Technical Memorandum

To:	Chané Coetzee	**From:**	Lisa Ramsay
Company:	**SLR Consulting (South Africa) Proprietary Limited**		
cc:		**Date:**	14 August 2023
		Project No.	710.09002.00025

RE: Specialist Air Quality Opinion – Marula PV Project

1. Project Description

1.1 Background

Marula Platinum (Pty) Ltd (Marula), an existing platinum producer and a subsidiary of Impala Platinum Holdings Limited, owns and operates the Marula Mine. The Marula Mine is situated along the R37, approximately 30 km to the northwest of the town Burgersfort and has been operational since 2001.

Marula now proposes to change their approved surface infrastructure layout through the establishment of a Solar Photovoltaic (PV) facility, with a generation capacity of up to 33 Megawatt (MW), within its existing Mining Right Area (MRA) for self-generation only (the solar PV facility is hereafter referred to as the proposed Project, or just the Project). The proposed solar PV facility will be connected through the expansion of the Marula Mine's existing transmission infrastructure and substation.

1.2 Study Site

1.2.1 Site Description

Marula Platinum (Pty) Ltd (Marula) operates the Marula Platinum Mine (Marula Mine) which is located in the Burgersfort Magisterial District and the Sekhukhune District Municipality of Limpopo, see Regional Setting (**Figure 1-1**) and local setting (**Figure 1-2**).

The Marula Mine Mining Right Area (MRA) is located on the following farm portions.

- Driekop 253 KT;
- Clapham 118 KT;
- Forest Hill 117KT and
- Winnarshoek 250 KT.

The PV facility will be located on the following farms:

- Driekop 253 KT; and
- Clapham 118 KT.

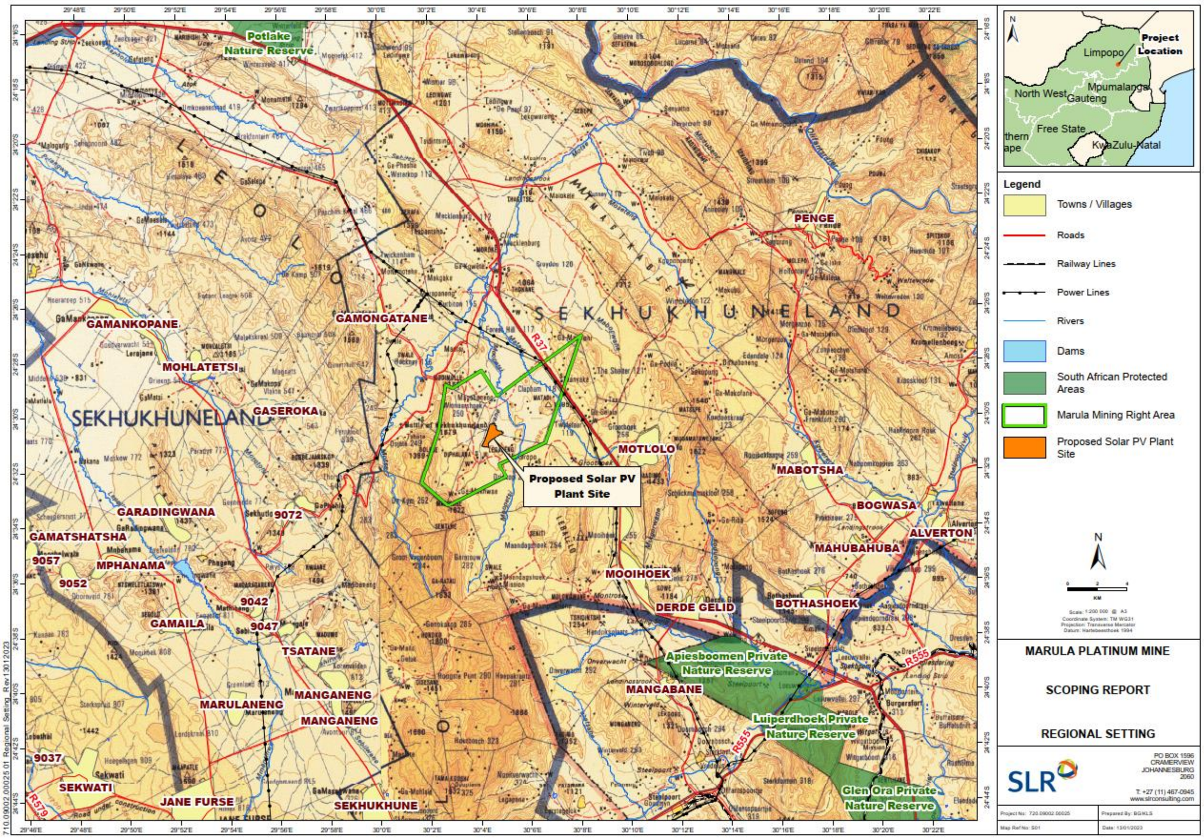

Figure 1-1: Regional setting

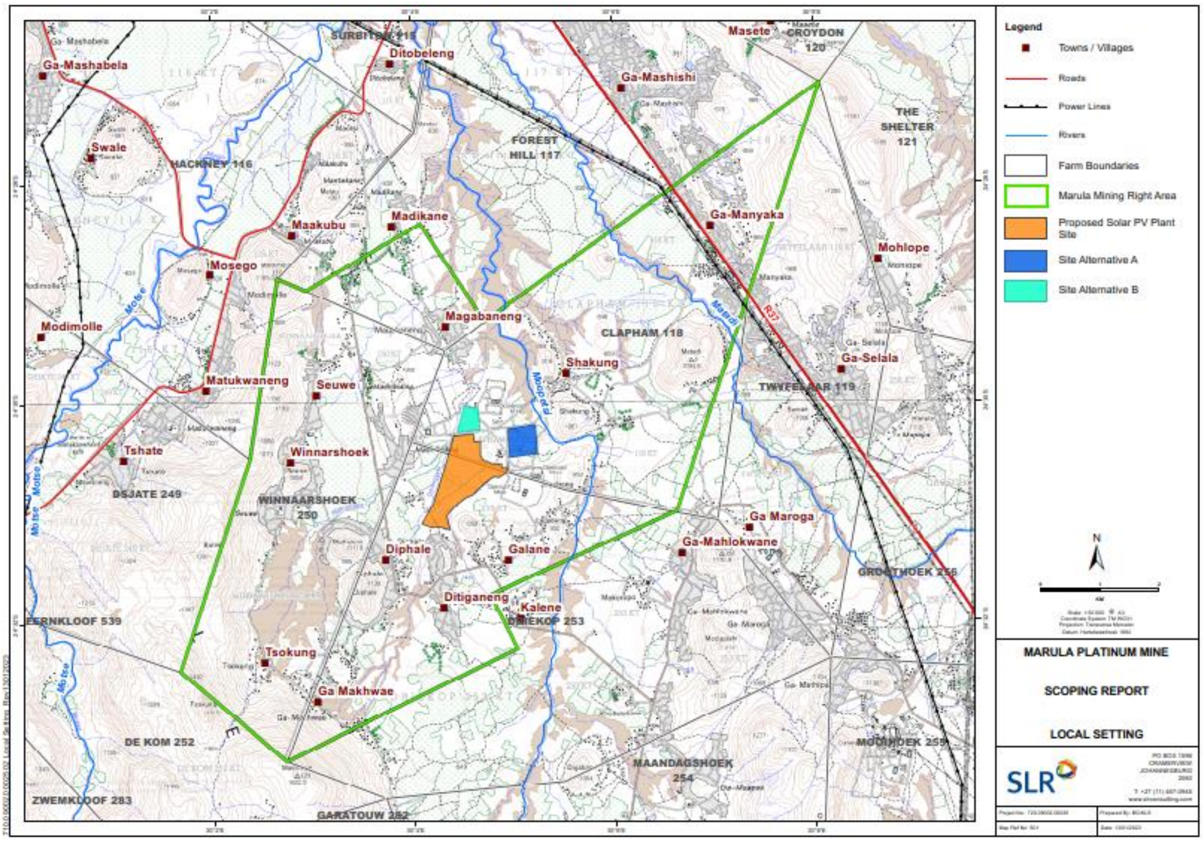

Figure 1-2: Local setting

1.2.2 Sensitive Receptors

Key towns and villages in the vicinity of the proposed project site include:

- Magabaneng to the north;
- Seuwe to the northwest;
- Winnarshoek to west;
- Diphale to the southwest;
- Ditiganeng to the south;
- Kalene to the south-southeast;
- Galane to the southeast;
- Ga Moroga and Ga-Mahlokwane to the east;
- Shakung to the northeast.

Schools near to the proposed project site include:

- Mohlahlamorudi High School to the southeast
- Magabaneng Primary School to the west
- Dihlabakela Secondary School to the northwest

1.2.3 Existing Sources of Air Pollution

1.2.3.1 Mining Emissions

The main emissions to air from mining operations consist of wind-borne dust (TSP, PM_{10} and $PM_{2.5}$) from mineral extraction, material handling, vehicle movement on unpaved surfaces, stockpiling, and processing activities (e.g. crushing) as well as vehicle exhaust emissions (i.e. predominantly gases) from mining equipment[1].

1.2.3.2 Agricultural Activities

Farming activities in the region include fruit (particularly citrus) farming in the Burgersfort Valley, potatoes, wheat, maize, cotton, soya beans and cattle. Cultivated and pastured land requires field preparation and management (i.e. tilling, harvesting, burning, etc.) while crop producers usually administer chemical treatments (i.e. pesticide, fertiliser, etc.). Wind erosion and crop burning result in significant PM and CO emissions while crop spraying is associated with gaseous emissions including NO_2, SO_2, and VOCs.

1.2.3.3 Domestic Fuel Burning

Many low-income and informal settlements are dependent on domestic fuels (i.e. wood, coal, paraffin, etc.) for cooking and heating purposes. Domestic fuels are often combusted indoors in small makeshift cook stoves. Poor combustion conditions result in high emissions into the home, which is usually insufficiently ventilated, preventing pollutants from escaping the living environment. Pollutants and emission rates depend on the type of fuel, fuel characteristics and efficiency of the combustion method. Typical emissions include NO_2, SO_2, CO, VOCs, PM, and H_2S.

Domestic fuel burning shows a characteristic diurnal and seasonal emissions signature. Periods of increased fuel burning, and subsequent emission release occur in the early morning and evening for space heating and cooking purposes.

Both formal and informal housing is noted throughout the region with high probability that some of these households rely on domestic fuels. This is particularly relevant in the mornings and evenings and especially during winter when the demand for space heating increases with decreasing temperatures and the increased likelihood of early morning inversion/fumigation conditions.

1.2.3.4 Veld Fires

As a significant source of gaseous and particulate matter emissions to the atmosphere, biomass burning is a persistent air quality concern in South Africa. In addition to natural fires, intentional fires are lit for the purposes of land management (cultivated land management, preventing bush encroachment, firebreaks, etc.). Pollutants associated with biomass burning include greenhouse gases, ozone (O_3), PM, CO, and VOCs[2]. Emission properties are a function of the burning process and biomass type. The combustion process for smouldering fires is less efficient resulting in an increase in the release of CO, whereas more complete combustion occurs with intense, flaming fires, releasing more CO_2.

Veld fire risk for the municipalities of South Africa has been estimated based on the prevailing vegetation type by Kruger *et al* (2006)[3]. Biomes categorised as high to extreme risk include

[1] NPI (2012): Emissions Estimation Technique Manual for Mining v3.1

[2] Department of Environmental Affairs (2016) *2nd South Africa Environment Outlook: A report on the State of the Environment – Chapter 10: Air Quality*. Pretoria

[3] Kruger, F.J., Forsyth, G.G., Kruger, L.M., Slater, K., Le Maitre, D.C. and Matshate, J. (2006): Classification of veld fire risk in South Africa for the administration of legislation regarding fire management. *Forest Ecology and Management* (Vol 234)

savanna, grassland and fynbos. The biome of Burgersfort is designated as savanna[4], and thus at risk of veld fires.

1.3 Key Project Components

The main components of solar PV technology to be utilised for this project include the following components:

1.3.1 PV Cell

The PV cell is the device that generates electricity when exposed to solar radiation. The absorbed solar energy excites the electrons inside the PV cell and produces electrical energy. PV cells produce direct current (DC). There are three main types of solar cells:

- Monocrystalline – made from a single silicon crystal.
- Polycrystalline – made from multiple silicon crystals.
- Thin film – common material used for thin film modules are Cadmium Telluride (CdTe) and Copper indium gallium selenide (CIGS).

1.3.2 PV module

The PV module is the set of interconnected PV cells encapsulated between a transparent front (usually glass) and a backing support material of either laminate or glass then mounted in an aluminium frame, or frameless with durable tempered glass. The modules will appear dark blue or black and will be mounted in an aluminium frame or laminated between durable glass sheets. The modules are designed to absorb the solar radiation and hence are not susceptible to reflection or glinting. Newer modules can also absorb irradiation reflected off the ground via the back of the panel if the back of the panel is glass. This type of module technology is referred to as bi-facial modules which are produced by several panel suppliers and can be produced in either monocrystalline or polycrystalline form. The proposed solar PV facility will utilise monofacial or bifacial PV modules.

1.3.3 PV array

The PV array is the complete power generating plant consisting of multiple PV modules wired in series and in parallel. The PV modules will be connected by DC cables to combiner boxes mounted underneath the PV module mounting structures. Each combiner box will occupy an area of approximately one square metre. The power generated by many PV module strings is combined in the combiner box and transmitted via DC cables to an inverter and transformer enclosure.

1.3.4 Mounting structures

Multiple PV modules are bolted onto a mounting structure which tracks the sun's progress across the sky in an east to west direction.

1.3.5 Inverter

The inverter converts the DC to alternating current (AC). The inverter and transformer are anticipated to be housed within the same inverter station housing (typically an insulated, steel-framed 6 m shipping container, or small brick building). The transformers convert the low voltage AC from the inverter to medium voltage. The actual number of the required inverter stations for the proposed Project will be determined prior to the commencement of the construction phase of the project. The inverters will vary in size and frequency depending on

[4] South African National Biodiversity Institute (2004): *National Spatial Biodiversity Assessment*

technology. Inverter stations will be installed in between the PV panel rows, in a line inside the layout area at the end of each row, located on a concrete plinth.

1.3.6 Substation

The substation receives power from the inverters via underground cables and provides protection and control equipment required to safely manage the plant and to ensure grid code compliance regulations. The substation will consist of a building, outdoor electrical plant and equipment and the transformers.

1.3.7 Battery Energy Storage System

Although the BESS is currently not considered for the project a short description of the technology is presented here.

The BESS allows for the storage of surplus energy generated by the solar PV facility for later use. The BESS enables a balance between supply and demand of electricity during the day and uses the stored energy during peak demand periods, i.e., morning and evenings. Energy generated from the PV panel array is DC and converted to AC by the inverters and then transferred to the on-site substation where it is determined if the energy should be stored or evacuated. When the energy is required, it is evacuated into the grid network, and when it is not required, it is transferred to the BESS and stored for later use.

Parsons (2017)[5] outline various advanced battery systems, including lead and advanced lead-acid batteries, ultracapacitators, lithium-ion batteries, vanadium flow batteries, zinc bromine flow batteries, ion-chromium flow batteries, and sodium sulphur batteries. Ultracapacitators and lithium-ion batteries generally are limited by high production costs, while vanadium flow batteries, zinc bromine flow batteries, and ion-chromium flow batteries remain developing technologies. Sodium sulphur batteries require high operating temperatures (250-300ºC).

Should the Client consider BESS, and not select the lithium-ion option, we assume a lead-acid battery option will be selected. This is a mature battery technology with lower initial costs, albeit higher maintenance requirements than some of the alternatives. Our assessment thus consider both the lithium ion and lead-acid options.

1.3.8 Operations and Maintenance Buildings

Additional infrastructure is required to support the operations of a solar energy facility, and to provide services to personnel tasked with the operations and maintenance of a facility. Operations & Maintenance Buildings (O&M) typically include offices, an operational and control centre, workshop, warehouse, and ablution facilities.

1.3.9 Access Roads

An access road will be constructed for the provision of access from the existing road network to the Project site. The main access road will be approximately 6 m wide and 500 m in length. Within the Project site, internal access roads will be constructed to provide access to the PV panel array and other components of the solar PV facility. The internal roads will be approximately 4 m wide with a combined distance of 4,000 m.

1.4 Project Phases

The proposed Project will be carried out in the following phases:

- Development and Planning Phase

[5] Parsons (2017). South Africa Energy Storage Technology and Market Assessment, Job Number 640368, USTDA Activity Number 2015-11032A, Objective 4: Environmental Impact Assessment.

- Construction phase;
- Operational phase; and
- Decommissioning and closure phase.

Activities undertaken during each of the phases are described in the sections that follow.

1.4.1 Development and Planning Phase

During the development and planning phase of the proposed Project, Marula will assess the key parameters required for the construction and operation of the solar PV facility. This will include:

- A detailed layout of the proposed Project.
- Eskom grid connection requirements.
- Detailed geotechnical investigations of the project site.

During the development and planning phase of the proposed Project, the project will be adapted to meet regulatory requirements, time schedules and expectations of all relevant parties.

1.4.2 Construction Phase

The site preparation is expected to include the following:

- Clearance of vegetation in line with Marula's Biodiversity Management Plan.
- Removal of existing structures (if present).
- Establishment of a contractor's camp (for equipment, offices etc only).
- Installation of perimeter fencing and levelling of the site and preliminary earthworks.
- Stripping and stockpiling of soil resources in line with soil conservation procedure.
- Cleaning, grubbing and bulldozing activities.
- Establishing access and internal roads.
- Digging trenches and foundations.
- Establishing storm water controls (channels, berms) as per storm water management plan.

The construction phase will further include the following:

- Ramming or drilling of the mounting structure frames.
- Installation of the PV modules onto the frames.
- Installation of measuring equipment.
- Laying of cables between the module rows to the inverter stations.
- Optionally laying of gravel or aggregate from nearby quarries placed in the rows between the PV panel array for enhanced reflection onto the panels, assisting in vegetation control and drainage.
- Construction of foundations for the inverter stations and installation of the inverters.
- Should the Client consider BESS, BESS foundations and installation of the substation components and placement of BESS.
- Construction of operations and maintenance buildings.

- Undertaking of rehabilitation on cleared areas where required, and concurrent rehabilitation where necessary.
- Testing and commissioning.
- Removal of equipment and disassembly of construction camp.

1.4.3 Operational Phase

The operation phase of the proposed Project will comprise the following activities:

- Regular cleaning of the PV modules by trained personnel.
- Vegetation management under and around the PV modules to allow maintenance and operation at full capacity.
- Maintenance of all components including PV modules, mounting structures, trackers, inverters, substation transformers, BESS, and equipment.
- Office management and maintenance of operations and maintenance buildings.
- Supervision of the solar PV facility operations.
- Site security monitoring.

1.4.4 Decommissioning and Closure Phase

Marula is considering measures for structures to remain post-mining for use by communities. This will be considered and confirmed as part of the project.

2. Legal Framework

2.1 National Legislation

2.1.1 National Environmental Management Act (No. 107 of 1998) Section 28 – Duty of Care

The *Duty of Care* obligations set out in Section 28 of the National Environmental Management Act (Act 107 of 1998) (NEMA)[6] stipulates that "*every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment*".

As such, any person or organisation must undertake the following necessary measures, set out by NEMA, to minimise or contain atmospheric emissions:

a) Investigate, assess and evaluate the impact on the environment;

b) Inform and educate employees about environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment;

c) Cease, modify or control any act, activity or process causing the pollution or degradation;

d) Eliminate any source of the pollution or degradation; and

[6] Republic of South Africa (1998): National Environmental Management Act (No. R. 107 of 1998) Government Gazette, 27 November 1998 (No. 19519)

e) Remedy the effects of the pollution or degradation.

Failure to comply with the above conditions and / or directives is in breach of the *Duty of Care*, and the guilty party will be subject to the sanctions set out in section 28 of NEMA.

2.1.2 National Environmental Management Air Quality Act (No. 39 of 2004)

Air quality in South Africa is administered under the National Environmental Management: Air Quality Act (Act 39 of 2004) (NEM:AQA)[7]. The objectives of NEM:AQA are to:

- Protect the environment by providing reasonable measures for the protection and enhancement of air quality, the prevention of air pollution and ecological degradation, and securing ecologically sustainable development while promoting justifiable economic and social development; and
- Give effect, in terms of air quality, to the constitutional right "*to an environment that is not harmful to health and well-being*"[8].

Key air quality management functions of NEM:AQA include:

- The establishment of ambient air quality standards for commonly occurring pollutants that pose a threat to health and the environment;
- The declaration of priority areas where ambient air quality standards are being, or may be, exceeded;
- The listing of activities that result in atmospheric emissions and which have the potential to impact negatively on the environment and the licensing thereof through an Atmospheric Emissions License (AEL);
- Procedures to enforce Pollution Prevention Plans or Atmospheric Impact Reporting for the control and inventory of atmospheric pollutants of concern;
- Requirements for addressing dust and offensive odours;
- The development and implementation of Air Quality Management Plans (AQMP) at national, provincial, and municipal levels; and
- Provision for municipalities to make and administer by-laws pertaining to air quality management.

2.1.2.1 NEM:AQA Section 21 – Listing of Activities with Associated Minimum Emission Standards

Section 21 of NEM:AQA tasks the Minister of the National department responsible for environmental affairs with the responsibility of publishing a list of activities which result in atmospheric emissions, and which he/she reasonably believes have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions, or cultural heritage. All activities listed by Section 21 require an AEL. This list applies nationally and is enforced by district municipalities i.e. Sekhukhune District Municipality in this case.

[7] South Africa (2005): *National Environmental Management: Air Quality Act* (No. R. 39 of 2004) Government Gazette, 24 February 2005 (No. 27318)
[8] Republic of South Africa (1996): Constitution of the Republic of South Africa (No. 108 of 1996)

Listed activities and associated Minimum Emission Standards (MES) were published in Government Notice Regulation 893 of 2013[9]. The Project under assessment here does not trigger any of the published listed activities and therefore the facility does not require an AEL.

2.1.2.2 NEM:AQA Section 9 – National Ambient Air Quality Standards

Ambient air quality standards are defined as *"targets for air quality management which establish the permissible concentration of a particular substance in, or property of, discharges to air, based on what a particular receiving environment can tolerate without significant deterioration"*[10]. South Africa's National Ambient Air Quality Standards (NAAQS) were promulgated in 2009[11] and 2012[12] and regulate a range of pollutants deemed to be commonly occurring yet which pose a threat to human health and the environment. NAAQS regulated pollutants are presented in **Table 2-1**. Each pollutant has specific averaging periods, compliance timeframes, permissible frequencies of exceedance and recognised measurement reference methods.

Table 2-1: South African National Ambient Air Quality Standards

Pollutant	Averaging Period	Concentration ($\mu g/m^3$)	Permissible Frequency of Exceedance	Reference method
Sulphur dioxide (SO_2)	1-hour	350	88	ISO 6767
	24-hour	125	4	
	1-year	50	0	
Nitrogen dioxide (NO_2)	1-hour	200	88	ISO 7996
	1-year	40	0	
Particulate matter less than 10 microns (PM_{10})	24-hour	75	4	EN 12341
	1-year	40	0	
Particulate matter less than 2.5 microns ($PM_{2.5}$)	24-hour	60	4	EN 14907
		25 [(a)]	0	
	1-year	20	4	
		15 [(a)]	0	
Ozone (O_3)	8-hour (running)	120	11	SANS 13964
Benzene (C_6H_6)	1-year	5	0	EPA TO-14 or TO-17
Lead (Pb)	1-year	0.5	0	ISO 9855
Carbon monoxide (CO)	1-hour	30 000	88	ISO 4224
	8-hour (average)	10 000	11	
Notes: (a) - Effective date is 01 January 2030				

[9] Department of Environmental Affairs: (2013): List of Activities which result in Atmospheric Emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage (No. R. 893), Government Gazette, 22 November 2013, (No. 37054), as amended by GN 551 in 2015 and GN 1207 in 2018.

[10] Department of Environmental Affairs (2000): Integrated Pollution and Waste Management Policy for South Africa. Government Gazette (No. R227 of 2000), 17 March 2000 (No. 20978)

[11] Department of Environmental Affairs (2009): National Ambient Air Quality Standards. Government Gazette (No. R 1210 of 2009), 24 December 2009 (No. 32816)

[12] Department of Environmental Affairs (2012): National Ambient Air Quality Standard for Particulate Matter with Aerodynamic Diameter less than 2.5 Micro Metres ($PM_{2.5}$). Government Gazette (No. R 486 of 2012), 29 June 2012 (No. 35463)

2.1.2.3 NEM:AQA Section 32 – Control of Dust

The National Dust Control Regulations (NDCR)[13] defines 'dust' as *"any material composed of particles small enough to pass through a 1 mm screen…"* and 'dustfall' as *"the deposition of dust"*. The NDCR stipulates acceptable dust fallout (DFO) rates for both residential and non-residential areas. These dust fallout standards are presented in **Table 2-2**.

Table 2-2: Acceptable rates of dust fallout

Restriction	30-day average dust fallout rate (mg/m^2/day)	Permitted frequency of exceedance
Residential area	D < 600	Two within a year, not sequential months
Non-residential area	600 < D < 1,200	Two within a year, not sequential months

2.2 Local Regulations

Section 156(2) of the Constitution permits municipalities to administer by-laws for the effective administration of matters that it has the right to administer. The management of air pollution is listed as a matter in which local government has authority, and national or provincial government may not compromise or impede a municipality's right to exercise its power or perform its functions[14]. SLR is not aware of any local by-laws. A draft Fetakgomo Tubatse Local Municipality Air Quality Management By-law was identified, by a final version of this could not be sourced.

3. Impact Description

3.1 Pollutants Associated with the Project

3.1.1 Particulate Matter (PM)

Particulate matter (PM) is the key pollutant of concern during the construction phase of the project. PM refers to solid or liquid particles suspended in the air, varying in size from particles that are only visible under an electron microscope to soot or smoke particles that are visible to the human eye. PM contributes greatly to deteriorations in visibility, as well as posing major health risks, as small particles (PM_{10}) can penetrate deep into lungs (inhalable fraction), while even smaller particle sizes ($PM_{2.5}$) can enter the bloodstream via capillaries in the lungs (respirable fraction), with the potential to be laid down as plaques in the cardiovascular system or brain. Health effects include: respiratory disease, lung tissue damage, cardiovascular disease, cancer and premature death. Acidic particles may damage buildings, vegetation and acidify water sources.

Total suspended particulates (TSP) includes particles of aerodynamic diameter of 30 microns or less and is generally a nuisance as dust fallout. Dust fallout comprises of particulate matter with varying aerodynamic diameters and mass characteristics. Visible dust fallout typically has a high particle size and mass characteristic, and thus a localised impact due to the rapid gravity settling of the larger particles. Nuisance effects can be caused by particles of any size, though are generally associated with particles greater than 20 microns. Large dust particles fall out of the air relatively close to the source and form dust layers on furniture, motor vehicles, etc.

[13] Department of Environmental Affairs (2013): National Dust Control Regulations. Government Gazette (No. R 827), 01 November 2013 (No. 36974)

[14] Department of Environmental Affairs (2018): The 2017 National Framework for Air Quality Management in the Republic of South Africa (No.R.1144 of 2018) Government Gazette, 26 October 2018 (No. 41996).

3.1.2 Gaseous Emissions from Battery Energy Storage Systems

BESS loss of containment due to corrosion or fires, or during maintenance procedures poses risks to ambient air quality.

In the case of lithium-ion batteries, the following emissions are of concern[15]:

- When exposed to water (including humidity), lithium emits flammable gases;
- Most lithium-ion batteries contain organic electrolytes (e.g. lithium perchlorate, acetonitrile), that are combustible, with associated emissions;
- Additional heavy metals (such a cobalt and manganese) within the battery can be emitted to atmosphere under upset conditions (a containment breach or thermal runaway fire conditions)

In the case of lead-acid batteries, the following emissions are of concern[16]:

- Overcharging of lead-acid batteries can result in the emissions of hydrogen (H_2) and hydrogen sulphide (H_2S). H_2 does not have health implications, but has explosion risks. H_2S has a rotten egg smell. Concentrations of H_2S high enough to cause health impacts are not expected in the offsite ambient environment.
- Containment loss is the greatest concern relation to the storage of hazardous chemicals onsite, and is a particular concern with the lead-acid BESS since sulphuric acid is highlight corrosive:
  - Acute exposure to sulphuric acid fumes can cause irritation to eyes and the mucus membranes of the respiratory system;
  - Toxic fumes of molten lead. Ambient lead is regulated under the NAAQS (**Table 2-1**) due to well established health implications of chronic exposure;
- Fugitive emissions of other gases (e.g. H_2S and SO_x) pose further risks; and
- Depending on the metal alloy composition in lead-acid batteries, arsine (arsenic hydride, AsH_3) and stibine (antimony hydride, SbH_3) can also be emitted.

4. Potential Emissions During Project Phases

4.1 Development and Planning Phase

No significant project-related emissions are expected during this phase of the project beyond vehicle exhaust emissions associated with travel to view the proposed project site, and dust generated during geotechnical investigations of the project site, e.g. any drilling activity.

4.2 Construction Phase

The PM emissions associated with the construction will be of a temporary nature. Emission will vary from day to day depending on the phase of construction, the level of activity, and the prevailing meteorological conditions.

The following possible sources of PM emissions have been identified for the construction phase:

- Vehicle activities associated with the transport of equipment to the site;
- Preparation of the surface area prior to development; and

[15] *Ibid.*
[16] *Ibid.*

- The removal of construction equipment from site after the set-up of new infrastructure.

Vehicles travelling to and from the site will emit PM and gases, such as NO_2. Expected vehicle volumes, however, will not result in any significant impact on local air quality beyond the direct vicinity of key transport routes.

4.3 Operational Phase

If areas exposed during the construction phases are promptly revegetated, emissions during the operational phase of the facility are expected to be insignificant. Sources of potential emissions are:

Exposed areas: Areas left exposed after construction can results in emissions of PM particularly during periods of high wind speeds, or due to wheel entrainment of PM if vehicles travel over these areas.

Vehicular traffic: Vehicles travelling to and from the site will emit PM and gases. Expected vehicle volumes, however, will not result in any significant impact on local air quality beyond the direct vicinity of the main access road and access gate.

BESS: Refer to **Section 3.1.2**.

4.4 Decommissioning and Closure Phase

Marula is considering measures for structures to remain post-mining for use by communities. This will be considered and confirmed as part of the project. However, if existing structures are demolished, the following activities need to be considered:

- Breakdown of structures,
- Rubble removal;
- Filling and levelling;
- Topsoil replacement; and
- Land and waste piles prepared for revegetation.

Possible sources of particulate emissions during the closure and post-closure phase include:

- Smoothing of areas by bulldozer;
- Grading of sites;
- Transport and dumping of material for void filling;
- Infrastructure demolition;
- Infrastructure rubble piles;
- Transport and dumping of building rubble;
- Transport and dumping of topsoil; and
- Preparation of soil for revegetation – ploughing and addition of fertiliser, compost etc.

Decommissioning of BESS can also result in emissions to atmosphere due to containment issues (refer to **Section 3.1.2***).* As such, the decommissioned components should be removed from site as soon as possible and transferred to an appropriate recycling facility. While there are recycling options for lead-acid batteries in South Africa, opportunities for the recycling of lithium-ion batteries needs further investigation.

5. Conclusion

A regulatory assessment indicated no triggers of the listed activities (**Section 2.1.2.1**). As such, the facility does not require an AEL. Local existing air pollution sources include mining, agricultural activities, domestic fuel burning and veld fires. The key pollutant from the proposed site during the construction and decommissions phases would be PM. Other pollutants include gaseous emissions from vehicle exhausts and from any generators used onsite. Strict BESS management and maintenance procedures will ensure containment and prevent any significant air quality impacts. On decommissioning, the BESS should be promptly removed offsite in line with manufacturer guidance and taken to the nearest appropriate recycling facility. While there are recycling options for lead-acid batteries in South Africa, opportunities for the recycling of lithium ion batteries needs further investigation.

Air quality impacts specific to the Project are expected to be temporary (limited largely to the construction phase), and the need for a full Air Quality Impact Assessment (AQIA) comprising emissions inventory and dispersion modelling is not considered necessary. However, SLR recommends the follow:

- A full meteorological assessment to assess the likely dispersion of ambient dust from the construction operations;
- A full review of existing dust fallout monitoring reporting for the Marula Mine to contextualise cumulative ambient air quality impacts for local receptors; and
- The development of an Air Quality Management and Monitoring Plan for the various phases of the project to minimise any potential impacts and keep track of any emission fluctuations in time.

Regards,

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