 (Medium)	39 (Medium)
Activities at the extension of the TSF	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	3 (Medium)	39 (Medium)
	Yes	Negative	2 (Local)	5 (Permanent)	4 (Low)	2 (Low)	22 (Low)
Activities at the pollution control dam	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	3 (Medium)	39 (Medium)
	Yes	Negative	2 (Local)	5 (Permanent)	4 (Low)	2 (Low)	22 (Low)
Additional traffic along the existing feeder roads	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	3 (Medium)	39 (Medium)
	Yes	Negative	2 (Local)	5 (Permanent)	4 (Low)	2 (Low)	22 (Low)
<b>Mitigation measures</b>							
<ul style="list-style-type: none"> <li>All noise sources exceeding 85.0dBA to be identified and, if practical, to be acoustically screened off.</li> <li>Noise survey to be done on a quarterly basis and after one year to change to an annual basis if the prevailing ambient noise levels at the boundaries of the Mototolo concentrator plant have not changed.</li> <li>Noise survey to be done quarterly and after one year to change to an annual basis if the prevailing ambient noise levels at the footprint boundaries align with the 70.0dBA threshold value.</li> <li>Noise survey to be done along the feeder roads on an annual basis to determine the noise levels.</li> </ul>							
<b>Decommissioning phase</b>							

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Noise increase at the boundary of the mine and at the abutting residential areas during decommissioning phase were rated low without and with mitigation measures.							
Removal of infra-structure	No	Negative	2 (Local)	3 (Medium Term)	4 (Long Term)	3 (Medium)	27 (Low)
	Yes	Negative	2 (Local)	3 (Medium Term)	4 (Long Term)	2 (Medium)	18 (Low)
Backfill of disturbed areas	No	Negative	2 (Local)	3 (Medium Term)	4 (Long Term)	3 (Medium)	27 (Low)
	Yes	Negative	2 (Local)	3 (Medium Term)	4 (Long Term)	2 (Low)	18 (Low)
Planting of grass and vegetation at rehabilitated area	No	Negative	2 (Local)	3 (Medium Term)	4 (Long Term)	3 (Medium)	27 (Low)
	Yes	Negative	2 (Local)	3 (Medium Term)	4 (Long Term)	2 (Low)	18 (Low)
<b>Mitigation Measures</b>							
<ul style="list-style-type: none"> <li>Planting of grass and vegetation to be done during daytime working.</li> <li>Building activities to be done during daytime working hours unless there is no heavy-duty machinery which may create a noise problem.</li> </ul>							

#### 10.1.2.4 SOIL AND LAND CAPABILITY IMPACT ASSESSMENT

It is anticipated for the soils to be exposed to erosion, compaction, dust emission, and potential soil contamination impacts during the proposed mining. These impacts may persist for the duration of the operational phase if not mitigated adequately. The construction of the proposed activities will result in a loss of low agricultural importance soils. Site-specific mitigation measures were developed to ensure that the impacts of significance are reduced to acceptable levels.



Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
<b>Construction phase</b>							
The identified impacts will result from the site preparations, expansion of slimes dam and magnetite dump facilities, development of PCD and RWD, and other associated activities. Soil impacts associated with the proposed project were rated high without mitigation measures and low with mitigation measures.							
Soil erosion and dust emission	No	Negative	2 (Local)	4 (Long Term)	8 (High)	5 (Definite)	70 (High)
	Yes	Negative	2 (Local)	2 (Short Term)	6 (Moderate)	3 (Medium)	30 (Medium)
Soil compaction	No	Negative	2 (Local)	4 (Long Term)	8 (High)	5 (Definite)	70 (High)
	Yes	Negative	2 (Local)	2 (Short Term)	6 (Moderate)	3 (Medium)	30 (Medium)
Soil contamination	No	Negative	2 (Local)	5 (Permanent)	10 (Very High)	5 (Definite)	85 (High)
	Yes	Negative	2 (Local)	2 (Short Term)	4 (Low)	2 (Low)	16 (Low)
Loss of agricultural land capability	No	Negative	2 (Local)	2 (Short Term)	4 (Low)	2 (Low)	16 (Low)
	Yes	Negative	2 (Local)	2 (Short Term)	4 (Low)	2 (Low)	16 (Low)
<b>Mitigation measures</b>							

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
		<ul style="list-style-type: none"> <li>• Any disturbance of high potential agricultural soils must be avoided, should this be not feasible, the footprint of the proposed project should be clearly demarcated to restrict the planned activities within infrastructure footprint as far as possible, thus minimising edge effects and reducing the extent and overall significance of impact;</li> <li>• An adequate stormwater management plan must be carefully designed and implemented to avoid erosion of topsoil on adjacent arable soils throughout all the mining phases. In this regard, special mention is made of:                             <ul style="list-style-type: none"> <li>○ Sheet runoff from cleared areas, paved surfaces, and access roads must be curtailed;</li> <li>○ The strategic placement of berms must slow down runoff from paved surfaces; and</li> <li>○ All overburden stockpiles.</li> </ul> </li> <li>• Compaction of soil can be mitigated by ripping the affected area and introducing both organic and inorganic fertilizers;</li> <li>• Contamination prevention measures should be addressed in the Environmental Management Programme (EMPr) for the proposed development, and this must always be implemented and made available and accessible to the contractors and construction crew conducting the works on site for reference;</li> <li>• A spill prevention and emergency spill response plan must be compiled to guide the construction works;</li> <li>• Unnecessary disturbances of the potentially arable soils outside the demarcated areas can be avoided where possible to minimise loss of agricultural land use;</li> <li>• During the decommissioning phase, the disturbed areas should be thoroughly cleaned, and all building material should be removed to a suitable disposal facility;</li> <li>• The footprint should be ripped at 25cm to alleviate compaction as part of rehabilitation;</li> <li>• Stored topsoil should be replaced (if any) and the footprint graded to a smooth surface.</li> </ul>					

**10.1.2.5 TERRESTRIAL BIODIVERSITY**

The impact on the floral habitat, diversity, and SCC associated with the proposed expansion were rated medium-high without mitigation measure and low with mitigation measures. This includes impacts during the planning, construction, operational, decommissioning, and closure phase.

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
<b>Planning phase</b>							
<b>Impact of floral habitat and diversity</b>							
Rocky outcrop	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	5 (Definite)	65 (High)
	Yes	Negative	2 (Local)	4 (Long Term)	4 (Low)	4 (High)	40 (Medium)
Degraded Marikana Thornveld	No	Negative	2 (Local)	4 (Long Term)	4 (Low)	5 (Definite)	50 (Medium)
	Yes	Negative	2 (Local)	2 (Short Term)	2 (Minor)	4 (High)	24 (Low)
Freshwater habitat	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	5 (Definite)	65 (High)
	Yes	Negative	2 (Local)	3 (Medium Term)	4 (Low)	4 (High)	36 (Medium)
Transformed habitat	No	Negative	1 (Site)	4 (Long Term)	6 (Moderate)	4 (High)	44 (Medium)
	Yes	Negative	1 (Site)	3 (Medium Term)	4 (Low)	3 (Low)	24 (Low)
<b>Impact on floral SCC</b>							
	No	Negative	1 (Site)	4 (Long Term)	4 (Low)	4 (High)	36 (Medium)

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Degraded Marikana Thornveld, Freshwater Habitat and Rocky Outcrop Habitat	Yes	Negative	1 (Site)	3 (Medium Term)	2 (Minor)	3 (Low)	18 (Low)
<b>Operational phase</b>							
Impact of floral habitat and diversity							
Rocky outcrop	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	5 (Definite)	65 (High)
	Yes	Negative	2 (Local)	4 (Long Term)	4 (Low)	4 (High)	40 (Medium)
Degraded Marikana Thornveld	No	Negative	2 (Local)	4 (Long Term)	4 (Low)	5 (Definite)	50 (Medium)
	Yes	Negative	2 (Local)	2 (Short Term)	2 (Minor)	4 (High)	24 (Low)
Freshwater habitat	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	5 (Definite)	65 (High)
	Yes	Negative	2 (Local)	3 (Medium Term)	4 (Low)	4 (High)	36 (Medium)
Transformed habitat	No	Negative	2 (Local)	3 (Medium Term)	4 (Low)	4 (High)	36 (Medium)
	Yes	Negative	1 (Site)	3 (Medium Term)	2 (Minor)	3 (Low)	18 (Low)

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
<b>Impact on floral SCC</b>							
Degraded Marikana Thornveld, Freshwater Habitat and Rocky Outcrop Habitat	No	Negative	2 (Local)	4 (Long Term)	4 (Low)	5 (Definite)	50 (Medium)
	Yes	Negative	2 (Local)	2 (Medium Term)	2 (Minor)	4 (Medium)	24 (Low)
<b>Decommissioning and closure phase</b>							
Rocky outcrop	No	Negative	1 (Site)	4 (Long Term)	4 (Low)	4 (Medium)	36 (Medium)
	Yes	Negative	1 (Site)	3 (Medium Term)	2 (Minor)	3 (Low)	18 (Low)
Degraded Marikana Thornveld	No	Negative	2 (Local)	4 (Long Term)	4 (Low)	5 (Definite)	50 (Medium)
	Yes	Negative	2 (Local)	2 (Short Term)	2 (Minor)	4 (Medium)	24 (Low)
Freshwater habitat	No	Negative	2 (Local)	5 (Permanent)	6 (Moderate)	5 (Definite)	65 (High)
	Yes	Negative	2 (Local)	3 (Medium Term)	4 (Low)	4 (Medium)	36 (Medium)
Transformed habitat	No	Negative	2 (Local)	4 (Long Term)	4 (Low)	5 (Definite)	50 (Medium)
	Yes	Negative	2 (Local)	2 (Short Term)	2 (Minor)	4 (Medium)	24 (Low)

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
<b>Impact on floral SCC</b>							
Degraded Marikana Thornveld, Freshwater Habitat and Rocky Outcrop Habitat	No	Negative	1 (Site)	4 (Long Term)	4 (Low)	4 (Medium)	36 (Medium)
	Yes	Negative	1 (Site)	3 (Medium Term)	2 (Minor)	3 (Low)	18 (Low)
<b>Mitigation measures</b>							
<ul style="list-style-type: none"> <li>It is recommended that prior to the commencement of construction activities, the entire construction servitude be fenced off, and clearly demarcated to limit footprint creep and edge effects;</li> <li>No hunting or trapping of faunal species is allowed. Access control and personnel movement must be actively managed to ensure that habitat and faunal species therein outside of the designated footprint areas are not disturbed or impacted upon;</li> <li>Revegetation of disturbed areas should be carried out to restore habitat availability and minimise soil erosion and surface water runoff;</li> <li>Vehicles must be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be limited to what is necessary, and the footprint thereof kept to a minimal.</li> <li>Any temporary roads should be rehabilitated as soon as they are no longer in use to prevent effects of habitat fragmentation;</li> <li>All areas of increased ecological sensitivity falling outside of the expansion activities footprints should be designated as No-Go areas and be off limits to all unauthorised construction vehicles and personnel;</li> <li>No additional habitat is to be disturbed during the operational phase of the development. Detailed mitigation measures are included in Biodiversity Impact Assessment Report attached as <b>Appendix C2</b>.</li> </ul>							

### 10.1.2.6 VISUAL IMPACT

The proposed activities have been evaluated against internationally accepted criteria to determine the impact they will have on the landscape character and the viewers that have been identified in the study area. The visual impacts were rated low – medium with mitigation measures and without mitigation measures as follows:

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
<b>Construction phase</b>							
Expansion of slimes dam	No	Negative	1 (Site)	2 (Short Term)	4 (Low)	3 (Medium)	21 (Low)
	Yes	Negative	1 (Site)	2 (Short Term)	4 (Low)	3 (Medium)	21 (Low)
Expansion of magnetite dump facility	No	Negative	2 (Local)	2 (Short Term)	4 (Low)	3 (Medium)	24 (Low)
	Yes	Negative	1 (Site)	2 (Short Term)	4 (Low)	3 (Medium)	21 (Low)
Construction of New PCDs	No	Negative	2 (Local)	2 (Short Term)	4 (Low)	2 (Low)	16 (Low)
	Yes	Negative	2 (Local)	2 (Short Term)	2 (Minor)	2 (Low)	12 (Low)
Construction of new RWD	No	Negative	2 (Local)	2 (Short Term)	4 (Low)	2 (Low)	16 (Low)
	Yes	Negative	2 (Local)	2 (Short Term)	2 (Minor)	2 (Low)	12 (Low)
<b>Operational phase</b>							
	No	Negative	2 (Local)	4 (Long Term)	6 (Moderate)	3 (Medium)	36 (Medium)

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Expansion of slimes dam	Yes	Negative	2 (Local)	4 (Long Term)	4 (Low)	3 (Medium)	30 (Medium)
Expansion of magnetite dump facility	No	Negative	2 (Local)	4 (Long Term)	6 (Moderate)	3 (Medium)	36 (Medium)
	Yes	Negative	2 (Local)	4 (Long Term)	4 (Low)	3 (Medium)	30 (Medium)
New Pollution Control Dams	No	Negative	2 (Local)	4 (Long Term)	4 (Low)	2 (Low)	20 (Low)
	Yes	Negative	2 (Local)	4 (Long Term)	2 (Minor)	2 (Low)	16 (Low)
New Return Water Dam	No	Negative	2 (Local)	4 (Long Term)	4 (Low)	2 (Low)	20 (Low)
	Yes	Negative	2 (Local)	4 (Long Term)	2 (Minor)	2 (Low)	16 (Low)
<b>Closure phase</b>							
Expansion of slimes dam	No	Negative	1 (Site)	4 (Long Term)	6 (Moderate)	1 (Improbable)	11 (Low)
	Yes	Negative	1 (Site)	4 (Long Term)	4 (High)	1 (Improbable)	9 (Low)
Expansion of magnetite dump	No	Negative	2 (Local)	4 (Long Term)	6 (Moderate)	3 (Medium)	36 (Medium)
	Yes	Negative	2 (Local)	4 (Long Term)	4 (High)	3 (Medium)	30 (Medium)
New Pollution Control Dams	No	Negative	1 (Site)	4 (Long Term)	4 (High)	2 (Low)	18 (Low)
	Yes	Negative	1 (Site)	4 (Long Term)	2 (Minor)	2 (Low)	14 (Low)



Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
New Return Water Dam	No	Negative	1 (Site)	4 (Long Term)	4 (High)	2 (Low)	18 (Low)
	Yes	Negative	1 (Site)	4 (Long Term)	2 (Minor)	2 (Low)	14 (Low)
<b>Mitigation measures</b>							
<ul style="list-style-type: none"> <li>Where areas are going to be disturbed through the destruction of vegetation, for example, the establishment of the construction camp, the vegetation occurring in the area to be disturbed must be replanted with endemic, indigenous species, especially veld-grass and trees.</li> <li>It is recommended that permeable steel structures be used for the structures of height, as far as possible, to create the lowest degree of visual obstruction.</li> <li>Plant fast-growing endemic trees along the boundaries of the mine. The trees will with time, create a screen and increase the biodiversity of the area.</li> <li>It is also recommended that trees be planted in areas where the proposed expansion of the Magnetite dump is most visible to reduce the visual impact of receptors.</li> </ul>							

#### 10.1.2.7 AIR QUALITY IMPACT ASSESSMENT

The air quality impacts associated with the proposed activities were identified and rated medium to low. The table below shows the impact rating of air quality and proposed mitigation measures.

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
<b>Impacts on Air Quality</b>							
Combustion emissions from plant	No	Negative	2 (Local)	3 (Medium Term)	6 (Moderate)	4 (High)	44 (Medium)
	Yes	Negative	2 (Local)	3 (Medium Term)	2 (Minor)	4 (High)	28 (Low)

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Fugitive dust	No	Negative	2 (Local)	3 (Medium Term)	6 (Moderate)	3 (Medium)	33 (Medium)
	Yes	Negative	2 (Local)	3 (Medium Term)	4 (High)	3 (Medium)	27 (Low)
<b>Mitigation measures</b>							
<ul style="list-style-type: none"> <li>• Encourage vegetation growth on dumps;</li> <li>• Spraying of haul roads for dust suppression;</li> <li>• Installation of wind breaks upwind of dumps;</li> <li>• Coverage fine material; and</li> <li>• Speed control on haul roads.</li> </ul>							

#### 10.1.2.8 TRAFFIC IMPACT ASSESSMENT

The proposed activities will result in traffic impacts during construction and operation phases due to an increase activity and the number of vehicles. The impacts were rated low without mitigation measures and with recommended legal traffic requirements and other considerations.

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
<b>Traffic Impact Assessment</b>							
Traffic impact during construction	No	Negative	2 (Local)	4 (Long Term)	2 (Low)	4 (High)	32 (Medium)
	Yes	Negative	2 (Local)	2 (Short Term)	2 (Low)	3 (Medium)	18 (Low)

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Traffic Impact during operations	No	Negative	2 (Local)	4 (Long Term)	2 (Low)	4 (High)	32 (Medium)
	Yes	Negative	2 (Local)	2 (Short Term)	2 (Low)	3 (Medium)	18 (Low)
<b>Mitigation measures</b>							
<ul style="list-style-type: none"> <li>All legal authorisations and permits must be obtained for the transportation of abnormal loads and hazardous materials on public roads;</li> <li>Measures should be taken to ensure that all health and safety requirements regarding transportation activities are complied with. This may include dust covers for hauling vehicles and dust control on all gravel roads;</li> <li>It is proposed that flagmen and temporary warning signs be placed at all access points where heavy vehicles will access public roads during construction, and;</li> <li>Controls should be in place to ensure that vehicles exiting the site are not overloaded.</li> </ul>							

#### 10.1.2.9 GEOHYDROLOGICAL IMPACT ASSESSMENT

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
<b>Construction phase</b>							
Groundwater water quality	No	Negative	2 (Local)	2 (Short Term)	4 (Low)	2 (Low)	16 (Low)
	Yes	Negative	2 (Local)	2 (Short Term)	2 (Minor)	2 (Minor)	12 (Low)
Increase in hydrological yield	No	Negative	2 (Local)	2 (Short Term)	6 (Moderate)	3 (Medium)	30 (Medium)

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
	Yes	Negative	2 (Local)	2 (Short Term)	4 (Low)	3 (Medium)	24 (Low)
Decrease in Hydrological yield	No	Negative	2 (Local)	2 (Short Term)	4 (Low)	2 (Low)	16 (Low)
	Yes	Negative	1 (Site)	3 (Short Term)	2 (Minor)	1 (Improbable)	6 (Low)
Soil erosion	No	Negative	2 (Local)	1 (Immediate)	4 (Low)	3 (Medium)	21 Low
	Yes	Negative	2 (Local)	2 (Short Term)	4 (Low)	2 (Low)	16 (Low)
<b>Operational phase</b>							
Soil erosion	No	Negative	2 (Local)	2 (Short Term)	6 (Moderate)	3 (Medium)	30 (Medium)
	Yes	Negative	1 (Site)	1 (Immediate)	4 (Low)	2 (Low)	12 (Low)
Water quality deterioration	No	Negative	2 (Local)	2 (Short Term)	4 (Low)	3 (Medium)	24 (Low)
	Yes	Negative	2 (Local)	2 (Short Term)	4 (Low)	2 (Low)	16 (Low)
Decrease in hydrological yield	No	Negative	2 (Local)	2 (Short Term)	4 (Low)	3 (Medium)	24 (Low)
	Yes	Negative	2 (Local)	2 (Short Term)	4 (Low)	2 (Low)	16 (Low)
<b>Closure phase</b>							
Soil erosion	No	Negative	2 (Local)	2 (Short Term)	6 (Moderate)	3 (Medium)	30 (Medium)

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
	Yes	Negative	2 (Local)	2 (Short Term)	4 (Low)	3 (Medium)	24 (Low)
Deterioration of water quality	No	Negative	2 (Local)	2 (Short Term)	6 (Moderate)	3 (Medium)	30 (Medium)
	Yes	Negative	1 (Site)	1 (Immediate)	4 (Low)	2 (Low)	12 (Low)
Increase in hydrological yield	No	Negative	2 (Local)	2 (Short Term)	4 (Low)	3 (Medium)	24 (Low)
	Yes	Negative	1 (Site)	1 (Immediate)	4 (Low)	2 (Low)	12 (Low)
<b>Mitigation measures</b>							
<ul style="list-style-type: none"> <li>• The proposed PCD must be lined properly to prevent any infiltration of contaminated water into the groundwater.</li> <li>• To prevent accidental hydrocarbon spills, all earth moving machinery should be regularly inspected for oil or diesel leakages.</li> <li>• Representative groundwater monitoring boreholes must be installed around the pollution control dam and be monitored on a quarterly bases for quality</li> <li>• Vegetation removal must be as minimum as possible. All bare surface areas must be re-vegetated to mimic the natural hydrological yield as much as possible.</li> <li>• Stormwater collection systems must be designed and constructed to collect contaminated runoff from site.</li> <li>• Dirty Water infrastructure must be designed in line with the requirements of GN 704.</li> <li>• Dust suppression and regulation/management of speed must be implemented.</li> </ul>							

## 11 AN ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK INCLUDING THE FOLLOWING:

### 11.1 CUMULATIVE IMPACTS, THE NATURE, SIGNIFICANCE, CONSEQUENCES OF THE IMPACT, RISK, EXTENT, DURATION AND PROBABILITY

Cumulative impacts in relation to an activity mean the past, present, and reasonably foreseeable future impacts of an activity, considered together with the impacts of activities associated with that activity, that may not be significant but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities (DEA, 2014 EIA Regulations). The cumulative impact can be defined as two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts, and the change in the environment which results from the incremental impact of the project when added to other closely related past, present, or reasonably foreseeable future projects, and can result from individually minor, but collectively significant, projects taking place over some time.

This section describes the potential impacts of the project that are cumulative. There are three separate levels of cumulative impacts considered, and this includes project site localised cumulative impacts: regional cumulative impacts, and global cumulative impacts. This section provides cumulative impacts ratings associated with the proposed project, including waste generation, traffic, socio-economic, visual impacts, air quality, and climate change. It also outlines the mitigation measures of each rated cumulative impacts as follows:

#### 11.1.1.1 WASTE GENERATION

The construction of the proposed PCD, RWD and magnetite disposal facility as well as the expansion of the slimes dam, and other associated infrastructure will generate a variety of waste material within the study area.

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
General Waste	No	Negative	2 (Local)	3 (Medium)	6 (High)	5 (Definite)	55 (High)
	Yes	Negative	1 (Site)	3 (Medium)	4 (Low)	5 (Definite)	40 (Medium)
Corrective Actions	<ul style="list-style-type: none"> <li>No waste will be buried on site or incorporated into the foundation trenches;</li> <li>The work force must be encouraged to sort waste into recyclable and non-recyclable waste; Separation of waste per category i.e., hazardous, and general waste and scrap metal.</li> <li>No burning of waste will be allowed on site; and</li> <li>Waste must be regularly removed from site and disposed of at a registered waste disposal facility.</li> </ul>						

### 11.1.1.2 VISUAL IMPACT

The proposed activity will change the area's visual character, particularly considering that the proposed site is next to regional roads (R55, R566, and M17). Given the undulating topography of the site and the proximity to these routes, the impact can be considered definite and long-term. The cumulative impact will be higher than anticipated due to existing mines.

Aspect	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Visual	No	Negative	3 (Regional)	2 (Short Term)	8 (High)	3 (Medium)	39 (Medium)
	Yes	Negative	2 (Local)	2 (Short Term)	6 (Moderate)	2 (Low)	20 (Low)
Corrective Actions	<ul style="list-style-type: none"> <li>Keep the construction sites and camps neat, clean, and organized to portray a tidy appearance; and</li> <li>Screen the construction camp and lay-down yards by enclosing the entire area with a dark green or black shade cloth of no less than 2m height.</li> </ul>						

### 11.1.1.3 TRAFFIC IMPACT

During the construction phase, increased heavy vehicle traffic should be expected. Without management, such increased traffic loads may negatively impact existing traffic flow. Further, unmanaged construction vehicles may decrease road safety for other road users, and uncontrolled movement of construction vehicles may result in unnecessary impacts on the environment through vegetation and habitat destruction.

Aspect	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Traffic	No	Negative	3 (Regional)	2 (Short Term)	8 (High)	3 (Medium)	39 (Medium)
	Yes	Negative	2 (Local)	2 (Short Term)	6 (Moderate)	2 (Low)	20 (Low)
Corrective Actions	<ul style="list-style-type: none"> <li>The delivery of construction material and equipment should be limited to hours outside peak traffic times (including weekends) prevailing on the surrounding roads;</li> <li>Access roads must be marked; and</li> <li>Delivery vehicles must comply with all traffic laws and bylaws.</li> </ul>						

#### 11.1.1.4 SOIL AND LAND CAPABILITY

According to the soil and land capability specialist, the land capability of the identified soils forms ranged between Class I and VIII due to land use limitations related to anthropogenic activities and low soil workability potential of the dominant soils. These soils are therefore considered to have little contribution to regional and national agricultural production. However, small pockets of prime agricultural soils (i.e., Hutton and Shortlands) were also found within the study area. These soils are considered to have a significant potential contribution to the regional and national agricultural production grid. It should be noted that no mining activities are planned on prime agricultural soils, therefore the direct impact is not foreseen. The indirect impact is also deemed unlikely on these soils due to their proximity to the current and proposed mining activities. The extent of the agriculturally important soils within the study area is limited to support viable commercial cultivated agriculture.

The overall potential loss of land capability is anticipated to be relatively low, considering the dominant soil forms occurring within the study area due to the marginal agricultural potential of these soils. Furthermore, the surrounding climatic conditions are associated with a moderately restricted growing season due to high and/or low temperatures, frost, and moisture stress. Suitable crops may be grown at risk of some yield loss because cultivation, as mentioned above constraints under normal circumstances.

Aspect	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Soil and Land capability	No	Negative	2 (Local)	5 (Long-Term)	6 (Moderate)	3 (Medium)	39 (Medium)
	Yes	Negative	2 (Local)	4 (Long Term)	4 (Low)	2 (Low)	20 (Low)
Corrective Actions	<ul style="list-style-type: none"> <li>Excavation of soil should be limited within the demarcated areas as far as practically possible.</li> <li>Ensure that all stockpiles (especially topsoil) are clearly and permanently demarcated and located in defined no-go areas.</li> <li>The A and B-horizons should be stripped separately and replaced in the same sequence on top of the spoil material.</li> </ul>						

#### 11.1.1.5 AIR QUALITY

Cumulative impacts refer to the incremental effect of several projects that may have an individually minor, but collectively significant impact on air quality. These are the cumulative impacts that result from mining operations near the project site. Project site localised cumulative impacts include the cumulative effects from operations that are close enough to potentially cause additive effects on the environment or sensitive receivers. These include mainly dust deposition. From the air quality impact assessment conducted for the proposed project, the modelling indicates that



daily exceedances may occur in a cumulative plume to the northeast of the facility and a lesser extent, to the west of the mine. Dust fall exceedances are not anticipated in neighbouring residential areas. These plumes do not intercept sensitive receptor areas.

Further, emissions to air during the operation of a facility of this project are generally limited to fugitive dust and combustion-related emissions. Long term average levels of oxides of nitrogen resulting from combustion emissions at the Bushveld Vametco Alloy (BVA) plant are likely to have minimal effects on the surrounding area, not significantly impacting the neighbouring residential areas.

Therefore, the overall impact on the air quality because the project will not be cumulatively considerable and will be less than significant if the sound implementation of mitigation measures identified for reducing emissions are implemented. If emissions are kept below the relevant threshold levels by ensuring the management and mitigation measures prescribed adhere to there is no significant cumulative impacts expected as the air quality impacts will be limited to the site level.

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Air Quality	No	Negative	3 (Regional)	5 (Permanent)	6 (Moderate)	3 (Medium)	42 (Medium)
	Yes	Negative	2 (Local)	4 (Long Term)	4 (Low)	2 (Low)	20 (Low)
Corrective Actions	<ul style="list-style-type: none"> <li>Revegetation of exposed areas for long-term dust and water erosion control is commonly used and is the most cost-effective option.</li> <li>Plants with roots that bind the soil and vegetation cover should be used that breaks the impact of falling raindrops, thus preventing wind and water erosion.</li> <li>Hard surfaced haul roads or standing areas to be washed down and swept to remove accumulated dust.</li> <li>Dust suppression of roads being used during rehabilitation should be enforced.</li> <li>It is recommended that the rehabilitation by vegetating should begin during the operational phase already as the objective is to minimise the erosion.</li> <li>Leaving the surface of soil in a coarse condition reduces wind erosion and ultimately reduces dust levels.</li> <li>Additional mitigation measures include keeping soil moist using sprays or water tanks, using windbreaks.</li> </ul>						

**12 WHERE APPLICABLE, A SUMMARY OF THE FINDINGS AND RECOMMENDATIONS OF ANY SPECIALIST REPORT COMPLYING WITH APPENDIX 6 TO THESE REGULATIONS AND AN INDICATION AS TO HOW THESE FINDINGS AND RECOMMENDATIONS HAVE BEEN INCLUDED IN THE FINAL ASSESSMENT REPORT.**

Twelve (12) specialist studies were undertaken during the EIA process and are listed in Table 29 below. In addition to the ones undertaken during the Scoping phase, the Climate Change Impact study was undertaken during the EIA phase.

**Table 28 List of Specialist Studies undertaken**

Specialist Study	Company	Name of Specialist
Air quality Impact Assessment	Kijani Green Energy	Simon Gear
Heritage Impact Assessment	Farisani Investment T/A Archaeo-Ages Consulting	Moses Mabuda
Noise Impact Assessment	dB Acoustics	Barend Jacobus van der Merwe
Socio-economic Impact Assessment	NGT Holdings	Nkosinathi Thomose
Soil, Land use and Capability	Scientific Aquatic Services	Braveman Mzila
Traffic Impact Assessment	Eco Elementum	Pieter Jooste
Visual Impact Assessment	Outline Landscape	Kathrin Hamelouw
Wetland Impact Assessment	WaterMakers	Willem Lubbe
Biodiversity Impact Assessment	Scientific Aquatic Services	Chris Hooton
Hydrological Impact Assessment	CM Electric	Chenai Makamure
Geohydrological Impact Assessment	MWEM	Golden Manganyi
Climate change	EHRCON	Jeandré Neveling

Input from specialist have been considered throughout the compilation, and it is the same information that was referenced during the elimination of alternatives. Further, the findings of specialist studies undertaken are summarized in Section 9 and 14, and impacts assessed are included in Section 11 above.

**13 AN ENVIRONMENTAL IMPACT STATEMENT WHICH CONTAINS—**

**13.1.1 A SUMMARY OF THE KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT**

Potential environmental impacts identified during the EIA phase are described in Table 21 above, and it is not an exhaustive list but an insight into the potential impacts associated with the proposed project.

Further, the potential impacts associated with the proposed project also include impacts on:

- Biodiversity (flora and fauna);
- Soil, land use and land capability;
- Heritage;
- Agriculture;
- Wetland;
- Hydrogeology;
- Hydrology;
- Traffic;
- Air quality;
- Socio-economic;
- Visual impacts;
- Topographical changes;
- Geological changes;
- Climate Change Impact; and
- Geohydrology.

**13.1.2 A MAP AT AN APPROPRIATE SCALE WHICH SUPERIMPOSES THE PROPOSED ACTIVITY AND ITS ASSOCIATED STRUCTURES AND INFRASTRUCTURE ON THE ENVIRONMENTAL SENSITIVITIES OF THE PREFERRED DEVELOPMENT FOOTPRINT ON THE APPROVED SITE AS CONTEMPLATED IN THE ACCEPTED SCOPING REPORT INDICATING ANY AREAS THAT SHOULD BE AVOIDED, INCLUDING BUFFERS**

The maps below show the proposed activities and their associated structures and infrastructure on the environmental sensitivities of the proposed study area, as contemplated in the accepted Scoping Report. The Maps at an appropriate scale with all the proposed activities on environmental sensitivities are attached as **Appendix A**.

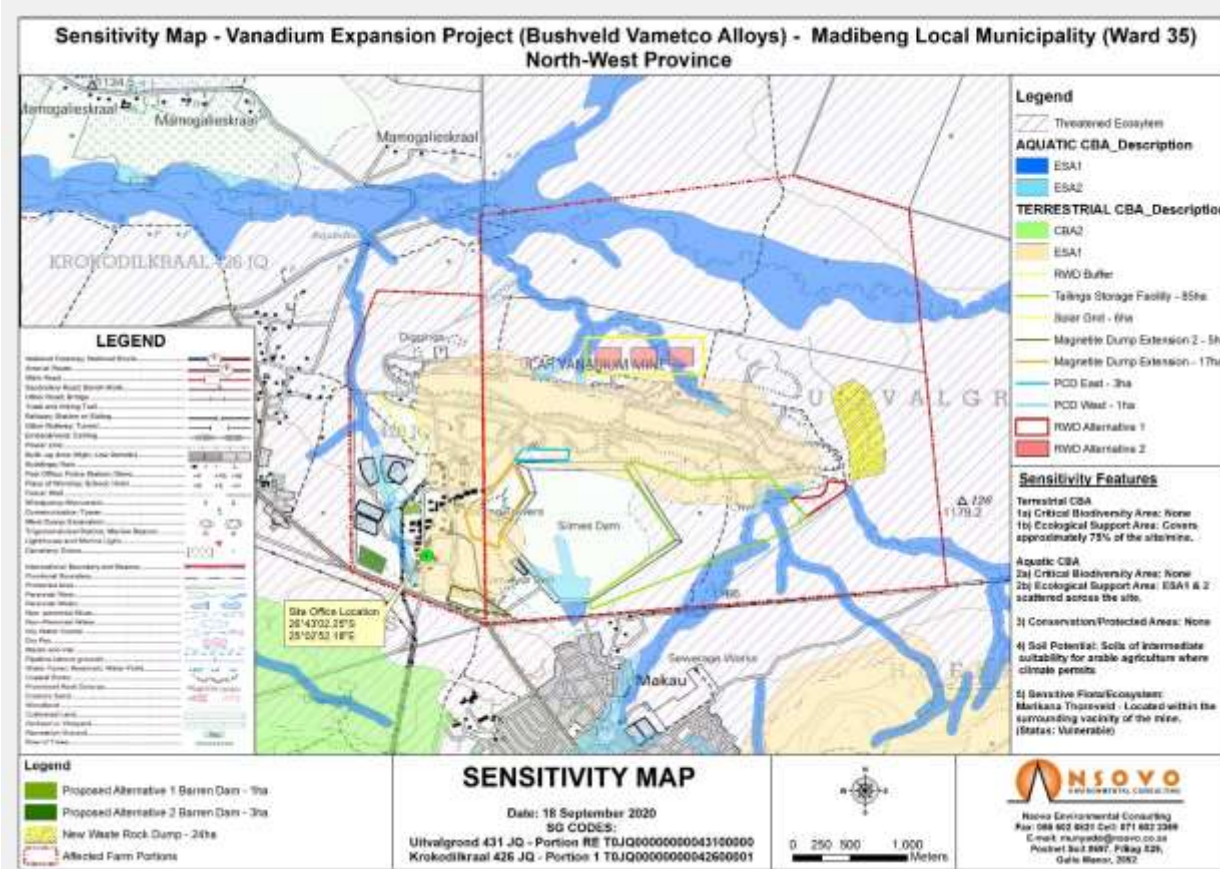


Figure 21: Proposed activities on environmental sensitivity area

### 13.1.3 A SUMMARY OF THE POSITIVE AND NEGATIVE IMPACTS AND RISKS OF THE PROPOSED ACTIVITY AND IDENTIFIED ALTERNATIVES

A summary of the positive and negative impacts and risks of the proposed activities is provided in Section 9.7 of this EIA report.

#### 14 BASED ON THE ASSESSMENT, AND WHERE APPLICABLE, RECOMMENDATIONS FROM SPECIALIST REPORTS, THE RECORDING OF PROPOSED (IMPACT MANAGEMENT OUTCOMES FOR THE DEVELOPMENT FOR INCLUSION IN THE EMPR AS WELL AS FOR INCLUSION AS CONDITIONS OF AUTHORISATION

Table 24 below presents the recommendations from the applicable specialist's inputs associated with the proposed project as follows:

**Table 29: The summary of the specialist impact management outcome and recommendation**

Recommendations by specialists	
Specialist	Recommendation
Soil Land Use and Land Capability	<p>The proposed development is anticipated to have the following impacts:</p> <ul style="list-style-type: none"> <li>• Soil erosion,</li> <li>• Compaction of soil,</li> <li>• Dust emission,</li> <li>• Potential soil contamination; and</li> <li>• Loss of agricultural land capability.</li> </ul> <p>These impacts may persist for the duration of the operational phase if not mitigated adequately. The extension of the existing TSF and development of the new Return Water Dam (RWD) will result in a loss of soils only suitable for grazing. Soil compaction is expected to be severe without mitigation measures in place due to the physical composition of Vertic soils as they contain high content of expanding clay (smectite group) minerals. The potential loss of land capability is anticipated to be relatively low considering the dominant soil forms occurring within the study area due to the marginal agricultural potential of these soils.</p> <p>The overall impacts mentioned above are expected to be moderate without mitigation and low with mitigations measures. The implementation of the site-specific mitigation measures will reduce the overall impacts to acceptable levels from a land use and land capability point of view.</p>

	<p>Following the assessment of the study area and the identified potential impacts, the following is recommended:</p> <ul style="list-style-type: none"> <li>• Any disturbance of high potential agricultural soils must be actively avoided, should this be not feasible, the footprint of the proposed mining areas should be demarcated to restrict the planned activities within infrastructure footprint as far as possible, thus minimising edge effects and reducing the extent and overall significance of impact;</li> <li>• An adequate stormwater management plan must be carefully designed and implemented to avoid topsoil erosion on adjacent arable soils throughout all the mining phases.</li> <li>• All vehicular traffic should be restricted to the existing roads and the selected road servitude as far as practically possible; to avoid unnecessary compaction of the surrounding soils;</li> <li>• Compaction of soil can be mitigated by ripping the footprint and introducing both organic and inorganic fertilizers.</li> <li>• Mining vehicles/equipment should be regularly checked for leakages to avoid soil contamination by hydrocarbons.</li> </ul>
<p>Visual Impact assessment</p>	<p>Most of the study area is considered to have moderate to low landscape character sensitivity due to the most developed landscape, environmental degradation and the minimal pristine condition of the landscape, the moderate visual quality and minimal tourism value. o a certain extent, the proposed activities will change the visual character of the site, thus having a visual impact on the surrounding communities. However, the mitigation measures and recommendations are proposed to reduce or alleviate the intrusive contrast between the proposed project components and activities and the receiving landscape to a point where it is acceptable to visual and landscape receptors. The following are the recommendations and mitigation measures associated with identified impacts. Rehabilitate disturbed areas around pylons as soon as practically possible after construction to restrict extended periods of exposed soil.</p> <ul style="list-style-type: none"> <li>• Trees must be planted in areas where the proposed magnetite dump is most visible to reduce the receptors' visual impact. Locate access routes to limit modification to the topography and to avoid the removal of established vegetation.</li> <li>• Utilise existing screening features such as dense vegetation stands or topographical features to place the construction camps and lay-down yards out of the view of sensitivity visual receptors.</li> </ul>

<p>Wetland Impact Assessment</p>	<p>The impact assessment identified the destruction of wetland habitat, surface water pollution, including sedimentation as well as increased erosion, loss of wetland and riparian functionality and decreased downstream water quality as the primary impacts during the construction and operational phase.</p> <p>Several general and specific mitigation measures are proposed to reduce negative impacts and incorporate some potentially positive impacts of the proposed development. Some of the most pertinent recommendations include:</p> <ul style="list-style-type: none"> <li>• Care must be taken on the eastern periphery where the existing clean water diversion channel is situated within the proposed footprint of the new Waste Rock Dump.</li> <li>• The existing clean water diversion channel must be redirected west of the proposed new waste rock dump.</li> <li>• Alternatively, if contours permit, the clean water diversion channel could also be re-routed around the eastern periphery of the proposed Waster Rock Dump.</li> <li>• Further, a diffuse release gabion channel must be constructed on contour on the downstream end of the clean water diversion channel to ensure that channelisation of the valley bottom wetland (HGM 1) is not promoted.</li> <li>• Some soft channel rehabilitation intervention is also recommended just downstream from the release point as part of the installation of the diffuse release channel.</li> <li>• The clean and dirty water separation infrastructure should be audited by a surface hydrologist to ensure that adequate clean and dirty separation infrastructure is in place for the mining complex.</li> <li>• An appropriate wetland and riparian monitoring program must be implemented prior to the start of the construction phase (<b>Refer Appendix C1 for Wetland Impact Assessment Report</b>).</li> </ul>
<p>Heritage</p>	<p>A graveyard has been recorded near the proposed site and is used by the Rankotea community. The identified cemetery has approximately 1200 graves and is not directly affected by the proposed mining expansion project. Further, the graves are marked and well maintained by both the community and the mine. However, approximately 30 formal graves with tombstones were recorded at the site proposed for the tailings dam. These</p>

	<p>graves will be directly affected by the proposed development (both expansion and the new Return Water Dam). The Heritage Impact Assessment Study assessed the project footprint in relation to the proposed development and rated it medium to high in terms of cultural heritage significance.</p> <p>The following recommendations must be adhered to:</p> <ul style="list-style-type: none"> <li>• An estimated 30 historical graves must be exhumed and relocated to another formal graveyard.</li> <li>• The identified historical building be conserved by the form of documentation before it is destroyed</li> <li>• A historical building destruction permit must be acquired from SAHRA before a building/ruins are destroyed.</li> <li>• If previously unknown human remains are accidentally uncovered during development, then work on the affected section and the immediate vicinity should be halted and the finds protected and reported to SAHRA. <b>(Refer Appendix C2 for Heritage Impact Assessment Report)</b></li> </ul> <p>Overall, impacts to heritage resources are not considered to be adverse to warrant abandonment of the proposed project provided the proposed mitigation is adhered to. It is thus concluded that the project may be cleared to proceed as planned subject to the Heritage Authority ensuring that a detailed heritage monitoring procedure is included in the project EMP, for the construction phase.</p>
Traffic	<p>The specialist highlighted that based on traffic impact assessment, the proposed development might increase in the volumes of traffic during both construction and operation phases. However, this impact will be concentrated locally and the traffic influence outside the boundaries of the study area would be insignificant. The following is recommended to ensure proper management of traffic in the area:</p> <ul style="list-style-type: none"> <li>• All legal authorisations and permits must be obtained for the transportation of abnormal loads and hazardous materials on public roads;</li> <li>• Measures should be taken to ensure that all health and safety requirements regarding transportation activities are complied with. This may include dust covers for hauling vehicles and dust control on all gravel roads;</li> <li>• It is proposed that flagmen and temporary warning signs be placed at all access points where heavy vehicles will access public roads during construction, and</li> <li>• Controls should be in place to ensure that vehicles exiting the site are not overloaded.</li> </ul>



Air quality	<p>The Air Quality Assessment has been conducted in the area and identified the dust emissions and fugitive dust impacts associated with increased traffic during construction, operation, and decommissioning phases of the proposed development. The following mitigation measures are recommended to manage air quality impacts in the area.</p> <ul style="list-style-type: none"> <li>• Traffic speed control and dust suppression on the roads to minimize dust impacts;</li> <li>• Minimise materials handling (operational efficiency);</li> <li>• Encourage re-vegetation on the TSF, magnetite and waste rock dumps;</li> <li>• Windbreaks upwind of dumps;</li> <li>• Cover fine material; and</li> <li>• Speed control on the haul road.</li> </ul>
Noise	<p>The Noise Impact Assessment Study indicated that the following mining-related activities will create a noise increase in the immediate vicinity of the mining activities permanently:</p> <ul style="list-style-type: none"> <li>• Activities at the waste rock dump (hauling and tipping of waste rock), an extension of the TSF (pumps), return water dam or stormwater (pumps) and at the pollution control dam (pumps).</li> <li>• Additional processing plant activities;</li> <li>• Crushing activities;</li> <li>• Hauling of material from abroad to the mine;</li> </ul> <p>However, the potential environmental noise impact will be low during the construction and decommissioning phases and moderate during the operational phase. The implementation of noise mitigatory measures will ensure that the impact will change from moderate to low. The following are the recommendations for impacts associated with noise in the area:</p> <ul style="list-style-type: none"> <li>• Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels and any noise sources above 85.0dBA to be acoustically screened off.</li> <li>• Construction activities to take place during daytime period only.</li> <li>• Blasting to be done during daytime and to use the safe blasting techniques.</li> </ul>

	<ul style="list-style-type: none"> <li>• Environmental noise monitoring on a quarterly basis.</li> <li>• Emergency generators to be placed in such a manner that it is away from any residential area.</li> <li>• Noise monitoring at the residential areas and the mine boundaries to be done on a quarterly basis for a year after which the frequency may change to an annual basis.</li> <li>• Actively manage the process and the noise management plan must be used to ensure compliance to the noise regulations and/or standards. The levels to be evaluated in terms of the baseline noise levels.</li> </ul>
<p>Biodiversity</p>	<p>Based on the biodiversity impact assessment, the impact on the floral ecology arising from the expansion activities will range from high to medium-low significance prior to the implementation of mitigation measures. With mitigation as stipulated in this report effectively implemented, all impacts can be reduced, ranging from moderately low to very low.</p> <p>Based on the faunal assessment, only common faunal species were observed at the time of the assessment, although several faunal SCC is expected to frequent the area for foraging purposes. The currently proposed expansion of TSF will result in the destruction of the associated Rocky Habitat unit which may be harbouring the reptile SCC <i>Python natalensis</i> (South African Python, LC). Additionally, the proposed TSF and RWD Alternative 1 Expansion Areas will likely cause the destruction of the associated Freshwater Habitat unit which may be providing habitat for amphibian SCC and foraging avifaunal SCC. Due to the extent of the proposed activities habitat fragmentation of the unfenced area is highly likely as the Degraded Marikana Thornveld acts as a migration corridor for faunal species.</p> <p>The following are the recommendations for the proposed project:</p> <ul style="list-style-type: none"> <li>• All areas of increased ecological sensitivity falling outside of the expansion activities footprints should be designated as No-Go areas and be off limits to all unauthorised construction vehicles and personnel,</li> <li>• No collection of floral SCC or medicinal floral species within the site boundary must be allowed by construction personnel; and –</li> </ul>

	<ul style="list-style-type: none"> <li>• Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC outside of the proposed expansion footprint area.</li> <li>• No additional habitat is to be disturbed during the operational phase of the mine as the material is deposited.</li> <li>• The Magnetite Dumps, TSF, PCDs, WRD, RWD and their expansion, should be restricted to the footprint area that is authorised.</li> <li>• Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities.</li> <li>• All construction related waste and material is to be disposed of at a registered waste facility and no waste of construction rubble is to be dumped in the surrounding natural habitats.</li> <li>• An Alien and Invasive Plant Management and Control Plan must be designed and implemented to monitor and control alien floral recruitment in disturbed areas.</li> </ul>
<p>Hydrology</p>	<p>The hydrological impact assessment identified the hydrological impacts associated with the proposed project and the mitigation measures or recommendations to manage and reduce the identified impacts. Some of the impacts include the following:</p> <ul style="list-style-type: none"> <li>• Reduction of the availability of surface water resources to downstream water users.</li> <li>• This is because of the changes in water quantity or flows regime into the Rosespruit because of the proposed activities.</li> <li>• The deterioration of Rosespruit and tributaries water quality.</li> </ul> <p>The mitigation measures include the following:</p> <ul style="list-style-type: none"> <li>• Adequate stormwater management must be incorporated into the design of the proposed development to prevent erosion through the discharge of dirty water into the watercourse.</li> <li>• Sheet runoff from cleared areas, paved surfaces and access roads need to be curtailed.</li> <li>• Runoff from paved surfaces should be slowed down by the strategic placement of bioswales.</li> <li>• The footprint areas of all surface infrastructure must be minimised to what is essential and within the designated and approved development footprint.</li> </ul> <p>Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities.</p>

Climate Change	<p>Mitigation will not alter the impacts of GHG emissions in terms of the extent, duration or probability of the project impact, the intensity of the impact can be reduced, notably by reducing the quantity of GHG emissions. There are many ways to reduce GHG emissions from mining activities, which include basic mitigation strategies to specific tactics and actions. Basic mitigation strategies include:</p> <ul style="list-style-type: none"> <li>• Optimisation of operational activities and logistics.</li> <li>• Implementation of a fuel management strategy, which encourages more efficient use of plant and vehicles, planning, logistics, driver education, and maintenance.</li> <li>• Reduction in the amount of waste disposed to landfill and reuse of waste, which will subsequently reduce the number of vehicle movements and fuel usage.</li> <li>• Procurement of generators, which use biodiesel.</li> <li>• Exploring alternative energy possibilities.</li> <li>• Regular monitoring of fuel and energy.</li> <li>• Identification of significant energy-consuming equipment and recognising opportunities where technical efficiencies in plant and equipment can be applied.</li> </ul>
Hydrogeological Investigation	<p>The summary of the finding associated with the hydrogeological issues are presented as follows:</p> <ul style="list-style-type: none"> <li>• The area is characterised by Gabbro and Norite rocks of the Upper Zone of the Rustenburg Layered Suite.</li> <li>• The aquifer system in the study area can be classified as a Minor Aquifer. Therefore, a moderate level of protection is required to reduce degradation of the aquifer.</li> <li>• The groundwater flow direction emulated the topography, flowing in a westerly direction in the western part of the study area. Groundwater is mainly used for domestic and stock watering purposes use in the area as deduced from the hydro census.</li> <li>• The level of groundwater protection based on the Groundwater Quality Management Classification is considered medium.</li> <li>• The hydrogeological impacts associated with the proposed expansion activities are considered medium to low based on the risk assessment.</li> </ul>

The following important recommendation should be followed:

- Groundwater level and quality should be monitored to be able to trace and measure possible contaminants and negative lowering of the groundwater levels that may emanate from the proposed construction activities.
- To ensure that groundwater is protected and to trace possible contaminant it is also recommended that groundwater quality should be conducted quarterly. Monitoring should be able to cover both wet and dry season, it is important to note that a groundwater monitoring network should also be dynamic.
- Additional Groundwater monitoring boreholes around the developments to monitor both up and downgradient groundwater quality and levels.
- Groundwater monitoring should be in accordance with the applicable WUL issued to Vametco.
- A numerical groundwater model should be conducted to simulate hydrogeological impacts with plume delineation predictions associated with the planned expansion activities at Vametco.

## **15 THE FINAL PROPOSED ALTERNATIVES WHICH RESPOND TO THE IMPACT MANAGEMENT MEASURES, AVOIDANCE, AND MITIGATION MEASURES IDENTIFIED THROUGH THE ASSESSMENT**

### **15.1.1 LOCALITY ALTERNATIVE**

#### **15.1.1.1 RETURN WATER DAM ALTERNATIVES**

Two locations alternatives are under consideration, and this includes Alternative 1 which entails the development of one big RWD with an extent of 5ha and storage capacity of 225 000 m<sup>3</sup> and Alternative 2 entails the development of three return water dams which will require an extent of 9ha and a buffer of 12ha and storage capacity of 450 000 m<sup>3</sup>. Both alternatives have been assessed during the Scoping phase and sensitivities mapped out on the attached maps. Threatened Ecosystem (Marikana Thornveld) have been noted within the sites, although minimal. All the necessary specialists provided input that informed the comparative analysis of the two site alternatives.

Alternative 2 will require more clearance of vegetation compared to Alternative 1. In the future, open-pit mining will be expanded towards the proposed Alternative 2. As a result, only Alternative 1 is feasible and will be studied further and an informed decision taken.

#### **15.1.1.2 BARREN DAM ALTERNATIVES**

The development of the barren dam considered two site alternatives whereby Alternative 1 entails the developing a barren dam with an extent of 1ha, and storage capacity of 105 000m<sup>3</sup> and Alternative 2 entails the development of three will require an extended area of 3ha and storage capacity of 315 000m<sup>3</sup>. All the necessary specialists provided input that informed the comparative analysis of the two site alternatives. Alternative 1 does not fall cover within any Threatened Ecosystem (Marikana Thornveld), whereas Alternative 2 does. However, both alternatives are feasible and will be studied further and an informed decision taken.

### **15.1.2 NO-GO ALTERNATIVE**

The no-go option was assessed as an alternative, and this option aligns with maintaining the status quo. When assessed against the potential positive environmental as well as socio-economic impacts, the no-go option was an unviable option. The socioeconomic benefits, as well as the benefits to the physical environment because of the proposed activities during the operational phase, far outweigh the status quo.

## **16 ANY ASPECTS WHICH WERE CONDITIONAL TO THE FINDINGS OF THE ASSESSMENT EITHER BY THE EAP OR SPECIALIST WHICH ARE TO BE INCLUDED AS CONDITIONS OF AUTHORISATION**

None identified. The specialists have proposed recommendations that must form part of the authorisation and be adhered to by the applicant.

## **17 A DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE WHICH RELATE TO THE ASSESSMENT AND MITIGATION MEASURES PROPOSED**

### **17.1 ASSUMPTIONS AND LIMITATIONS**

It is assumed that the technical data supplied by the client was correct and valid at the time of the compilation of specialist studies and the draft EIR. Furthermore, it is assumed that the alternatives presented by the client are feasible.

### **17.2 PUBLIC PARTICIPATION PROCESS**

The Public Participation Process is undertaken in line with Chapter 6 of the 2014 EIA Regulations. The EAP will endeavour to reach all the stakeholders. During this process, it is likely that some I&APs may not be reached. However, the effort will be made to reach the stakeholders and I&APs through newspaper adverts, site notices and the Nsovo website.

The current COVID-19 situation in the country does affect public engagements as open public meetings, and open-days are either restricted or prohibited. The restrictions on print media does to a certain extent impact on the reach of reports to the general public.

### **17.3 LITERATURE REVIEWS IS VIEWED AS CORRECT**

The compilation of the reports is based on various literature reviews and specialist input viewed as correct at the time. However, it is acknowledged that there might be some gaps in knowledge regarding the literature reviewed, although concerted efforts were made to attain as much information as possible.

### **17.4 HERITAGE STUDY**

The Phase 1 HIA may have missed heritage resources in the project area, as some heritage structures may lie below the surface and may only be exposed once development commences. As such, a heritage chance-find procedure should be developed and implemented during the construction phase of the project.

## 17.5 VEGETATION ASSESSMENT

There is a key difference between the approach of the ecological consultant and that of the ecological researcher. In consultancy, judgements must be made and advice provided that is based on the best available evidence, combined with collective experience and professional opinion. The available evidence may not be especially good, potentially leading to over-simplification of ecological systems and responses, and do contain a degree of uncertainty.

## 18 A REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD OR SHOULD NOT BE AUTHORISED, AND IF THE OPINION IS THAT IT SHOULD BE AUTHORISED, ANY CONDITIONS THAT SHOULD BE MADE IN RESPECT OF THAT AUTHORISATION

### 18.1 REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD OR SHOULD NOT BE AUTHORIZED

The project should thus be authorized for the following reasons:

- The proposed slimes, magnetite and waste rock dumps expansion and development are a prerequisite for the operation of the mine, without which the mine will have major challenges in the management of slimes, magnetite, and waste rock wastes.
- The proposed construction of the RWD, PCDs and barren dam addresses several challenges that the mine was experiencing, including the containment of the contaminated water from the plant and magnetite dump. It also addresses the challenge of the containment of the barren and mother liquor solution as well as the stormwater in the vicinity of the mine.
- The proposed activities seek to ensure the least impacts of mining operations on the environment by adhering to the legislative and regulatory requirements as well as world best practices.
- The proposed activities will allow for the identified positive impacts to be realised at a local, regional, and national scale.
- It is acknowledged that the various phases of the proposed project will yield negative impacts on the environment; however, given the mitigation proposed, it can be confirmed that the identified socioeconomic benefits far outweigh the negative consequences identified.
- Given the current high regarding climate change and mining activities and the significant concerns that South Africa, together with the world, has, the proposed project did not take this for granted. Thus, the necessary assessment has been made, and mitigation measures are recommended. Therefore, climate change cannot be considered a fatal flaw.
- Considering the current state of the economy following the worldwide pandemic, i.e., COVID-19 and the adverse effects it has had on South Africa's economy, any activity that seeks to stimulate the economy and sustain jobs where possible must be encouraged.



The proposed project has considered all the requirements and followed the necessary processes to comply with the necessary regulations. It is therefore recommended that the Integrated Environmental Authorisation and Waste Management License in line with the requirements of the NEMA and NEM: WA be issued to the applicant.

## **18.2 IF THE OPINION IS THAT IT SHOULD BE AUTHORISED, ANY CONDITIONS THAT SHOULD BE MADE IN RESPECT OF THAT AUTHORISATION**

Given the comprehensiveness of the impact assessment undertaken to this end, it is recommended that the proposed project be authorised. The conditions that must be included in this Environmental Authorisation are as follows:

- All mitigation measures detailed in this report and the specialist studies must be implemented.
- The EMPr as contained within **Appendix G** must be used as a blueprint throughout all phases of the project.
- The Design of the magnetite dump must be in line with the Minimum Liner standards and approved by the Department of Human Settlement Water and Sanitation.
- An integrated Water Use license must be obtained from the Department of Human Settlement Water and Sanitation before commencement.
- The proposed facilities must be lined as per the recommendations made in the waste classification and as per the DHSWS minimum requirements.
- Ensure that all stockpiles (especially topsoil) are clearly demarcated and defined as no-go areas.
- An independent ECO must be appointed during construction to ensure environmental compliance monitoring and timeous reporting;
- The mine's internal Environmental officers must be conversant with best practices in line with rehabilitation during decommissioning and an audit is to be conducted during and after rehabilitation.
- If archaeological materials are unearthed, all development within a radius of at least 10m of such indicator should cease and the area is demarcated by a danger tape. Accordingly, a professional archaeologist or HRA officer must be contacted immediately.
- Avoid any disturbance to the areas demarcated as No-Go.
- In general, minimize clearing and operations in habitats with a high sensitivity rating and delineate and maintain a no-go buffer of at least 100m around such habitats.

## **19 WHERE THE PROPOSED ACTIVITY DOES NOT INCLUDE OPERATIONAL ASPECTS, THE PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED AND THE DATE ON WHICH THE ACTIVITY WILL BE CONCLUDED AND THE POST CONSTRUCTION MONITORING REQUIREMENTS FINALISED**

The proposed project includes the operational aspects of the magnetite, slimes, and waste rock dumps as well as the RWD and Barren Dam. It is expected that the activities will be expected to operate for the Life of Mine. Subsequently,

the authorisation is required for the Life of Mine. While the necessary resource monitoring will continue post-construction and post-operation.

## **20 AN UNDERTAKING UNDER OATH OR AFFIRMATION BY THE EAP IN RELATION TO THE FOLLOWING**

### **20.1 THE CORRECTNESS OF THE INFORMATION PROVIDED IN THE REPORTS**

In undertaking this project, the EAP has taken into consideration the requirements stipulated in the EIA 2014 Regulation as amended, as well as other relevant Acts and Regulations. Further, the EAP considered the information provided by the client as well as the specialist on the project as true and correct. Subsequently, in the compilation of the reports and consolidating information from other parties, the EAP confirms the correctness of the information provided in the report.

Furthermore, to allow comprehensiveness and increased accuracy in assessing the impacts of the proposed project on the environment, input was sought from the specialists in the various fields as indicated above. This report is a culmination of the EAP's independent opinion based on experience and expertise as well as input from specialists. The EAP confirms that specialist observations and recommendations have been comprehensively included in the Draft EIA Report where relevant and their reports attached accordingly. Should there be any form of misrepresentation, it was not intended.

### **20.2 THE INCLUSION OF COMMENTS AND INPUTS FROM STAKEHOLDERS AND I&APs**

The EIA process was undertaken in accordance with the requirements of the Regulations as highlighted above; further the process adhered fully to the principles of public participation, i.e., transparent and afforded a fair opportunity to stakeholders and I&APs to participate meaningfully.

Subsequently, the EAP confirms that comments and issues raised by both stakeholders and I&APs have been addressed fully and included in all communication to the Authorities. Further comments received from this draft Report will be addressed accordingly in the final submission.

### **20.3 ANY INFORMATION PROVIDED BY THE EAP TO INTERESTED AND AFFECTED PARTIES AND ANY RESPONSES BY THE EAP TO COMMENTS OR INPUTS MADE BY INTERESTED OR AFFECTED PARTIES**

Throughout the process, several notices and documentation were shared with stakeholders as well as I&APs. Further, several engagements both public and focus group meetings will be held to share information and address any concerns. The information and responses provided to these parties, either in writing or verbally, are confirmed to have been accurate and correct.

## **21 WHERE APPLICABLE, DETAILS OF ANY FINANCIAL PROVISION FOR THE REHABILITATION, CLOSURE, AND ONGOING POST DECOMMISSIONING MANAGEMENT OF NEGATIVE ENVIRONMENTAL IMPACTS**

The proposed new activities, i.e., the expansion of the existing TSF and magnetite dump as well as the development of the RWD, WRD and Barren Dam will add on to the current footprint and thus require that the necessary financial provisions for the Project to comply with GN R 1147. Therefore, the scope will be calculated according to the requirements encapsulated in the Financial Provision Regulations, 2015 (Government Notice Regulation [GN R] No. 1147), published under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) as amended, in Government Gazette 39425.

Vametco undertakes annual closure review and updates of its financial provisions in line with the requirements of the Regulation. Going forward the proposed activities will be incorporated, and provisions made accordingly. The 2020 Financial Provision is attached as **Appendix-G1**.

## **22 AN INDICATION OF ANY DEVIATION FROM THE APPROVED SCOPING REPORT, INCLUDING THE PLAN OF STUDY, INCLUDING—**

### **22.1 ANY DEVIATION FROM THE METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS**

The Methodology used in determining the significance of the identified potential impacts is as proposed in the approved Scoping and Plan of study for EIA; therefore, no deviation in this regard.

## **23 ANY SPECIFIC INFORMATION THAT MAY BE REQUIRED BY THE COMPETENT AUTHORITY.**

The Scoping Report was accepted by the DMRE with conditions on the 18<sup>th</sup> of February 2021. The conditions are included hereunder and addressed accordingly in the EIR and EMPR. The conditions are included verbatim as follows:

The conditions as per Regulation 22 (a) of the Environmental Impact Assessment Regulations which are as follows:

- a) The Environmental Impact Assessment Report (EIAR) and Environmental Management Program (EMPr) including specialist report must be subjected to a public participation process of at least 30 days. The said EIAR and EMPr must reflect and incorporate any comments and concerns raised by the interested and affected parties. The report must be submitted within 106 days from the date of this letter. Furthermore, all comments and recommendations made by stakeholders including all relevant authorities and interested and affected parties (I&AP) as part of the SR must be taken into consideration when preparing the EIAR.

- b) A detailed and complete EIA must be submitted with the EMP. This EMP must not just provide recommendation, suggestions or statements but must indicate actual remedial measures/activities and clear commitments which will be binding to the holder should the EA be issued.
- c) The closure objectives must be clearly outline and must be in line with the principles of sustainable development and environmental practises.
- d) The EMP must be consulted with every organ of state that administers a law relating to matters affecting the environment as stipulated on Regulation 7 (2) of NEMA: EIA Regulation 2014 and submit proof and comments thereof.

The aforementioned comments have been addressed as part of the Draft EIA and will further be addressed in the Final.

## **24 ANY OTHER MATTERS REQUIRED IN TERMS OF SECTION 24(4) (A) AND (B) OF THE ACT.**

This Report has been prepared in terms of NEMA, its respective 2014 EIA Regulations as amended, and other various Acts. Information that the NEMA requires is included in the draft EIA and will also be included in the final EIR.

## **25 FATAL FLAWS**

No fatal flaws or highly significant impacts were identified during the EIA phase that would necessitate substantial redesign or termination of the project. Potential negative impacts have been identified and where the impacts were detrimental to the environment, alternatives were proposed together with mitigation measures. Further the heritage specialist identified that will be relocated with proper consultation and as per the requirements of the legislation.

## **26 CONCLUSION AND RECOMMENDATIONS**

The Draft EIA phase is being undertaken in accordance with the requirements of the NEMA and the EIA Regulations as well as associated legislations. This report includes the specialist input and has comprehensively identified the impacts of each proposed activity and provided mitigation measures for the negative impacts.

Based on the studies undertaken and input from the specialists it can be concluded that the impacts associated with the construction and operation of the proposed project are expected to be of Medium to Low significance with the implementation of adequate mitigation measures. No environmental and social fatal flaws were identified to be associated with the proposed project.

The findings of the specialist studies undertaken as part of the EIA process concluded that:

- The impact associated with the proposed activities is expected to be of Medium to Low significance with the implementation of adequate mitigation measures.

- Two alternative sites for the barren dam and return water dam were assessed during this EIA phase. Based on input from the specialist, assessment of the site, comparative analysis of the alternatives, and many other factors highlighted above, all sites are feasible; however, Alternative 1 of both barren dam and RWD are the preferred sites.
- The other activities such as the expansion of the Tailings Storage Facility (TSF) and magnetite dump had no alternatives considered as they entail the expansion of the existing infrastructure.
- The identified graves within the proposed project area earmarked for the TSF will need to be relocated according to the requirements of the legislation before project commencement.

## 26.1 RECOMMENDATIONS

Based on the nature and extent of the proposed development, the local levels of disturbance predicted the expected benefits at a regional and national scale, the findings of the EIA and the understanding of the significance level of potential environmental and social impacts, it is the opinion of the EIA project team that the proposed project can proceed subject to the implementation of the mitigation measures detailed in Chapter 11 of this report and the EMPr.

Moreover, the following conditions must be included in the Environmental Authorisation to be issued by the DMRE:

- All mitigation measures detailed in this report and the specialist studies must be implemented.
- The EMPr, as contained within **Appendix G**, must be used as a blueprint throughout all phases of the project.
- The Design of the magnetite dump must be in line with the Minimum Liner Standards and approved by the DHSWS.
- An integrated Water Use license must be obtained from the DHSWS before commencement of the project.
- The proposed Bushveld Vametco mine expansion project must be in line with the environmental noise standards and guidelines and the Noise Impact Management Plan (NIMP). Further, the Noise Monitoring Plan (NMP) for the Bushveld Vametco mine must be adhered to.
- The clean and dirty water separation infrastructure should be audited by a surface water hydrologist to ensure that adequate clean and dirty separation infrastructure is in place for the mining complex.
- An appropriate Wetland and Riparian Monitoring Program must be implemented prior to the start of the construction phase.
- The identified graves within the proposed project area earmarked for the TSF will need to be relocated according to the requirements of the legislation before project commencement.
- Ensure that all stockpiles (especially topsoil) are clearly and permanently demarcated and located in defined no-go areas.
- Utilise existing screening features such as dense vegetation stands or topographical features to place the construction camps and lay-down yards out of the view of sensitivity visual receptors.
- Suitable wetland rehabilitation design and implementation must ensure that wetland functionality is restored.

- Emergency plans and infrastructure to deal with spillages (especially hydro-carbon spillages) must be in place, this should include mobile response units to deal with spillages in the field.
- A walled concrete platform, dedicated store with adequate flooring or bermed area should be used to accommodate chemicals such as fuel, oil, paint, herbicide, and insecticides, as appropriate, in well-ventilated areas.
- Storage of potentially hazardous materials should be above any 100-year flood line. These materials include fuel, oil, cement, bitumen etc.
- The mine's internal Environmental Officers must be conversant with best practices in line with rehabilitation during decommissioning, and audit are to be conducted during and after rehabilitation.
- Where mining infrastructure is required across natural watercourses, new stormwater infrastructures, such as pipes and culverts, could replace the hydraulic function currently offered by the natural watercourses. This infrastructure should be designed for both hydraulic performance and environmental functionality. A thorough assessment of the suitability of the new stormwater infrastructure must be made at the preliminary design stage.
- A GN 704 audit is to be conducted bi-annually to assist with compliance with the separation of clean and dirty water infrastructure unless otherwise, the frequency of the audit is determined by the existing Water Use Licence.
- If archaeological materials are unearthed, all development within a radius of at least 10 m of such indicator should cease, and the area must be demarcated by a danger tape. Accordingly, a professional archaeologist or SAHRA officer should be contacted immediately.
- Avoid any disturbance of the No-Go habitats, i.e., the rocky ledges south of the current mining plant.
- Minimize the physical destruction of any remaining primary vegetation, especially in or near wetland areas.
- Adequate stormwater control and management must be practised ensuring that contaminants are not introduced into water resources during the construction and operational phases of the proposed project.
- The Applicant must report any water pollution incidents originating from the proposed project to the Provincial Office of DHSWS within 24 hours.
- In general, minimize clearing and operations in habitats with a high sensitivity rating and delineate and maintain a No-Go buffer of at least 100m around such habitats.

In addition, this Draft EIA Report will be made available to the I&APs, Stakeholders and Organs of State for a 30-day review period. All comments received will be included in the Final EIA Report and submitted to the DMRE for decision making.

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