

PROPOSED TSUMEB EXPANSION PROJECT

CONSOLIDATED ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Tsumeb, Oshikoto Region, Namibia

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ACRONYMS AND ABBREVIATIONS

Acronyms / Abbreviations	Definition
CLA	Contaminated Land Assessment
DPMT	Dundee Precious Metals Tsumeb
ECC	Environmental Clearance Certificate
ESMP	Environmental and Social Management Plan
ESIA	Environmental and Social Impact Assessment
HDPE	High Density Polyethylene
MET	Ministry of Environment and Tourism
MMP	Management and Mitigation Plan
PPE	Personal Protective Equipment
PM _{2.5}	Particulate matter 2.5 micrometre or less in diameter
PM ₁₀	Particulate matter 10 micrometre or less in diameter
SLR	SLR Environmental Consulting (Namibia)(Pty) Ltd
TCL	Tsumeb Corporation Limited

1 INTRODUCTION

Metals have been mined at the Dundee Precious Metals Tsumeb (DPMT) site for over a hundred years. Between 1961 and 1963, the original smelter was replaced with a new copper and lead smelter while an arsenic plant and a cadmium plant were also established for the processing of by-products originating from the smelting process. At the time, the combination of the copper and lead smelter with an arsenic and cadmium plant allowed for the interchange of intermediate products between the smelter lines and provided a suitable bleed for the arsenic and cadmium.

In mid-1998 Goldfields Namibia, the holding company of Tsumeb Corporation Limited (TCL) went into liquidation and the Tsumeb Smelter was shut down. In 2000, the former TCL assets were taken over by Ongopolo Mining and Processing Limited (OMPL) and the copper and arsenic plants were re-commissioned. The cadmium plant was decommissioned and no lead processing has taken place since re-commissioning. In July 2006 the assets of OMPL were sold to Weatherly Mining International who owned and operated the plant for four years before selling it to Dundee Precious Metals Inc. (DPM) in March 2010. The company now operates as Dundee Precious Metals Tsumeb Ltd, a wholly owned subsidiary of DPM that is listed on Canada's Toronto Stock Exchange. In terms of the sales agreement, DPMT is not considered liable for environmental contamination that took place prior to 2010. Studies are, however, underway in order to investigate the sources of historic and current contamination and to identify practicable remediation measures.

The smelter was constructed in the early 1960s to process concentrate from the Tsumeb copper mine and is one of only five commercial-scale smelters in Africa capable of processing concentrates with a high arsenic content. Currently, it receives copper concentrate from El Brocal (Peru), Chelopech (Bulgaria), Codelco (Chile), Armenia and Opuwo (Namibia) for processing in the smelter.

Following the purchase of the smelter complex in 2010, DPMT have undertaken a series of upgrades and improvement projects, including the following:

- Construction of a hazardous waste disposal site (2012);
- Addition of a second oxygen plant (2012);
- Improvement of the off-gas handling systems (2012-2013);
- Closure of the reverberatory furnace (2013);
- Addition of a 1,540 t/d sulphuric acid plant and associated acid storage and dispatch facilities (mid 2015);
- Addition of two new and larger Peirce-Smith converters (end 2015);
- A new effluent treatment plant; and
- Decommissioning of the arsenic plant (end of February 2017).

The Tsumeb Smelter now comprises one primary smelting furnace, the refurbished Ausmelt furnace. Blister copper is produced from the copper concentrate and delivered to refineries for final processing.

With additional custom concentrates available worldwide and areas for operational improvements identified, DPMT is now proposing to expand their current operations to increase concentrate processing capacity from approximately

240 000 to 370 000 tons per annum (tpa). The proposed expansion would be contained within the existing facility footprint and would include the following components:

- Upgrading of the existing Ausmelt feed and furnace;
- Installation of a rotary holding furnace (RHF);
- Implementation of slow cooling of the RHF and converter slag;
- Upgrading of the slag mill to improve copper recovery and handle the increased tonnage from slow cooled slags;
- Installation of an additional Peirce-Smith (PS) converter; and
- Additional related infrastructure improvements (power supply, etc.).

The new project components and associated service infrastructure is collectively referred to as the 'Tsumeb Smelter Upgrade and Optimisation Project'. New facilities will be designed, constructed, operated and maintained in line with good international practice.

DPMT currently holds an Environmental Clearance Certificate (ECC) in terms of the Environmental Management Act (No. 7 of 2007; EMA) for its operations at the Tsumeb Smelter. To allow for the proposed Upgrade and Optimisation Project, an amendment of the ECC and Environmental Management Plan (EMP) is required.

DPMT also holds various other ECCs and EMPs for different project components established after the original ECC for the Smelter operations was issued. As part of this Environmental and Social Impact Assessment (ESIA) Amendment process all of the commitments in the separate EMPs and additional measures related to the proposed new project components have been combined into this consolidated Environmental and Social Management Plan (ESMP) for all DPMT's facilities. As impacts and related management and mitigation measures will be considered cumulatively by DPMT, it is easier to manage the environmental and social aspects if consolidated into one document linked to DPMT's overarching Health, Safety and Environmental (HSE) Integrated Management System. DPMT wish to follow this consolidated approach. If approval is granted and an Amended ECC issued, it would then serve as a consolidated ECC for the entire DPMT Smelter complex and would supersede the previous ECCs. Refer to Section 3 for further information relating to previously issued ECCs.

This ESMP has been primarily compiled in order to amend the Environmental Clearance Certificate; however, as part of DPMT's corporate commitments, alignment with the European Bank for Reconstruction and Development's (EBRD) Performance Requirements has been sought as EBRD is an investor in DPM.

This document is a consolidated ESMP providing an update to the actions described in the initial approved EMP for smelter operations (Synergistics, 2011 and 2016 ECC renewal), as well as incorporating management actions listed in EMPs approved since 2011 for the following additional project components:

- Hazardous waste site (2012 and included in 2016 ECC renewal);

- Sulphuric acid plant (2013);
- Kliplime Quarry (2013);
- General waste site (2013 and included in 2016 ECC renewal);
- Sewerage system (2014); and
- 11kV power line (2014).

This ESMP includes a series of individual mitigation and management plans (MMPs) which are designed to meet legal requirements, avoid, minimise or manage the impacts associated with the construction of new components, operation, decommissioning and closure of the Tsumeb Smelter. The MMPs have been compiled based on a review of the findings and recommendations of the EMPs listed above, as well as those from the ESIA Amendment process for the Tsumeb Smelter Upgrade and Optimisation Project

DPMT's Integrated Health, Safety and Environmental (HSE) Management System is based on three ISO standards, namely: ISO 14001:2015, ISO 45001:2018 and ISO 9001:2015 and addresses the following key components:

- Scope
- Context of the Organisation
- Leadership
- Planning
- Support
- Operational Control
- Performance Evaluations; and
- Improvement

The Integrated system consists of a combination of elements/requirements from all three standards and aims at ensuring that all these requirements are complied with and that the overall HSE performance is improved. Environmental and social management forms a major component of the system and provisions have thus been made in the DPMT company structure to ensure that compliance issues and environmental and social performance are addressed. Current DPMT environmental and social functions/activities have been aligned with the requirements of the integrated structure. This integrated system is currently in the implementation phase.

This ESMP forms part of DPMT's overarching (HSE) Integrated Management System (Operational Control).

2 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

2.1 OVERARCHING REQUIREMENTS

To implement the ESMP, DPMT will comply with the following overarching requirements:

- Review, update and implement an appropriate integrated environmental and health and safety (EHS) management system in line with international standards. Ensure adequate resources are in place to implement and maintain the EHS.
- Formally adopt international standards where no appropriate Namibian standards exists, or where Namibian legislation is not deemed in line with best practice. This would apply to all environmental, social, safety and health aspects, across reasonable timelines. Formally establish targets (interim if needed) against which improvement, compliance / performance can be measured. The targets / standards should meet the objectives of the ESMP.
- Undertake ESIA processes in line with good international practice for all subsequent project components and activities that may trigger the need for ESIA's to be done.
- Ensure contractors and sub-contractors are made aware of the requirements of the ESMP, their responsibilities in terms of the ESMP and how to execute them. Contracts with contractors and sub-contractors would need to reflect these requirements.
- Ensure that all relevant permits, approvals etc. are in place for any activities specified in the ESMP (e.g. borehole drilling permits).
- Ensure that all conditions attached to ECCs, approvals and permits are met.
- Review and update Hazard / Aspect Identification and Risk Assessments for processes and plant areas on a regular basis (e.g. every 36 months, or when major changes are made), focusing on environmental and social aspects and risks. The assessment process should be used to prioritise risk areas and identify controls to avoid or reduce these risks, and should also inform updates to the ESMP. The risk assessment should also be used to inform gaps in information (e.g. unknown impacts / risks / levels) and determine studies / gap closing activities. Risk assessments shall be done in accordance with best international practice / standard methods. Risk assessments are to include any contractors working onsite, as and when they come onsite, whether permanent or temporary.
- Make area owners aware of the ESMP requirements within their area of responsibility, where actions relate to them and their personnel. This includes contractors. For this, DPMT needs to ensure all processes and areas are allocated to specific area owners.
- Ensure that adequate resources (i.e. personnel, equipment, funds) are available to execute the commitments in the ESMP within the associated timelines.

2.2 AIMS

The ESMP details the actions required to effectively implement the mitigation measures identified in the amended ESIA. These actions are required to minimise negative impacts and enhance positive impacts associated with the operations at the Tsumeb Smelter.

The ESMP sets out the commitments as required by Section 8(j) of the Environmental Management Act Regulations as governed by the Government of the Republic of Namibia's ministry of Environment and Tourism. Those requirements include the following:

- (j)(aa) information on any proposed management, mitigation, protection or remedial measures to be undertaken to address the effects on the environment that have been identified including objectives in respect of the rehabilitation of the environment and closure;*
- (bb) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of the activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and*
- (cc) a description of the manner in which the applicant intends to modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation remedy the cause of pollution or degradation and migration of pollutants.*

An ESMP is a living document and will be updated by DPMT or their consultant(s) and amended as new information (e.g. environmental and social data from ongoing studies), policies, authority guidelines and technologies develop. The ESMP will also be reviewed and updated, if required, based on the findings and recommendations of periodic internal and external audits and performance assessments (refer to Section 4 for audit frequencies). Should a listed activity(ies) as defined in the Environmental Impact Assessment Regulations: Environmental Management Act, 2007 (Government Gazette No. 4878) be triggered (as a result of future modifications/changes at the Smelter), this ESMP will be updated as a result of another ESIA process as stipulated in the Regulations.

2.3 OBJECTIVES

Objectives are given for each of the actions described in the ESMP. These relate directly to addressing the impacts identified in the EIA processes for the different components of the smelter operations.

2.4 MANAGEMENT ACTIONS

The various actions that need to be implemented in order to ensure that environmental and social objectives are met are described in the ESMP. Each action is given a reference number. The actions are measurable and therefore easy to monitor. Hence, compliance with the ESMP can be audited.

2.5 ROLES AND RESPONSIBILITIES

The ECC in terms of the Environmental Management Act (No. 7 of 2007; EMA) for DPMT's operations at the Tsumeb Smelter is a binding document between DPMT and the Government of Namibia. DPMT is responsible for adherence to the ESMP and for providing the funding for implementation of the management measures. The successful implementation of the ESMP is however dependent on clearly defined roles and responsibilities for each of the management actions given in the ESMP. Table 2-1 sets out the roles and responsibilities of parties for the implementation of the ESMP.

TABLE 2-1: ROLES AND RESPONSIBILITIES FOR IMPLEMENTATION OF THE ESMP

Roles	Responsibilities
Vice President / Managing Director:	Vice President / Managing Director of DPMT who takes overall responsibility for implementation of the ESMP.
DPMT Management:	DPMT staff responsible for overseeing implementation of ESMP in specific Smelter departments and lending support.
Site/Project Manager:	A representative of DPMT responsible for overseeing the day-to-day implementation of the new components construction project and the overall management of the site construction teams.
Environmental Manager:	A member of DPMT management responsible for providing support to the engineering and operations teams and other DPMT staff in terms of implementation of environmental and social management measures, as appropriate.
Utilities/Engineering Manager:	A DPMT Engineer responsible for quality control of new project component construction and ongoing monitoring of engineering operations.
Operations Director	A DPMT Engineer responsible for management and overseeing of all smelter operations.
Plant Manager:	A DPMT Engineer responsible for management of a specific smelter component, e.g. sulphuric acid plant, effluent treatment plant, etc. Responsible for implementation of the ESMP at a specific smelter component.
Environmental Consultant:	Independent consultants appointed by DPMT to audit the implementation and compliance with the ESMP.
Service Providers:	Companies/contractors awarded a contract by DPMT to undertake a component of the smelter optimisation project and ongoing maintenance of

<i>Roles</i>	<i>Responsibilities</i>
	project components. Responsible for adhering to DPMT policies, procedures and similar processes in place for environmental management and ESMP implementation.
Social Performance Department	The Social Performance Department is responsible for all community investment, liaison and social and communications aspects reflected in the ESMP

2.6 SCHEDULE

The schedule gives the timeframe in which the environmental and social management measures are to be implemented. The successful implementation of the action within the specified timeframes is to be monitored. Some of the timeframes are subject to ongoing feasibility studies and may be updated based on findings.

3 PERMITS AND CLEARANCES

DPMT require a number of approval/permits for their Smelter operations in Tsumeb. A list of the permits and ECCs currently held by DPMT is provided in Table 3-1. Additional required approval/permits that have been applied for and pending or must still be applied for are listed in Table 3-2.

TABLE 3-1: LIST OF PERMITS/ECCs HELD BY DPMT

Permit Name	Regulator	Period of validity
ECCs		
Smelter Operations	Ministry of Environment and Tourism	22 September 2019
Sewage Treatment Plant	Ministry of Environment and Tourism	27 June 2020
11kV Power Line	Ministry of Environment and Tourism	27 June 2020
Kliplime Quarry	Ministry of Environment and Tourism	15 March 2020
Sulphuric Acid Plant	Ministry of Environment and Tourism	31 May 2020
Permits/Registrations		
Occupational Health Clinic Certification	Ministry of Health and Social Services	20 May 2020
DPMT Guest House Certificate of Fitness/Registration (health, fire and business registrations)	Tsumeb Municipality	30 April 2020
Smelter Certificate of Fitness/Registration (health, fire and business registrations)	Tsumeb Municipality	30 April 2020
Information Centre Certificate of Fitness/Registration (health, fire and business registrations)	Tsumeb Municipality	30 April 2020
Radiation Source Registrations for XRF machines	National Radiation Protection Authority	Issued on 18 October 2016 with no set validity period
Radiation Source Licenses for XRF machines	National Radiation Protection Authority	18 October 2019
Radiation Sealed Source Registrations	National Radiation Protection Authority	Issued on 05 February 2014 with no set validity period
Radiation Sealed Source Licenses	National Radiation Protection Authority	19 March 2020
Borehole Drilling Permits	Ministry of Agriculture, Water and Forestry	04 July 2021 (permit for 8 boreholes) 08 November 2021 (permit for 4

		boreholes)
Air Pollution Control Certificate	Ministry of Health and Social Services	Not available. Certificate conditions/requirements still to be confirmed under legislation.
Groundwater Abstraction Permit	Ministry of Agriculture, Water and Forestry	22 March 2022
Water Discharge Permit (Waste Water and Effluent Disposal Exemption Permit)	Ministry of Agriculture, Water and Forestry	30 April 2021

TABLE 3-2: LIST OF PENDING OR OUTSTANDING PERMITS/APPROVALS

Permit name	Regulator	Status
Permits		
Research Permit (for harvesting of seeds/seedlings/cuttings for phytoremediation/rehabilitation purposes)	Ministry of Environment and Tourism	Application not submitted yet. Awaiting vegetation specialist recommendations.
Onsite Nursery Permit (for phytoremediation/rehabilitation purposes)	Ministry of Environment and Tourism	31 March 2020

4 AUDITING PROGRAMME

An environmental and social auditing programme has been developed as part of this ESIA process for the general Tsumeb Smelter operations (see Table 4-1). All components of the operations are to be included in the general environmental and social auditing programme. The programme is implemented to assess the level of compliance with environmental and social legislative requirements and the commitments made in the ESMP. Auditing is aimed at ensuring continual improvement in environmental and social performance.

TABLE 4-1: ENVIRONMENTAL AND SOCIAL AUDITING PROGRAMME

Frequency of Monitoring	Performance Audit	Responsibility	Reporting Requirements
OPERATION			
Quarterly	Quarterly inspections and critical control verification	Environmental Manager / Social Performance Department/ Health & Hygiene Manager	Internal report submitted to managers for discussion.
Annually	Management review	Managing Director / Vice President and senior management	Internal reports.
Annually	Internal Compliance Audit	Environmental Manager / Social Performance Department / Health & Hygiene Manager	Internally produced report to be submitted to environmental authorities and distributed internally.
Two-yearly (biennial)	External Compliance Audit.	Environmental Manager / Social Performance Department / Health & Hygiene Manager	Externally produced consultant's report to be submitted to environmental authorities and distributed internally.

The internal and external audit reports shall contain the following information:

- The period applicable to the performance assessment;
- The scope of the assessment;
- The assessment procedure used;
- The evaluation criteria used during the assessment;
- The results of the assessment;
- Recommendations on how and when non-compliances and deficiencies will be rectified; and
- Recommendations and motivation for any changes/updates required to the approved ESMP.

5 DPMT MANAGEMENT AND MITIGATION PLANS

The Management and Mitigation Plans (MMPs), listed in the table below, are applicable to all the relevant activities and facilities of the DPMT smelter. Where a management action is relevant to a specific project component this is indicated. The MMPs follow in the subsequent sections.

TABLE 5-1: VARIOUS MMPS AND NUMBERS

Number	Management and Mitigation Plan (MMP)
1	Construction Activities MMP
2	Stakeholder Engagement Plan
3	Air Quality MMP
4	Soils and Land MMP
5	Groundwater MMP
6	Surface Water MMP
7	Noise MMP
8	Ecology MMP
9	Community Health and Safety MMP
10	Occupational Health and Safety MMP
11	Socio-Economic MMP
12	Waste Management MMP
13	Environmental and Social Awareness and Training
14	Closure Phase

1

CONSTRUCTION ACTIVITIES MMP

5.1 CONSTRUCTION ACTIVITIES MANAGEMENT AND MITIGATION PLAN

5.1.1 MANAGEMENT AND MITIGATION

5.1.1.1 Construction Activities

Objectives

- *To ensure that all construction staff are aware of the objectives of the ESMP as well as the consequences of their individual actions*
- *To limit construction-phase impacts relating to soil, noise, dust, visual and outside work force.*

Actions

TABLE 1: ACTIONS RELATING TO CONSTRUCTION ACTIVITIES

No.	Issue	Management/Mitigation	Responsibility	Schedule	Reference
Contract Management					
1	ESMP administration	The requirements of the ESMP are to be included in all tender documentation for all contractors to allow service providers to make provision for environmental cost requirements and the ESMP is to form part of the contract agreement entered into with the service providers awarded contracts.	DPMT Management	Prior to commencement of construction activities	Standard ESMP requirement
Environmental Awareness and Training					
2	Environmental Induction Training	Environmental induction training is to be undertaken by all persons undertaking new construction work at the smelter site. This is to be in line with DPMT's current site induction procedures.	Environmental Manager/People Development Manager	Immediate / Prior to commencement of any new construction-related projects	Approved 2016 EMP
Soils					
3	Soil Impact	Where disturbed areas cannot be re-vegetated during the life of the operations, appropriate measures need to be taken to prevent further impacts on soil resources.	Environmental Manager	Prior to extension of sites.	Soil specialist study (2016)
4	Footprint	Construction activities must be limited to the areas required for new project components.	Environmental Manager	During construction	Soil specialist study (2016). Biodiversity Assessment Report 2016
5	Soil contamination during construction	Where construction of new components are undertaken on bare soil containing topsoil with vegetative material, the following measures are to be applied: <ul style="list-style-type: none"> • Consult the contaminated land assessment (CLA) and related soil survey information for suitability of re-use and appropriate handling of topsoils within the smelter boundary. • If found to be suitable for re-use and handling in line with the above, strip and stockpile 'topsoil' from the footprints of new features before construction. Stockpiles to be no higher than 2 m. • Store 'topsoil' separate from other materials and subsoils. Demarcate stockpile areas and erect appropriate durable signage. Draw up and maintain a soils register with estimates of soil type, quantities and quality. • Limit soil compaction, erosion, and contamination on 'topsoil' 	Environmental Manager / Construction Manager / Engineering Manager	Ongoing during construction phases	CLA and soil specialist study (2016)

No.	Issue	Management/Mitigation	Responsibility	Schedule	Reference
		stockpiles/berms. <ul style="list-style-type: none"> Design all new features to prevent soil pollution of surrounding undisturbed areas. Design all new features to limit/prevent soil erosion. Prevent soil contamination/pollution. Infrastructure that will not be used in future is to be removed from site and footprint areas are to be remediated (cleared/ripped/levelled). Areas showing residual contamination (oils, fuel) from construction activities are to be cleaned by lifting contaminated material for disposal in accordance with waste management requirements. All construction waste material is to be removed from site and disposed of in accordance with waste management requirements. 			
Air Quality					
6	Dust Emissions	Wet suppression will be utilised in order to reduce fugitive dust emissions. Should wet suppression not be sufficient, environmentally-friendly soil-binding agents will be utilised.	Environmental Manager	As required	Section 7.4 of ESIA CLA and Air Quality Specialist Study
7		Durable and environmentally-friendly dust suppression coatings to be in place on permanent haul and other internal roads.	Environmental Manager	Immediate	
8		Undertake air quality monitoring during construction in line with the following: <ul style="list-style-type: none"> Use real-time dust monitors and other samplers, e.g. SO₂ badges, in areas planned for construction in order to establish baseline (pre-construction) levels. Ongoing monitoring during construction is to include environmental and occupational health metrics as used on site. Pay special attention to arsenic levels in dust (PM₁₀ and PM_{2.5}) and where construction sites abut areas known to be historically contaminated (in line with CLA) or areas where old lead and cadmium plants operated, the air quality monitoring must take this into account and measure these compounds. 	Health & Hygiene Manager	Ongoing	
Socio-Economic					
9	Understanding of socio-economic environment and	DPMT will undertake further primary social and socio-economic data collection in order to update the current Social Impact Assessment (SIA) in order to be aligned with the European Bank for Reconstruction and	DPMT Management	Prior to construction	NA

No.	Issue	Management/Mitigation	Responsibility	Schedule	Reference
	associated impacts	Development's (EBRD) Performance Requirements. The primary baseline data needs to be gender disaggregated. The SIA will be disclosed to key stakeholders and made available to the general public at the DPMT information centre and public library. This ESMP will then be updated with any new mitigation and management measures that further data collection and analysis suggests are appropriate to address social and socio-economic impacts. The updated ESMP will be provided to MET and disclosed to stakeholders by DPMT.			
10	Outside Construction Workers	<ul style="list-style-type: none"> The appointed contractor should make the necessary arrangements for allowing workers from outside the area to return home on a regular basis and must transport workers back to their home towns within a day of their contracts ending in order to limit the impact of the presence of outside workers on the local communities. The contractor must ensure that all construction workers from outside the area are transported back to their home towns within a day of their contracts ending 	Appointed Contractor / Site Manager	Ongoing	Section 7.6 of ESIA Social Specialist Assessment
11	Training and Skills Development	Where feasible, training and skills development programmes for locals should be initiated prior to the construction phase for new project components.	People Development Manager/Social Performance Senior Manager	Prior to construction	
12	Heritage sites	All sites of heritage importance within the smelter property should be protected from any construction-related activities. Should construction activities lead to the removal or damage of sites of heritage importance, approach the National Heritage Council for the appropriate permit(s) to be issued in terms of the National Heritage Act.	Appointed Contractor / Site Manager / Environmental Manager	Prior to construction	Standard ESMP requirement
13	Chance heritage finds	Should any chance heritage finds be encountered in the form of archaeological artefacts or human remains during excavations, work should be ceased in the immediate vicinity and the finds confirmed by an archaeologist. Based on the nature of the find and archaeologist's advice, the National Heritage Council is to be advised and written permission requested to remove finds from the works area. In the event that human remains are discovered, advise and liaise with the National Heritage Council and Police and follow standard recovery procedures to the National Museum or National Forensic Laboratory, as directed.		Ongoing	
Visual					

No.	Issue	Management/Mitigation	Responsibility	Schedule	Reference
14	Visual Impact	Wet suppression will be utilised in order to reduce fugitive dust emissions that could cause a visual intrusion. Should wet suppression not be sufficient, soil-binding agents will be utilised.	Environmental Manager	As required	CLA, Air Quality Specialist Study, General Waste Site EMP
15		Chemical dust suppression to be in place on permanent haul and other roads at the Waste Landfill Site.	Environmental Manager	Immediate	
16		Vegetate inactive areas on site.	Environmental Manager	Immediate and ongoing	
Noise					
17	Noise during Construction	All vehicles and equipment (especially diesel-powered equipment) will be serviced regularly and be kept in good working order to limit vehicle noise.	Procurement Manager / Environmental Manager / Construction Manager	Prior to construction and ongoing	Section 7.5 in ESIA, Noise Specialist Study
18		Schedule high noise construction activities for daylight hours.	Site Manager	Construction phase	
19		Undertake construction noise monitoring in line with current on-site noise monitoring programme. Where noise becomes a nuisance, management measures will be investigated and implemented to address these.	Health & Hygiene Manage	Ongoing	
Waste					
20	Waste Management	Provide sufficient capacity in the smelter waste management systems to accommodate additional waste from workers during the construction phase or specify that each contractor is responsible for their own waste management. If the latter, ensure that the contractor's actions comply with waste management legislation and best practice.	Environmental Manager	Ongoing	Specialist Waste Management Review, Section 7.3.2 of ESIA
Public Relations					
21	Local employment	Preference to be given to local service providers and suppliers with capability to provide goods and services required for construction activities.	HR Manager	As Required	Section 7.6 of ESIA, Socio-economic specialist reports
22		Consult and update the Tsumeb Municipality's skills database for the area. Make this database available to appointed contractors for the construction phase.			
23	Construction workers	Set up an Environmental Monitoring Committee (EMC) (or similar body including key stakeholders, community members, local authority, etc.) to monitor construction activities and the implementation of recommended mitigation measures. The EMC should be briefed on potential risks to the local community associated with outside construction workers, e.g. disruption of existing family structures and social networks linked to potential behaviour of male construction workers.	Social Performance Advisor	Construction Phase	Section 7.6.6 of ESIA, Social Specialist Report

No.	Issue	Management/Mitigation	Responsibility	Schedule	Reference
Workers'/Contractors' Accommodation					
24	Accommodation	<p>Accommodation for workers/contractors provided by DPMT must be in line with the standards prescribed in the IGC and EBRD Guidance Note - Workers' Accommodation: Processes and Standards (A guidance note by IFC and the EBRD). This includes standards for:</p> <ul style="list-style-type: none"> • General living facilities • Room/dormitory facilities • Sanitary and toilet facilities • Canteen, cooking and laundry facilities • Nutrition and food safety • Medical facilities • Leisure, social and • telecommunication facilities 	DPMT Management	Construction Phase	IGC and EBRD Guidance Note - Workers' Accommodation
Code of Conduct					
25	Behaviour	<p>DPMT and the contractor(s) must, in consultation with representatives from the MF, develop a code of conduct applicable within both the workplace and the surrounding community for the construction phase. The code, which must be signed by all employees as part of their contract should identify which types of behaviour and activities are not acceptable. It should include a clear statement about zero-tolerance of gender-based violence and should be displayed on site and in the surrounding communities. Construction workers in breach of the code should be dismissed. All dismissals must comply with the Namibian labour legislation</p>	DPMT Management	Construction Phase	Social Impact Assessment

2

STAKEHOLDER ENGAGEMENT PLAN

5.2 STAKEHOLDER ENGAGEMENT PLAN

5.2.1 COMPONENTS

This plan is made up of the following components:

- General public and community relations

5.2.2 MANAGEMENT AND MITIGATION

5.2.2.1 General Public and Community Relations

Objectives

- *To promote transparency and facilitate communication with the affected public*
- *To promote local employment and improve local economy.*
- *To minimise disturbance to neighbouring communities due to operational activities.*

Actions

TABLE 2: ACTIONS RELATING TO PUBLIC RELATIONS (THESE ISSUES APPLY TO ALL DPMT PLANTS & SITES)

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
DPMT Smelter Plant					
	Environmental Monitoring Committee	Establish in a transparent and independent manner an Environmental Monitoring Committee (EMC) to monitor environmental and health-related issues associated with smelter operations. Details as set out below: <ul style="list-style-type: none"> • EMC to consist of representatives of DPMT, local municipality, national government, local community, Non-Government Organisations and labour. • Include input from independent specialists (health and environmental), where required. • Establish EMC within 6 months of project approval. • EMC to initially meet on a quarterly basis. • All monitoring data to be provided to the EMC with measures put in place to prevent / reduce the risk of misinterpretation of data. • All public complaints submitted to DPMT to be provided to the EMC on a quarterly basis. 	Public Relations Officer EMC	Establish within 6 months of approval Ongoing	Section 7.6 of the ESIA Report
2	Information availability	Appropriate and relevant monitoring information to be made available to the affected community.	Environmental Manager	Immediate Ongoing	Section 7.6 of the ESIA Report
3	Information communication	Additional ad-hoc public feedback meetings to be held, when required, to communicate information on smelter operations and to provide opportunity for members of the public to ask questions and raise concerns.	Social Performance Advisor	If required	
4	External Grievances	Implement and monitor the “Receiving Suggestions, Opinions and Grievances Procedure”. Ensure the procedure provides appropriate measures for handling of any Gender Based Violence (GBV) related complaints. Staff need to be trained to adequately handle GBV related complaints.	Social Performance Department	Ongoing	Receiving Suggestions, Opinions and Grievances Procedure
5	Internal Grievances	Implement and monitor the DPMT Internal (Employee) Grievance Policy and Procedure (2017). Ensure the procedure provides appropriate measures for handling of any GBV related complaints. Staff need to be trained to adequately handle GBV related complaints.	Human Resources Department	Ongoing	Internal (Employee) Grievance Policy and Procedure (2017)

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
6	Disturbance to neighbouring communities	Activities likely to cause a noise disturbance (e.g. blasting) are to be restricted to daylight hours and noise monitoring undertaken on-site in line with a noise monitoring programme in order to identify potential disturbances and avoid disturbance to neighbouring communities.	Plant / Site Managers	Ongoing	Section 7.5 of the ESIA Report
7	Municipal planning	Actively engage with the Tsumeb Municipality and regional government regarding future landuse planning for residential areas in close proximity to the smelter property. Discussions should specifically focus on the closest residential area of Ondundu and farming activities immediately to the northwest of the smelter property.	Social Performance Advisor	Ongoing	Sections 7.6 and 7.7 of the ESIA Report
8	Community perceptions	Community perceptions of high employment numbers for non-Tsumeb residents are to be addressed as part of a clear and transparent stakeholder engagement process. Collate employment information to address this concern. Ongoing communication is a key part of managing expectations, especially given the relatively small number of new job opportunities that the expansion of the smelter will create against the backdrop of higher expectations. Methodically develop a Stakeholder Engagement Plan, including a matrix of different stakeholders and appropriate communication, to proactively address existing and potential concerns and perceptions.	Social Performance Advisor	Ongoing	Section 7.6 of the ESIA Report
9	Stakeholder Engagement	Revise the DMPT Stakeholder Relationship Management and Engagement Framework in line with EBRD PRs in order to ensure that particular attention is paid to how special interest groups are identified and approached (including vulnerable groups like the San, women and fence line communities), and to ensure appropriate handling of any Gender Based Violence (GBV) related complaints. Where appropriate methods of engagement and information sharing need to be tailored to special interest groups. Staff need to be trained to adequately handle GBV related complaints.	Social Performance Department	Prior to construction	Stakeholder Relationship Management and Engagement Framework
10	Stakeholder Engagement	Finalise and implement the DMPT Stakeholder Relationship Management and Engagement Framework. Implementation of the Stakeholder Relationship Management and Engagement Framework should be reviewed at least every 6 months.	Social Performance Department	Prior to construction	Stakeholder Relationship Management and Engagement Framework

3

AIR QUALITY MMP

5.3 AIR QUALITY MANAGEMENT AND MITIGATION PLAN

5.3.1 COMPONENTS

This plan is made up of the following components:

- Dust control and emissions of chemicals of concern

5.3.2 MANAGEMENT AND MITIGATION

5.3.2.1 Dust and SO₂ emissions control

Objectives

- *To reduce SO₂ and dust emissions from the smelter operations to ensure compliance with DPMT's environmental emission and health exposure benchmark, reference and limit levels for SO₂ and other chemicals of concern. These levels are to be set as agreed with environmental authorities and must be defensible and relate to the smelter conditions and, where applicable, be in line with international standards*
- *To reduce impacts of fugitive dust emissions*
- *To monitor the effectiveness of dust management during operations and implement improvements as required.*

Actions

TABLE 3: ACTIONS RELATING TO AIR QUALITY

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
DPMT Smelter Plant					
1	SO ₂ emissions	Install and implement a daily (continuous) monitoring system for SO ₂ emissions from stacks.	Environmental Manager	Within 6 months of approval	Section 7.4 of the ESIA Report
2		Regulate and benchmark SO ₂ emission levels in line with SA NAAQS, WHO and EU standards. Any activities that lead to a sustained increase in SO ₂ levels above the relevant standards will not be allowed. Production and process engineering or optimisation changes where sustained increases within the allowable SO ₂ emissions window are a possibility, will be subjected to an environmental and health risk assessment prior to initiation to inform the decision on whether the activity is to be allowed.	Operations Director, Environmental Manager	Ongoing	
3	SO ₂ emissions	Continuous ambient monitoring of SO ₂ to provide a warning system when SO ₂ levels are above the South African National Ambient Air Quality Standards.	Environmental Manager	Ongoing	Section 7.4 of the ESIA Report
4		Implement corrective management actions should SO ₂ levels exceed guideline levels as per the South African National Ambient Air Quality Standards or EU standards, and in line with the accepted number of exceedances of the South African National Ambient Air Quality Standards or EU standards.	Operations Director Environmental manager	Ongoing	
5	Arsenic dust emissions	Converter furnace hood to be used to reduce fugitive emissions.	Operations Director	Ongoing	
6		Long-term furnace fugitive sampling to be undertaken.	Operations Director		
7		Annual isokinetic sampling of particulates to be undertaken.	Environmental Manager		
8		Complete testing of ladles of different geometry to understand what the required ladle dimension is to move from ditch cooling to slow cooling (pot cooling) of Ausmelt slag to provide information on the cooling rate.	Operation Director	Within 6 months of approval	
9		Complete mineralogical analysis on the slow cooled slag to fully understand the mechanism of fuming.	Operation Director	Within 6 months of approval	
10	Complete the study on the benefits of ditch cooling compared to quenching of slag.	Operation Director	Within 6 months of approval		

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
11	Dust control	Rehabilitation of closed eastern tailings dam surface to reduce dust. In this regard, a rehabilitation plan is to be drafted in line with specialist biodiversity and contaminated land input.	Environmental Manager	In line with rehabilitation plan - within 2 years of approval	
12		Investigate options to avoid, reduce and contain fugitive emissions, including dust, associated with conveyors, material crushers, ladle cooling, slag cooling and slag crushing and loading. Based on the investigation, implement feasible measures and investments to avoid, reduce and contain fugitive emissions.	Technical Director	Within 1 year of approval Ongoing	
13		Machinery will be regularly monitored and maintained. Maintenance programmes will be established and implemented.	Operator		
14		Wetting the slag heaps with recycled water before and during moving of the material and/or enclosure, extraction and hooding with fabric filters, in order to limit fugitive dust during sizing and crushing operations at the slag plant.			
15		Vehicle speeds on unpaved roads will be limited to 40km/h to limit dust. Wet unpaved roads or consider the use of a durable suppressant coating.	Safety Manager		
16		Control dust on paved internal roads by considering the use of mechanical broom or vacuum sweepers. Metal rich dust may be bagged and redirected to the smelter for metal recovery or to the tailings for disposal, as appropriate.	Operations Director	Ongoing	
17		Implement cattle-grids and vehicle brushes (or sprayers if recycled water is available) on the exit road from the smelter in order to minimise transport of polluted dust on car tyres into Tsumeb. De-sludge the water collection bays regularly and dispose of the sludge on the tailings facilities.	Operations Director		
18		Control dust sources by, where feasible, planting shelter belts of indigenous drought-tolerant evergreen trees along roads and around buildings to protect from fugitive dust and consume polluted runoff.	Environmental Manager		
19	RHF emissions	Fume capture and extraction systems at the RHF must be maintained and operated to specifications, in order to ensure minimal fugitive emissions during charging, holding and pour cycles.	Operations Director	Ongoing	Section 7.4 of the ESIA Report and Air Quality Specialist Report
20		Investigate options to avoid, reduce and contain fugitive emissions generated during the smelting process. Based on the investigation, implement feasible measures and investments to avoid, reduce and contain fugitive emissions from the smelting process.			
21		Movable and stationary hoods employed at the RHF must be positioned correctly during all cycles of the process in order to prevent fugitive emissions.			

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
22	Stack height	The height of the new baghouse stack must be at least 70 m above ground level, to ensure that emissions released do not result in more than 25% of the ambient air quality limits at ground level.	Engineering Manager/Technical Director	Detailed engineering design stage	
23	Regular maintenance	Schedule adequate and regular maintenance activities across all smelter operations in order to ensure stable operations of the plant and related emissions control of dust and gas.	Engineering Manager/Technical Director	Ongoing	
General Waste Site					
24	Dust Control	Wet suppression with recycled water will be utilised in order to reduce fugitive dust emissions. Should wet suppression not be sufficient, soil binding agents will be utilised.	Environmental Manager	Ongoing	General Waste Site EMP
25		Durable dust suppression coating to be in place on permanent haul and other roads at the general waste site.			
26		Vegetate inactive areas on site.	Environmental Manager	Immediate and Ongoing	
Hazardous Waste Site					
27	Dust control	Trucks transferring waste to site are not to be filled above the brim of the trailer.	Environmental Manager	Ongoing	Hazardous Waste Disposal Site EMP
28		Proper handling and disposal of arsenic containing dusts at the waste site must be implemented.			
29		Surface water from the return water dam is to be used for dust control on the hazardous waste site. If volumes of recycled water are insufficient for dust control, water is to be supplemented from another source. Overspray of water is to be prevented in order to contain contaminated water within the hazardous waste site footprint.			
30		Consider the addition of an effective dust suppressant chemical to the water used for dust suppression. The choice of dust suppressant should be in line with the hazardous waste site operational manual, e.g. organic compositions are not allowed.		As required	
Sulphuric Acid Plant					
32	Integrity of Railway lines for	Problems with rail transportation would be minimised through consultation with Transnamib regarding the required modifications to the line, appropriate	Supply Chain Manager/	Ongoing	Sulphuric Acid Plant EMP and

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
	acid transportation	maintenance, and effective emergency preparedness and response.	Logistic Manager		Section 7.4 of the ESIA
33	SO ₂ emissions	Ongoing management and maintenance of systems feeding off-gas to the sulphuric acid plant and the acid plant itself, in order to maintain improvements in SO ₂ levels in the surrounding area.	Operations Director	Ongoing	
34		Ensure that the plant is optimised and operations are stable in order to ensure an above 90% utilisation rate.	Operations Director	Ongoing	
35		Establish a procedure for ramping down / shutting down production, should operational problems be experienced at the sulphuric acid plant.	Operations Director	Ongoing	
36		Undertake continuous monitoring of SO ₂ emissions at the acid plant stack. Consider input of monitoring data into a real time atmospheric dispersion model.	Environmental Manager	Ongoing	
37		Avoid start-up and interruptions of the acid plant operations between the hours of 11am and 4pm (the period of highest atmospheric instability).	Operations Director	Ongoing	
38	Acid rain	Monitor the potential for acid rain generation during the wet season in off-site vegetated and cultivated areas surrounding the smelter property.	Environmental Manager	Ongoing during wet season	
Kliplime Quarry					
39	Dust control	Dust emitted from operations at the quarry and from transport vehicles on the access road must be managed as this may have an impact on the game and vegetation on the surrounding Tsumore Farm.	Quarry Manager	Ongoing	Kliplime Quarry EMP
Emissions Monitoring					
40	Stack and Fugitive Emissions	Undertake stack emission testing for the full operational cycle of the RHF once the furnace is operational in order to validate theoretical emission estimates.	Operations Director / Environmental Manager	Once RHF is operational	Section 7.4 of the ESIA Report
41		Undertake stack emissions testing on the outlet of the converter baghouse over the full converter cycle and at all other outlets to the atmosphere in order to monitor the efficiency of controls.	Operations Director / Environmental Manager	Ongoing	
42		Measure building fugitive emissions once the RHF has been commissioned. These emissions need to be updated given the decommissioning of the reverberatory furnace as well as to determine the extent of fugitive emissions from the charging and pouring RHF. Determine arsenic (and other chemicals of concern) content in particulate emissions.	Operations Director / Health & Hygiene Manager	Once RHF is operational	Section 7.4 of the ESIA Report and Air Quality Specialist Report

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
43		Improve data availability on the PM ₁₀ and PM _{2.5} analysers installed at the DPMT ambient monitoring stations. Also maintain data availability for SO ₂ and metal parameters by establishing a monitoring station maintenance programme and ensuring that critical spare equipment is kept in stock.	Environmental Manager	Within 1 year of approval	
44		Any anomalies or elevated levels in the ambient air quality monitoring station data should be immediately communicated to the site management team in order to ascertain the likely links of such anomalies with specific smelter operations/performance.	Environmental Manager Ambient air quality data consultant	Ongoing	
45		Consider extending the ambient air quality monitoring network to include two additional monitoring stations, one at the airport and a second 1-2 km northwest of the smelter boundary.	Environmental Manager	Within 1 year of approval	
46		Expand the fall-out dust monitoring programme by installing monitoring equipment in strategic places around the smelter site and at ambient monitoring stations.	Environmental Manager	Within 1 year of approval	
DPMT Standards					
47	Internal standards	DPMT shall compare air monitoring results to the “Environmental Standards and Objectives for Pollutants in Air, Water and Soil” and implement corrective actions as required.	Environmental Manager	Ongoing	DPMT Environmental Standards and Objectives for Pollutants in Air, Water and Soil

4

SOILS AND LAND MMP

5.4 SOILS MANAGEMENT AND MITIGATION PLAN

5.4.1 COMPONENTS

This plan is made up of the following components:

- Reducing the risk of soil contamination

5.4.2 MANAGEMENT AND MITIGATION

5.4.2.1 Reducing the risk of soil contamination

Objectives

- *To minimise contamination within the smelter footprint*
- *To contain spillages of hazardous chemicals from equipment and vehicles and to prevent soil contamination from hydrocarbon spills.*
- *To protect soils from becoming contaminated by runoff from the waste site and other contaminated areas*

Actions

TABLE 4: ACTIONS RELATING TO SOILS

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference	
DPMT Smelter Plant						
1	Containment of hazardous material and risk of contamination of smelter footprint	In all areas where there is storage of hazardous substances (i.e. hydrocarbons), there will be containment of spillages on impermeable floors and bund walls that can contain 110% of the volume of the hazardous substances. All re-fuelling and any maintenance of vehicles will also take place on impermeable surfaces.	Supply Chain manager	Within 12 months of approval	Standard ESMP requirements and Sections 7.2 and 7.3	
2		Concrete or similar impervious surfaces are to be provided in all areas where concentrates and hazardous smelter wastes (e.g. baghouse dusts) are handled or stored.	Operations Director	Within 12 months of approval		
3		Regularly inspect concrete surfaces and undertake annual integrity tests in order to ensure that contaminants do not enter into underlying soils.		Immediate and ongoing		
5		The handling and interim storage of hazardous workshop wastes is to take place on concrete and banded surfaces.	Director Asset Management	Ongoing		
6		Existing stockpiles of arsenic calcines and baghouse dusts are to be disposed within the hazardous waste disposal site or another registered hazardous waste disposal facility.	Environmental Manager	Ongoing		Current approved EMP and CLA
7		Baghouse dusts and calcines that cannot be processed are to be disposed of at the hazardous waste site.	Operations Director			
8		Existing onsite contamination should be managed as part of the broader site contamination management	Site Manager			
9		Appropriate protective clothing should be worn when in close contact with contaminated soil material to limit dermal and respiratory contact	H&S Manager			
11		Pollution will be prevented through basic infrastructure design and through maintenance of equipment.	Director Asset Management			
12		Maintain and update the Hazardous Chemical Substances Emergency Response Plan in line with the increased throughput capacity of the smelter.	Operations Director and Emergency Response Manager			
13		Any spills will be contained and cleaned up immediately. Spillages of chemicals during operations are to be reported and investigated through the site incident reporting and investigation procedure. Any contaminated soil must be contained within appropriate containers until such a time that they can be disposed of at an appropriate facility.	Operations Director and Environment Manager			

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
14		Implement cattle-grids and vehicle brushes (or sprayers if dirty water is available) on the exit road from the smelter in order to minimise transport of polluted dust on car tyres into Tsumeb. Desludge the water collection bays regularly and dispose of the sludge on the tailings facilities.	Operations Director		
15		Develop a contamination containment plan for the smelter site in line with the CLA and incorporate the above measures.	Environmental Manager	Within 1 year of approval	CLA
16	Soil contamination (Smelter Process Waste Management Facilities)	<p>Slag Dumps, Non-Designated Dumping Areas, Tailings Storage Facilities, and Evaporation Ponds:</p> <ul style="list-style-type: none"> • Construct and maintain optimum functioning of the 'clean' storm water runoff diversion canals/drains in order to divert 'clean' water around these potential pollution sources; • Canals must be lined with impermeable liners, e.g. HDPE or concrete; • Construct and maintain optimum functioning of 'dirty' water runoff intercept canals/drains to the pollution control dams; and • Remove non-designated waste and non-waste dumps to designated dumping areas. <p>Tailings Pipelines:</p> <ul style="list-style-type: none"> • Construct and maintain earth bund walls (vegetated) along entire length of pipelines; • Immediately repair pipelines where necessary; and • Immediately clean up spills. 	Operations Director/ Environmental Manager	Ongoing	Section 7.2 of the ESIA Report
17	Soil Contamination (Process Water Storage Facilities, and Clean Storm-Water Separation Facilities)	<p>Pollution Control Dams and 'Dirty' Water Canals/Drains:</p> <ul style="list-style-type: none"> • Construct and maintain optimum functioning of these clad (HDPE or concrete) features by attending to leaks, clearing blockages, preventing siltation and purifying the 'dirty' water for re-use in the plant. <p>'Clean' Water Runoff Diversion Canals:</p> <ul style="list-style-type: none"> • Maintain optimum functioning of these earth canals, in order to re-direct 'clean' water around these potential pollution sources. 			Section 7.2 of the ESIA Report

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
18	Soil Contamination (Topsoil' stockpiles/berms for rehabilitation 'topsoiling' purposes)	Sample/fertilize the 'topsoil' once every 3-4 years in order to maintain vegetative basal cover, thereby limiting soil erosion. No Grazing or burning of vegetation should be allowed.			CLA and Soil Assessment
19	Soil contamination via surface and stormwater runoff	Control and minimise the ingress of stormwater within the plant footprint as part of a stormwater management plan.	Operations Director and Environmental Manager	Ongoing	Sections 7.2 and 7.3 of the ESIA Report
20		Undertake regular monitoring of groundwater and surface water within the smelter footprint and specifically surrounding the sulphuric acid plant.			
21	Ongoing contaminated soil remediation	<p>The current Contaminated Land Assessment (CLA) must be completed. Once finalised the recommendations/mitigation and/or management measures of the CLA must be incorporated into the ESMP. The updated ESMP must then be provided to MET and disclosed to stakeholders by DPMT.</p> <p>In line with the draft CLA findings, the following measures should be implemented on-site in the interim:</p> <ul style="list-style-type: none"> • Control contamination sources by planting shelter-belts of indigenous drought-tolerant evergreen trees along roads and around buildings to protect against fugitive dust and to consume polluted run-off. • Remove spilled tailings and polluted sediments from the Jordan River in the dry season and dispose of it on the tailings facility. • Phytoremediation and stabilisation of the Jordan River stream banks with vegetation to prevent erosion of polluted riparian soils. With minimal disturbance, plant riparian species indigenous to the general region. • Removal of the thin layer (<20cm) of surface spilled tailings to expose underlying wetland soils where the Jordan River discharges and planting of indigenous wetland species for phytoremediation. • Phytoremediation of patches of polluted soils using plants to extract sulphur and metals, where feasible, without further disturbance. • Undertake periodic harvesting of the metal-loaded leaves or 	HSE Director	Before July 2020	Sections 7.2 and 7.3 of the ESIA Report and CLA

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
		branches and dispose on the tailings dam areas for dust suppression or mulch. Allow plants to resprout (perennials) or replant (annuals) after harvesting. <ul style="list-style-type: none"> Excavation of the thin layer (<5cm to 30cm) of polluted soils across the smelter site and use for soil cladding on tailings facilities in preparation for vegetation. Establish vegetation cover on the tailings facilities to control seepage to groundwater and prevent run-off of polluted stormwater. Continue with nursery operation and trials for phytoremediation. See the CLA study through to completion and review and add actions from the CLA for implementation as the studies are completed. 			
General Waste Site					
22	Soil Contamination	The waste site design provides for containment of contaminated water on the site.	HSE Director	Prior to Construction	General Waste Site EMP
23		Should soils become contaminated; the contaminated soils will be contained and removed for appropriate disposal, either to landfill or to the hazardous waste disposal site, should the soil be contaminated with arsenic at the prerequisite levels for disposal.	Environmental Manager	Ongoing	
24		Soils contaminated with hydrocarbons are to be appropriately treated (e.g. bioremediated).	Environmental Manager	Ongoing	
DPMT Standards					
25	Internal standards	DPMT shall compare soil quality monitoring results to the "Environmental Standards and Objectives for Pollutants in Air, Water and Soil" and implement corrective actions as required.	Environmental Manager	Ongoing	DPMT Environmental Standards and Objectives for Pollutants in Air, Water and Soil

5

GROUNDWATER MMP

5.5 GROUNDWATER MANAGEMENT AND MITIGATION PLAN

5.5.1 COMPONENTS

This plan is made up of the following components:

- Reducing the risks of groundwater contamination

5.5.2 MANAGEMENT AND MITIGATION

5.5.2.1 Reducing the risks of groundwater contamination

Objectives

- *To comply with the Namibian regulatory requirements*
- *To put measures in place to align the operations with the provisions of international best practices to protect water resources.*
- *To reduce the impact of the cone of depression caused by groundwater abstraction.*
- *To reduce the off-site spread of contaminated groundwater.*
- *To protect groundwater resources from seepage from potential contaminant sources*
- *To assess the effectiveness of pollution control measures.*

Actions

TABLE 5: ACTIONS RELATING TO GROUNDWATER

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
DPMT Smelter Plant					
1	Contamination risk	East tailings dam is to be rehabilitated to prevent groundwater pollution as required in line with the revised Closure Plan.	Environmental Manager	Within 3 years of approval	Sections 7.2 and 7.3 of the ESIA Report
2		The use of standard erosion control measures, such as interception drains, contour planting, silt fences, establishment of groundcover species, optimal drainage construction, and silt ponds are applied where appropriate.	Environmental Manager	Within 2 years of approval	
3		Regular maintenance and proper safety procedures to prevent leaks and spills.	Director Asset Management	Ongoing	
4		Implement and strengthen, where necessary, procedures to respond to emergency product spills in areas of DPMT responsibility. This may extend beyond the immediate boundary of the DPMT site.	Environmental Manager	Ongoing	
5	Contamination risk	Dispose of waste material at a suitably contained disposal site.	Environmental Manager	Ongoing	Standard EMP requirement
6		Implement the phytoremediation trials in line with the revised Closure Plan.	Environmental Manager	Ongoing, after establishment of nursery	Section 7.3 of the ESIA Report
7	Groundwater monitoring	Maintain the current groundwater site wide sampling programme (i.e. timing, depth, efficiency of testing equipment, record keeping, etc.) in order for a database to be built up on water quality and enable rapid identification of any changes in quality.	Environmental Manager / Plant Manager	Ongoing	Section 7.3 of the ESIA Report
8		Continued monitoring of groundwater quality and levels for the minimum period as specified by Namibian environmental regulations where applicable (e.g. S 31 EMA and the Water Act). All monitoring boreholes are to be properly surveyed in terms of position and height so that borehole levels can be expressed in meters above mean sea level, piezometric height can be derived and thereby the groundwater level profile.			
9		Install one upgradient and two down gradient monitoring boreholes that can be monitored and sampled to determine the potential quality		In line with	

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
		of unsaturated groundwater flow in the immediate vicinity of the sulphuric acid plant. Ensure that the newly drilled boreholes are properly logged and that proper pump tests are done and groundwater parameters derived. Ensure that the relevant borehole permits are obtained.		budgetary allocations	
10		Regular monitoring of the existing groundwater monitoring system shall occur at least quarterly and reported annually to authorities who regulate the management of the Tsumeb aquifers.	Environmental Manager	Ongoing	
11		Any complaints with respect to the management of groundwater quality will be directed to the site management. Complaints and any actions arising from a complaint will be recorded in a complaints register to be maintained by site management.			
12		Include regional groundwater monitoring from existing farm and municipal boreholes and produce a detailed groundwater monitoring schedule.			
14	Identification of pollution sources	Finalising of the project for identifying major sources of groundwater pollution and implementing the clean-up and remediation of these sources over the DPMT site.	Environmental Manager	Within 1 year of approval	
15	Arsenic plume migration	Additional boreholes should be drilled to the north of the site to better detect the arsenic pollution plume migration and further refine the updated 2018 groundwater model.	Environmental Manager	Ongoing, within 2 years of approval	
16					
17		Investigate targeted solutions for groundwater treatment and pollution source elimination in order to reduce potential offsite pollution.	Environmental Manager	After refining of groundwater model	
18	Groundwater model	Continue to refine the updated 2018 groundwater model by incorporating data from new monitoring boreholes to the north of the smelter boundary.	Environmental Manager	Within 1 year of approval	Section 7.3 of the ESIA Report
19	Impact on groundwater quantity	Continue to monitor water levels in boreholes on site and off site (including Tsumeb Municipality and DWAF monitoring and production boreholes) to monitor possible cone of depression caused by pumping from Shaft 1.	Environmental Manager	Immediate	
21		Renew the groundwater abstraction permit with the Ministry of Agriculture, Water and Forestry, as required.	Environmental Manager	Prior to permit lapsing.	

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
22	Handling and storage of hazardous substances	In all areas where there is storage of hazardous substances (i.e. hydrocarbons), there will be containment of spillages on impermeable floors and bund walls that can contain 110% of the volume of the hazardous substances.	Director Asset Management and Environmental Manager	Ongoing	Standard ESMP requirements
23		All re-fuelling and any maintenance of vehicles will take place on impermeable surfaces.	Operations Director/Director Asset Management		
24		Pollution will be prevented through basic infrastructure design and through maintenance of equipment.			
25		Environmental awareness for contractor and employees to be included during inductions.	Environmental Manager/Operations Director	Ongoing	
26		Any spills will be contained and cleaned up immediately.			
27	Stormwater management	Implement the surface water infrastructure upgrade project for the improved management of stormwater across the smelter site. Prioritised water infrastructure projects include the following: <ul style="list-style-type: none"> • Pollution Control Dams; • Drainage channels to Pollution Control Dams; • Concrete lined channels to replace the existing damaged open channels; • Lining of the No 10 Dam; • Recovering and rerouting contaminated water sources using bunding and pumps; • Separation of process water and stormwater; • Clean water separation via an earth embankment and sump; and • Treatment of effluent for recycling. 	Operations Director and Environmental Manager	In a phased manner in line with stormwater management plan	Section 7.2 of the ESIA Report
General Waste Site					
28	Groundwater Impact	Clean storm water is to be diverted from all areas that may be contaminated.	Environmental Manager	In a phased manner in line with stormwater management plan	Sections 7.2 and 7.3 of the ESIA Report
29		Water from the waste site is to be contained in a return water pond, and re-used.		Ongoing	
30		Monitor water quality near potential pollution sources and the surrounding community boreholes.	Environmental Manager	Continuation from planning phase	

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
Hazardous Waste Site					
31	Ensure containment of contaminants on site	Monitor and maintain leachate management systems to ensure liner efficiency in accordance with the Operational Manual.	Environmental Manager	As per requirements of Operational Manual.	Hazardous Waste Disposal Site Operational Manual and Section 7.3 of the ESIA Report
32		Implement and maintain a leachate treatment and recycling system in accordance with the Operational Manual.			
33		Undertake regular leachate monitoring.	Environmental Manager	As per requirements of leachate monitoring schedule	
34		Continue to undertake regular groundwater monitoring.		As per requirements of groundwater monitoring schedule	
Sulphuric Acid Plant					
35	Contamination risk	Appropriate collection of spillages of acid or contaminated solutions from leaking pipelines in areas that are not banded, followed by remedial action if required (e.g. neutralisation with lime).	Plant Manager/Emergency Response Manager	Ongoing	Sulphuric Acid Plant EMP
36		Implement and strengthen, where necessary, emergency procedures for product spills in areas of DPMT responsibility. This may extend beyond the immediate boundary of the DPMT site.		As per requirements of Operational Manual	
Closure Phase					
37	Rehabilitation	Decommissioning and closure procedures will be developed to avoid contamination of the groundwater resources as a result of activities such as the demolition, decontamination and storage of potentially contaminated plant infrastructure and waste.	Plant Manager / Environmental Manager	Ongoing	2016 Draft Closure Plan (to be revised before end of 2020)
38		Rehabilitation of waste stockpiles and tailings facilities in line with the revised Closure Plan recommendations.	Environmental Manager	Ongoing and at closure	
Water Balance					
39	Water Balance	Implement the actions recommended in the Surface Water Management: Site Water Balance Report (May 2019, Revision 3)	DPMT Management	Ongoing	Surface Water Management:

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
		compiled by Aurecon			Site Water Balance Report (May 2019, Revision 3)
DPMT Standards					
40	Internal standards	DPMT shall compare water quality monitoring results to the “Environmental Standards and Objectives for Pollutants in Air, Water and Soil” and implement corrective actions as required.	Environmental Manager	Ongoing	DPMT Environmental Standards and Objectives for Pollutants in Air, Water and Soil

6

SURFACE WATER MMP

5.6 SURFACE WATER MANAGEMENT AND MITIGATION PLAN

5.6.1 COMPONENTS

This plan is made up of the following components:

- Reducing the risks of surface water contamination

5.6.2 MANAGEMENT AND MITIGATION

5.6.2.1 Reducing the risks of surface water contamination

Objectives

- *To minimise contamination risk to groundwater during construction and operation.*
- *To ensure the continued diversion of clean water around the site and the containment of dirty water on the site.*
- *To minimise additional contact runoff which could overload the storm water system.*
- *To upgrade areas where design capacity is reached, to prevent problems*
- *To minimise health risks to surrounding communities, livestock and natural fauna and flora.*

Actions

TABLE 6: ACTIONS RELATING TO SURFACE WATER

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
DPMT Smelter Plant					
1	Surface water contamination	The use of standard erosion control measures, such as interception drains, contour planting, silt fences, establishment of groundcover species, optimal drainage construction, and silt ponds are to be applied where appropriate.	Environmental Manager	Within 1 year of approval	Sections 7.2 and 7.3 of the ESIA Report and CLA
2		Regular maintenance and proper safety procedures to prevent leaks and spills.	Director Asset Management	Ongoing	
3		Measure the remaining extent of contaminated soil on the smelter property and plant a shelter belt of indigenous trees or shrubs along the edges of these areas in order to prevent erosion and transport of contaminated soil into the Jordan River.	Environmental Manager	Ongoing	
4		Implement phytoremediation in order to prevent the erosion and spread of polluted riparian soils.	Environmental Manager	Ongoing	
5	Quality of Railway lines for acid transportation	Implement and strengthen, where necessary, emergency procedures to respond to emergency product spills in areas of DPMT responsibility. This may extend beyond the immediate boundary of the DPMT site.	Emergency Response Manager	Ongoing	Sulphuric Acid Plant EMP
6	Storm Water Management	Implement the surface water infrastructure upgrade project for the improved management of stormwater across the smelter site. Prioritised water infrastructure projects include the following: <ul style="list-style-type: none"> • Pollution Control Dams; • Drainage channels to Pollution Control Dams; • Concrete lined channels to replace the existing damaged open channels; • Lining of the No 10 Dam; • Recovering and rerouting contaminated water sources using bunding and pumps; • Separation of process water and stormwater; • Clean water separation via an earth embankment and sump; and • Treatment of effluent for recycling. 	Operations Director and Director Asset Management	Implement in a phased manner, commencing within 1 year of approval	Sections 7.2 and 7.3 of the ESIA Report and CLA

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
7		Consider the addition of a diversion berm and channel to the east of the smelter in order to achieve clean water separation. This would reduce flooding of the plant during excessive storm events and reduce contamination of the Jordan River with arsenic laden runoff.			
8		Undertake regular monitoring of stormwater infrastructure in order to ensure there are no blockages or excessive siltation and contact water is efficiently stored.		Ongoing	
9		Undertake regular sampling of runoff water on the site and in the downstream Jordan River in order to monitor pollution levels of water leaving the site.	Environmental Manager	Ongoing	
10		A study investigating phytostabilisation measures to control dust is to be completed. Preliminary recommendations include revegetation of exposed areas and the planting of pollution control woodlands at the base of tailings facilities to protect the Jordan River from runoff and sub-surface polluted seepage.	Environmental Manager	Ongoing	
11	Additional surface water run-off	Review storm water calculations with increased contact water from additional slag storage.	Senior Engineer Water and Tailings	Within 1 year of approval	Section 7.2 of the ESIA Report
12	Emergency procedures	Ensure that emergency procedures are in place do deal with major flood events.	Emergency Response Manager	Within 1 year of approval	
13	Drinking water	Undertake regular monitoring of on-site drinking water sources in order to ensure quality complies with Namibian drinking water standards.	Health & Hygiene Manager	Ongoing	Section 7.3 of the ESIA Report
Sewerage Plant					
14	Monitoring	Monitor operations of the sewerage plant in accordance with the site water monitoring programme.	Environmental Manager/Utilities	Ongoing	Section 7.2 of the ESIA Report
15		Continuously monitor workshops, oil spillages, sewerage pipelines and connections in order to prevent oil and other waste streams that could damage sewerage plant infrastructure from entering the system.			
16	Permit	Ensure that a valid discharge permit for treated effluent is in place and renewed with the Ministry of Agriculture, Water and Forestry, as required.		Prior to permit lapsing	General ESMP requirement
General Waste Site					

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
17	Storm Water Management	Clean storm water is to be diverted from all areas that may be contaminated.	HSE Director	In a phased manner in line with the stormwater management plan	Section 7.2 of the ESIA Report
18		Water from potentially contaminated areas to be contained in pollution control dams, recycled and re-used. Implement a water quality monitoring programme at the general waste site area.		Ongoing	
Hazardous Waste Site					
19	Diversion of clean water around the site and containment of dirty water	Monitoring and maintenance of surface water management measures in accordance with Operational Manual.	Environmental Manager	As per requirements of Operational Manual	Section 7.2 of the ESIA Report and the Hazardous Waste Disposal Site EMP
20		Implementation and maintenance of stormwater recycling system for run-off collected on site in accordance with Operational Manual.			
Water Balance					
21	Water Balance	Implement the actions recommended in the Surface Water Management: Site Water Balance Report (May 2019, Revision 3) compiled by Aurecon	Senior Engineer Water and Tailings	Ongoing	Surface Water Management: Site Water Balance Report (May 2019, Revision 3)

7

NOISE MMP

5.7 NOISE MANAGEMENT AND MITIGATION PLAN

5.7.1 COMPONENTS

This plan is made up of the following components:

- The monitoring and management of noise impact

5.7.2 MANAGEMENT AND MITIGATION

5.7.2.1 The monitoring and management of noise impact

Objectives

- *To minimise noise disturbance to surrounding communities*
- *To reduce impacts of noise from blasting and drilling on the surrounding areas and on the game on Tsumore Farm.*

Actions

TABLE 7: ACTIONS RELATING TO NOISE

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
DPMT Smelter Plant					
1		Monitor public complaints related to noise production from the smelter.		Immediate	Section 7.5 of the ESIA Report
2	Noise complaints	If a complaint regarding noise emissions relating to the continuous audibility of the operations is received, short term (24-hour) ambient noise measurements should be conducted as part of investigating the complaint. The results of the measurements should be used to inform any follow-up interventions. Measurements should be conducted by trained persons.	Environmental Manager	If required	
3	High noise activities	As far as is practicable, restrict start-up and major plant maintenance activities to daylight hours, should these activities be the source of high noise levels.	Director Asset Management	Ongoing	
4	Vehicle maintenance	All diesel-powered equipment and plant vehicles should undergo regular maintenance in order to prevent excessive noise levels. Undertake regular inspection of plant and, if necessary, replace intake and exhaust silencers.	Safety Manager	Ongoing	
5	Plant equipment	Select equipment with lower sound power levels. Vendors should be required to guarantee optimised equipment design noise levels. Implement engineering controls (e.g. installation and maintenance of silencers) in order to limit noise levels.	Supply Chain Manager	Detailed design stage Ongoing	Section 7.5 and Noise Specialist Report
6	Traffic noise	For management of noise from truck and vehicle traffic, the following should be implemented: <ul style="list-style-type: none"> • Minimise individual vehicle engine, transmission, and body noise/vibration. This is achieved through the implementation of an equipment maintenance program. • Maintain road surface regularly to avoid corrugations and potholes. • Avoid unnecessary idling times. • Minimise the need for trucks/equipment to reverse. This will reduce the frequency at which disturbing but necessary reverse warnings will occur. 	Site and Plant Manager	Ongoing	
7	Noise monitoring	Implement a noise monitoring programme to measure noise levels at sensitive noise receptors outside of the smelter footprint.	Environmental Manager and Health & Hygiene Manager	Ongoing on an annual basis	
8	Noise reduction	Establish a noise reduction action plan in order to manage the impact of noise from current processes on the surrounding environment and employees.	Environmental Manager and Health	Within 1 year of approval	

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
		Include administrative measures and engineering controls.	& Hygiene Manager		
Kliplime Quarry					
9	Blasting and drilling noise	Blasting and drilling operations must be limited to daylight hours during the week.	Quarry Manager	Ongoing	Kliplime Quarry EMP

8

ECOLOGY MMP

5.8 ECOLOGY MANAGEMENT AND MITIGATION PLAN

5.8.1 COMPONENTS

This plan is made up of the following components:

- Minimizing the damage and risks to natural ecology

5.8.2 MANAGEMENT AND MITIGATION

5.8.2.1 Minimizing the damage and risks to natural ecology

Objectives

- *To prevent damage or risks to natural ecology*
- *To control encroachment and proliferation of invasive and weed species*
- *To minimise disturbance to biodiversity and to minimise pressure on natural resources*
- *To limit the spread of alien invasive vegetation.*

Actions

TABLE 8: ACTIONS RELATING TO ECOLOGY

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
DPMT Smelter Plant					
1	Biodiversity Action Plan	Complete and execute a full Biodiversity Action Plan to address all issues relating to biodiversity management and rehabilitation, including all the below measures.	Environmental Manager	Within 2 years of approval	
2	Damage or risks to natural ecology	Implement measures for the control of SO ₂ emissions as set out in the Air Quality MMP to reduce risk of damage to vegetative material as a result of SO ₂ emissions.	Operations Director	Ongoing	Section 7.4 of the ESIA Report
3		Implement dust control measures as set out in the Air Quality MMP to reduce release of particulates which results in contamination of soils and vegetation.			
4	Alien vegetation	<ul style="list-style-type: none"> • Problem alien invasive species on DPMT property are to be controlled to prevent the spread of such species. Priority species for removal include the rubber vine (<i>Cryptostegia grandiflora</i>), wonderboom (<i>Leucaena leucocephala</i>), wild tobacco (<i>Nicotiana glauca</i>) and <i>Prosopis</i> species. • In the event that alien species provide a stability function, they are to be replaced with suitable indigenous species in a phased manner prior to removal. • Develop initiatives to contain invasive and alien species in the alien infested habitats along the eastern edge of the smelter property. • Remove cleared alien vegetation off-site so that it does not pose a fire risk. 	Environmental Manager	Ongoing	Section 4.12 of the ESIA Report
5	Weeds	Weeds are to be mechanically removed and/or chemically controlled as appropriate. Disposal methods for cuttings will depend on the species (e.g. burning).	Environmental Manager	Ongoing	Section 4.12 of the ESIA Report and Biodiversity Action Plan
6	No-go areas	Declare the dolomite hill habitat as a no-go area and avoid any further expansion into this habitat in line with the Biodiversity Action Plan.	Operations Director Environmental Manager	Within 1 year of approval	
7	Plant removal	Reduce access to the dolomite hill habitat and sandy plain habitat within the smelter boundary in order to prevent poaching of indigenous plants for firewood and medicinal purposes.	Environmental Manager	Ongoing	

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
8	Promote species diversity	Diversify the range of dominant vegetation species across the smelter property through the following: <ul style="list-style-type: none"> • Collect seeds of preferred species identified in the Biodiversity Action Plan and reseed areas selected with the purpose to create new base areas from which they can spread naturally, e.g. drainage line banks. • Target the sandy plains and the old eastern tailings facility. • Use only indigenous species. 	Environmental Manager	Ongoing	
9	Firewood harvesting	Prohibit wood harvesting on DPMT property	Environmental Manager/Security Manager	Ongoing	
10	Animals	DPMT will implement a zero tolerance policy with regard to the killing of any animals, including poaching. This applies to people directly employed by DPMT as well as any contractors working on their behalf.	Environmental/Security Managers	Ongoing	
11		Prevent large animals (livestock and game) from entering the premises and drinking from contaminated open water sources.			
12	Road kills	Enforce speed limits on access and internal roads in order to prevent road kills.	Security Manager	Ongoing	
13	Fire	No open fires will be permitted on site, except for fires in a controlled environment used for firefighting training.	Emergency Response Manager	Ongoing	Standard ESMP requirement
Powerline					
14	Bird strikes	Monitor for bird mortalities by undertaking the following steps: <ul style="list-style-type: none"> • Undertake quarterly monitoring surveys for bird mortalities along the entire length of powerline infrastructure and transformer structures, as well as on an around the tailings dam and near flood lights. • The identified "sensitive" sections should especially be closely checked, including the parts that cross drainage lines and other obvious flight corridors, and especially the section closest to the farm dam. • All mortalities should be recorded and reported to the DPMT Environmental Section and the NamPower/NNF Strategic Partnership to follow up and obtain specific recommendations around management. • Should collisions start to occur repeatedly in any one area on the line 	Environmental Manager	Ongoing	Powerline EMP

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
		that is not marked, the relevant section(s) should be retro-fitted with appropriate mitigation measures (flaps/markers). Should collisions still take place after mitigation, the marking methods would need to be reassessed.			
Kliplime Quarry					
15	Vegetation removal	Areas (quarry and project footprint area) from which vegetation may be removed are to be delineated prior to removal and vegetation is only to be removed from these areas.	Quarry Manager	During operations	Kliplime Quarry EMP
16		This material must be removed from the quarry site so that it does not pose a fire hazard.			
17		Consider the utilisation of cleared material in the creation of windrows on old tailings facilities within the smelter boundary in order to promote plant growth by providing compost and acting as traps for seeds and plant material.	Environmental Manager	Ongoing	

9

COMMUNITY HEALTH AND SAFETY MMP

5.9 COMMUNITY HEALTH AND SAFETY MANAGEMENT AND MITIGATION PLAN

5.9.1 COMPONENTS

This plan is made up of the following components:

- Ensuring community health and safety

5.9.2 MANAGEMENT AND MITIGATION

5.9.2.1 Ensuring community health and safety

Objectives

- *To monitor the impact of smelter operations on community health and safety*
- *To protect members of the community from dangers associated with access to the Kliplime Quarry.*

Actions

TABLE 9: ACTIONS RELATING TO COMMUNITY HEALTH AND SAFETY

No	Issue	Management/Mitigation	Responsibility	Schedule	References
DPMT Smelter Plant					
1	Buffer zone	Initiate a process with Government to delineate and establish a buffer zone, taking into account findings of specialist studies in the current ESIA and other ancillary studies. This buffer zone is to exclude agricultural development, collection of plant material (such as marula fruit) and certain commercial activities that place people at risk as a result of historical and future fallout of chemicals of concern from the smelter. The buffer zone is to be maintained in consultation with the appropriate local authorities in order to exclude residences within areas that may result in the exposure of persons to air quality emissions and soils containing high levels of pollutants.	Environmental Manager	Within 6 months of results of ongoing CLA study becoming available	Section 7.7 of the ESIA Report
2	Community health monitoring	Regular monitoring programme to be set up for voluntary community urine arsenic level testing. Schedule should be in line with a health specialist's recommendations. Monitoring should include tap water and drinking water source testing.	Health & Hygiene Manager / Stakeholder Affairs manager	Ongoing and in line with health specialist recommendations	Section 7.7 of the ESIA Report
3		Actions are to be identified to address issues of exposure identified by community health monitoring and to implement measures to reduce such exposure.			
4	Reduce SO ₂ exposure	Better control fugitive SO ₂ emissions at all points, particularly capturing emissions at the furnaces and the converters and from slow cooling of slag. Implement air quality management measures in the Air Quality MMP.	Plant Manager	Ongoing	Sections 7.4 and 7.7 of the ESIA Report
5	Efficient hazardous waste site operation	Efficient operation and maintenance of the hazardous waste disposal site and closure and capping in line with the long term operational and revised Closure Plan when the approved capacity is reached	Operations Director	In accordance with the deposition / operations manual	Sections 5.3 and 7.7 of the ESIA Report
6	Emissions monitoring	Ensure all air quality monitoring stations are functional for SO ₂ .	Environmental Manager	Ongoing	Sections 7.4 and 7.7 of the ESIA Report

No	Issue	Management/Mitigation	Responsibility	Schedule	References
7		Ensure that equipment at the monitoring stations is maintained and functional and undertake immediate repairs when necessary.			
8	Arsenic exposure investigation	Further arsenic exposure investigations to include the following: <ul style="list-style-type: none"> • Annual determination of arsenic levels in soil and grown vegetables/fruit in areas not covered by existing studies; • Hand to mouth behaviour as an arsenic exposure pathway; • Undertake more urine arsenic sampling in the most affected areas to the north of Tsumeb; • Undertake more urine arsenic sampling in under sampled areas within Tsumeb along with unexposed controls; and • Formalise a community arsenic management and monitoring programme to include the above investigations. Include community awareness component to address, e.g. personal hygiene and the related prevention of hand to mouth transmission of arsenic dust. 	Health & Hygiene Manager / Health Specialist	Ongoing Within 1 year of approval	Section 7.7 of the ESIA Report
9	Harvesting of plant foods	No harvesting of wild plant foods or edible insects is to be allowed within the smelter boundary.	Operations Director	Ongoing	Section 7.7 of the ESIA Report
10	Fencing and access	Fencing around the smelter site, tailings storage facilities and general waste site is to be maintained and access controlled.	Utilities Manager	Ongoing	General EMP requirement
Kliplime Quarry					
11	Dangers associated with access to the Kliplime Quarry	The fencing around the Kliplime Quarry is to be maintained and access to the site is to be prohibited (gate is to be locked at all times).	Quarry Manager	Ongoing	Kliplime Quarry EMP
12		Warning signage is to be put in place.			
13		Provide site security during drilling and blasting.		During drilling and blasting	
Hazardous Waste Site					
14		Maintain the fence and gate at the access point to the hazardous waste	Plant/Site Manager	Ongoing	Hazardous

No	Issue	Management/Mitigation	Responsibility	Schedule	References
15	Control access	site.			Waste Disposal Site EMP
		Maintain warning / access restriction signs at entrance to site.			
		Access to site is to be controlled and no unauthorised entry is to be allowed.			
16				Ongoing	
Further Health Impact Assessments					
17	Understanding of community health impacts	The recommendations/mitigation measures of the 2018/2019 Health Impact Assessment must be incorporated into this ESMP once finalised. The updated ESMP should then be provided to MET and disclosed to stakeholders by DPMT.	DPMT Management	Prior to Construction	2018 Health Impact Assessment
Unplanned events related to project design and construction					
18	Unplanned events	Ensure that HAZOP studies are carried out for the expansion project as well as part of the design phase for all future projects.	DPMT Management	Ongoing	Health, Safety & Environmental Criteria for Design, Purchasing, Installation, Refurbishment and Upgrading Procedure
Arsenic Exposure Reduction					
19	Arsenic Exposure Reduction Plan	Conduct a review on at least a 6-monthly basis to assess the implementation of the Arsenic Exposure Reduction Plan.	DPMT Management	Ongoing	Arsenic Exposure Reduction Plan
20	Arsenic exposure	Conduct follow up community health surveillance to assess the level of arsenic exposure.	Health & Hygiene Manager / Health Specialist	Ongoing	Health Impact Assessment
21	Arsenic exposure	Construct a wash bay for trucks leaving the site.	DPMT Management	Ongoing	Health Impact Assessment
22	Arsenic exposure	Provide warning signs at legacy waste sites.	DPMT Management	Ongoing	Health Impact Assessment
23	Arsenic exposure	Measure airborne arsenic levels more widely in the community.	Environmental manager and Health &	Ongoing	Health Impact Assessment

No	Issue	Management/Mitigation	Responsibility	Schedule	References
			Hygiene Manager		
HIV/AIDS Awareness					
24	HIV/AIDS awareness	Implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase	Health & Hygiene Manager	Ongoing	ESIA Report Section 7.6

10

OCCUPATIONAL HEALTH AND SAFETY MMP

5.10 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT AND MITIGATION PLAN

5.10.1 COMPONENTS

This plan is made up of the following components:

- Ensuring health and safety of DPMT employees

5.10.2 MANAGEMENT AND MITIGATION

5.10.2.1 Ensuring community health and safety

Objectives

- *To monitor the impact of smelter operations and expansion on occupational health and safety*
- *To improve the current occupational health and safety programmes to align with the increased smelter throughput capacity*

Actions

TABLE 10: ACTIONS RELATING TO OCCUPATIONAL HEALTH AND SAFETY

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
DPMT Smelter Plant					
1	Arsenic exposure	Implement engineering controls for reducing arsenic exposure pathways rather than emphasising reliance on personal protective equipment (PPE).	Engineering Manager	Ongoing	Section 7.7 of the ESIA Report
2		Continue to implement job rotations, but at lower arsenic cut-off values.	Operational Manager and Health & Hygiene Manager	Within 6 months of approval	
3		Investigate implementation of internationally recognised limits and standards for employee exposure to arsenic and complete arsenic exposure reduction action plan.	Health & Hygiene Manager	In progress, compliance by end 2021 if adopted	Section 7.7 of the ESIA Report
4				Conduct a review of control room facilities and upgrade where required in accordance with an arsenic exposure reduction action plan.	
4	Contractors' health and safety risks	Ensure that provisions are in place to manage health and safety risks associated with contractors and suppliers, including contract clauses, audits and performance reviews.	Health & Hygiene Manager	Ongoing	Section 7 of the ESIA Report
5	Emissions control	Investigate options to avoid, reduce and contain fugitive emissions and dust associated with the various operational processes (i.e. materials handling, smelting and slag processing), especially with regards to the increased throughput capacity. Based on the options analysis, implement reasonable measures.	Operational Manager and Health & Hygiene Manager	Ongoing	Sections 7.4 and 7.7 of the ESIA Report
6		Ensure converter and Ausmelt bag filters and bag house maintenance is undertaken on a regular basis.		Ongoing in line with planned maintenance and inspections	Section 7.4 of the ESIA Report
7		Implement measures to reduce dust emissions from conveyors in line with arsenic exposure reduction action plan.		By end of 2019	Sections 7.4 and 7.7 of the ESIA Report
8	Noise control	Investigate options to avoid and reduce noise exposure associated with the various operational processes, especially with regards to the increased throughput capacity. Based on the options analysis, implement reasonable measures.		Ongoing	Sections 7.5 and 7.7 of the ESIA Report

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
9	Update monitoring programmes	Review and update occupational hygiene and biological monitoring programmes to include considerations as a result of the increased throughput capacity. This should include dust, noise, heat and fume exposure, amongst others. Strengthen the industrial hygiene programme with more emphasis on industrial hygiene led exposure control rather than monitoring. Review the implementation of the Health & Hygiene Plan 2017 – 2021 on a 6-monthly basis.	Health & Hygiene Manager	Ongoing	Section 7.7 of the ESIA Report
10	Efficient hazardous waste site operation	Efficient operation and maintenance of the hazardous waste disposal site and closure and capping in line with the long term operational and revised Closure Plan when the approved capacity is reached	Operations Director	In accordance with the deposition / operations manual	Hazardous waste site EMP and Section 5.3 of the ESIA Report
11	Asbestos	Conduct a comprehensive asbestos survey, with an associated management plan.	Health & Hygiene Manager	Ongoing	
12	Heat stress	Update heat stress monitoring programmes and implement engineering controls where feasible.		Ongoing	
Unplanned events related to project design and construction					
13	Unplanned events	Ensure that HAZOP studies are carried out for the expansion project as well as part of the design phase for all future projects	DPMT Management	Ongoing	Health, Safety & Environmental Criteria for Design, Purchasing, Installation, Refurbishment and Upgrading Procedure
DPMT Standards					
14	Internal standards	DPMT shall compare OHS monitoring results to the “Occupational Health Standard: Adopted Workplace Exposure Limits” and implement corrective actions as required.	Health & Hygiene Manager	Ongoing	DPMT Occupational Health Standard: Adopted

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
					Workplace Exposure Limits

11

SOCIO-ECONOMIC MMP

5.11 SOCIO-ECONOMIC MANAGEMENT AND MITIGATION

5.11.1 COMPONENTS

This plan is made up of the following components:

- Promoting local employment and improve local economy

5.11.2 MANAGEMENT AND MITIGATION

5.11.2.1 Promoting local employment and improve local economy

Objectives

- *To increase contribution to local and regional economy*

Actions

TABLE 11: ACTIONS RELATING TO SOCIO-ECONOMIC ASPECTS

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
DPMT Smelter Plant					
1	To promote local employment and improve local economy.	Priority to be given to employment of local persons	Human Resources Manager	Ongoing	Section 7.6 of the ESIA Report Social Impact Assessment
2		Procurement to be given to local service providers within the district as far as practical.	Procurement Manager and Human Resources Manager		
3		DPMT procurement procedures to address capacity building within the community skill sector to meet potential job opportunities available at the plant or any future DPMT operations.			
4	Gender equality	The recruitment selection process should continue to promote gender equality and the employment of women where possible.		Ongoing	
5	Local SMME's	<ul style="list-style-type: none"> In consultation with the Tsumeb Municipality, ensure that the database of local companies, specifically Small Medium and Micro Enterprises (SMME's) that qualify as potential service providers is kept up to date. These companies should be notified of the tender processes and invited to bid for project-related work. Where possible, assist local SMME's to complete and submit tenders. Before the construction phase commences, DPMT must meet with representatives from the Tsumeb Municipality and establish whether a skills database exists for the area the database must be made available to the contractors appointed for the construction phase. DPMT, in consultation with the Tsumeb Municipality, must assist local SMME companies to complete and submit the required tender forms and associated information. 		Ongoing	
6	Tsumeb Community Trust	<ul style="list-style-type: none"> Continue to monitor the needs of the community in order to optimise the contribution of DPMT (e.g. via the Tsumeb Community Trust) to benefit the local and regional economy. Representatives from the local community and Tsumeb Municipality must be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that DPMT intends following for the construction phase of the project 	DPMT Management	Ongoing	

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
7	Concentrate transport	Consider increasing the percentage of concentrate transported by rail from the Port of Walvis Bay in order to reduce safety risks posed by truck traffic to other road users.	Operational Manager Walvis Bay bulk handling facility operator	Investigate within 1 year of approval	Section 5.4.8 of the ESIA Report
8	Concentrate handling	Consider loading concentrate into bags or similar enclosed containers in order to limit dust emissions at the bulk handling facility in the Port of Walvis Bay.		Investigate within 1 year of approval	
9	Sulphuric acid transport	<p>The following measures shall be implemented when transporting sulphuric acid from the sulphuric acid plant:</p> <ul style="list-style-type: none"> • The transporter must be provided with accurate information about the nature and properties of the load; • The load must be properly loaded and secured on site. • The transport operator must ensure that the Hazchem placards are properly fitted to the vehicle. • The responsible person must ensure that before the vehicle leaves the consignor's premises it is not overloaded or showing any obvious defect that would affect its safety. • Ensure that adequate steps are taken to minimise the effect an accident or incident may have on the public and on the environment; and • Initiate remedial action to clean up any spillage remaining on a site after an accident. 	Logistics Manager	Ongoing	Sulphuric Acid Plant EMP
10	Monitoring	DPMT must establish a Monitoring Forum (MF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should be established before the construction phase commences, and should include key stakeholders, including representatives from local communities and special interest groups (e.g. health and social welfare service providers, women's groups, any organisations dealing with GBV), local councillors, and the contractor(s). The MF should also be briefed on the potential risks to the local community associated with construction workers	DPMT Management	Ongoing	Social Impact Assessment

12

WASTE MANAGEMENT MMP

5.12 WASTE MANAGEMENT AND MITIGATION

5.12.1 COMPONENTS

This plan is made up of the following components:

- Effective waste management strategies

5.12.2 MANAGEMENT AND MITIGATION

5.12.2.1 Effective waste management strategies

Objectives

- *To minimise the impacts associated with waste generation and management on site*

Actions

TABLE 12: ACTIONS RELATING TO WASTE MANAGEMENT

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
DPMT Smelter Plant					
1	Waste Management Plan	Implement the DPMT Integrated Waste Management Plan in order to cover all aspects of waste production, reuse, recycling, treatment and disposal.	Environmental Manager	Ongoing	Section 5.3 of ESIA Report
2	Lining of new waste storage facilities	Ensure that all new waste-storage facilities are properly designed and constructed, as well as properly lined so as to prevent seepage into subsoil and the surrounding environment. These precautions will also restrict unwanted contact with humans and possible incompatible materials.	Environmental Manager	When designing new waste storage facilities	
3	Asbestos management	Review and upgrade the current asbestos management programme and drive actions in this plan for the appropriate management of asbestos waste products.	Health & Hygiene Manager	Within 1 year of approval	
4	Impacts associated with waste generation	General requirements for storage and handling of waste: <ul style="list-style-type: none"> • General and hazardous wastes are to be separated at source across all smelter operations; • Formalise a general waste handling area(s) appropriate to the type and volume of wastes received and processed; • The waste handling area should be equipped to manage specific hazardous waste streams or a specific hazardous waste handling area(s) must be developed separately; • Ensure that waste storage containers, are intact and not corroded or in any other way rendered unfit for the safe storage of waste; • Clearly demarcate and provide signage on and around waste storage areas; • Implement adequate measures to prevent accidental spillage of waste products; • Ensure that waste storage areas are secured to prevent waste being blown offsite; • Ensure that nuisances such as odour, visual impacts and breeding of vectors do not arise; • Prevent pollution of the environment and harm to health <ul style="list-style-type: none"> • Management and operations of this general waste handling area need to be revised as a soon as possible and a waste disposal solution added • No hazardous wastes should be delivered to the general waste handling area, 	Environmental Manager	Ongoing	Section 5.3 of ESIA Report

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
		<p>or the general waste site handling area could be upgraded to include a dedicated area and facilities (bunded and under roof) for the storage and handling of hazardous wastes.</p> <ul style="list-style-type: none"> The source practices which are resulting in hazardous wastes being included in the general waste stream are to be altered. Recyclable materials should be collected and stored at one location for further sorting and or processing (only be relevant if a market can be established for recycling of such materials). The residual portion of the waste stream requiring disposal should be subject to improved management. Open air burning of such wastes must be avoided. An alternative, improved solution must be implemented for the disposal of residual waste. If such burning were to continue in the short-term (for practical reasons) then the disposal of the resultant ash onto the ground at the general waste handling area must be prevented. 			
5	General waste disposal site	Open air burning of general waste must not be allowed on site.	Environmental Manager	Ongoing	Section 5.3 of ESIA Report
6		Establish a formal general waste landfill site in line with the approved landfill design or further investigate the feasibility of establishing a waste incinerator or disposing of general waste offsite in association with the Tsumeb Municipality.	HSE Director	Immediate	
7		No hazardous waste is to be disposed of at the general waste disposal site.	Environmental Manager	Ongoing	
8		A detailed waste management protocol will be developed for the site	Environmental Manager	Currently in draft format	
9		Waste generated is to be separated at source into recyclable and non-recyclable waste.	All		
10		No hazardous waste may be disposed of at the site. This requirement must be communicated in all induction and awareness training material.	Environmental Manager	Ongoing	
11		Waste collection points have been established on site. Care will be taken to ensure that these have sufficient capacity and that they are serviced frequently. Different skips are provided for wood, scrap metal, hazardous waste and general waste.			

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
12	Contain contaminated run-off from waste storage sites	A well-designed drainage system around waste-generating and –storage sites will be required so as to intercept any spillage and contaminated run-off that might result from loading and transporting of waste on the Smelter’s site. Waste water collected at a central drainage sump can be returned to the plant as process water or be tied-in with the feed to the Effluent Treatment Facility.	Utilities Manager/Emergency Response Manager		Sections 5.3 and 7.2 of ESIA Report
13	Emergencies	Emergency and safety protocols need to be in place in case of an incident which could lead to endangering the environment and human health. Emergency procedures are to consider events such as a potential tailings dam failure, pollution from erosion of the arsenic calcine dams, significant sulphuric acid spillage, etc. Existing emergency response plans should be maintained and updated, especially for the sulphuric acid plant where there would be an increase in acid production as a result of the increased throughput capacity of the smelter.			Standard ESMP requirement
14	Dangerous goods/waste transport	Dangerous goods and waste-transporting pipelines must be constructed of compatible and durable material, and must be subject to periodical maintenance and inspection programmes	Transport management	Ongoing	Section 5.3 of the ESIA Report and standard ESMP requirements
15		The Road Traffic and Transport Regulations of 2001 specify duties of the operator, driver, consignor and consignee (Section 308), require the driver to undergo training (Section 311) and specify the documents to be held by the driver (Section 312). Compliance with these regulations will ensure proper handling of dangerous goods during transport.	Logistic manager	Ongoing	
16		Ensure chain of custody records/waste manifest documents are kept for all waste materials transported offsite by internal or external waste service providers.			
17	Hazardous waste management	<p>Non-arsenic hazardous waste, not suitable for disposal at the on-site hazardous waste disposal site, will be collected by a contractor with the relevant permits and will be removed to a permitted hazardous waste disposal facility. Hazardous waste may only be stored on site, in a fenced off area with access control.</p> <p>Management of hazardous wastes not disposed to the DPMT hazardous waste disposal site must include the following:</p> <ul style="list-style-type: none"> • Classify all wastes in terms of the Globally Harmonised System (SANS 10234); • Label containers and provide Safety Data Sheets for all hazardous wastes; • Ensure chain of custody records/waste manifest documents for each hazardous waste departing the Tsumeb Smelter is kept; • Audit all external waste service providers to ensure that waste management 	Environmental Manager	Ongoing	Section 5.3 of the ESIA Report and standard ESMP requirements

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
		<p>operations are legally compliant;</p> <ul style="list-style-type: none"> • Implement the Minimum Requirements for waste Disposal to Landfill and Minimum Requirements for the handling, Classification and Disposal of Hazardous Waste (Second Edition 1998, South African Department of Water Affairs and Forestry) as provided in Table 2. These requirements are in line with IFC standards and are set out in the table below this MMP. <p>Arsenic hazardous waste, including baghouse dusts and calcines that cannot be processed are to be disposed of at the DPMT hazardous waste disposal site. Existing historic stockpiles of arsenic calcines and baghouse dusts are also to be disposed of at the hazardous waste disposal site or another registered hazardous waste disposal facility. A specific action plan and schedule must be established for disposal of old calcine dump material.</p>			
18	Hazardous waste disposal site expansion	<p>The additional construction of Cell 2 of the hazardous waste disposal site as per the approved 201 500 m³ site capacity will be undertaken in line with minimum best practices as per the original agreements for a H:H disposal site. In addition to the measures included in the Construction MMP, the following measures are to be implemented during the construction phase:</p> <ul style="list-style-type: none"> • Areas designated for site development are to be clearly demarcated and no disturbance is to take place outside of demarcated areas. • No vegetation is to be removed or damaged outside of areas demarcated for the development of the waste site. • If borrow pit areas are to be utilised for construction materials the following measures should be implemented: <ul style="list-style-type: none"> - Existing infrastructure is to be relocated in accordance with the landowner's requirements. - Access to site to be undertaken in accordance with landowner's requirements. - All infrastructure erected during borrowing activities to be removed from site at the end of operations unless agreed otherwise with the landowner. - Borrow pit areas to be fenced to restrict access of persons and cattle. - Faces of excavation are to be sloped to a maximum slope of 1:3. - Soil covering material is to be stripped and stockpiled prior to excavation. - Stockpiled soil is to be placed over excavated area as part of rehabilitation. - Rehabilitation of site to ensure free drainage of stormwater and to prevent 	HSE Director		Hazardous waste disposal site ESMP

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
		water from collecting in excavated area.			
19	Hazardous waste disposal site operation	Ensure operation of the hazardous waste disposal site is in line with the long term operational and revised Closure Plan. Ensure that these plans are regularly reviewed and kept up to date.	Environmental Manager	Ongoing	
20	Hazardous waste disposal alternatives	Further, investigate alternative options for the disposal of hazardous arsenic waste.	HSE Director	Within 3 years of approval	Sections 5.4.9 and 7.7 of the ESIA Report
21	Recycling initiatives	Review feasibility of implementing a system for the reuse or recycling of certain waste items generated by smelter operations in collaboration with a local waste contractor.	Environmental Manager	Within 1 year of approval	Section 5.3 of the ESIA Report
Sewage Plant					
22	Sewage Plant operations	<ul style="list-style-type: none"> Monitor operations of the sewerage plant in accordance with the site water monitoring programme. Ensure that the new sewage plant is repaired as a matter of priority and fully commissioned and the reed beds rehabilitated to remove sewage contaminant risks 	Utilities Manager and Environmental Manager	Ongoing	Section 7.2 of the ESIA Report
23	Rehabilitation of reed beds	Continuously monitor workshops, oil spillages, sewerage pipelines and connections in order to identify and manage oil and other waste streams from entering the sewage system.			

TABLE 2: MINIMUM REQUIREMENTS FOR HAZARDOUS WASTE HANDLING, STORAGE AND TRANSPORTATION

Subject	Minimum Requirement
Qualification as disposal site	If waste is held at a storage site for a period exceeding three months, the site automatically qualifies as a Waste Disposal Site, and must be registered as such and meet all the requirements of a disposal site.
Temporary storage area	A temporary storage area must have a firm, waterproof base and drainage system. It must be so designed and managed that there is no escape of contaminants into the environment.
Identification of waste	The transporter must be provided with accurate information about the nature and properties of the load.
Documentation	The transport operator must be provided with the relevant transportation documentation for the consignment.
Security of load	The load must be properly loaded and secured on site.
Hazchem placard	The transport operator must be supplied with the appropriate Hazchem placards and must ensure that it is properly fitted to the vehicle.
Vehicle roadworthiness	The responsible person must ensure that before the vehicle leaves the consignor's premises it is not overloaded or showing any obvious defect that would affect its safety.
Escape of hazardous spillage at site	The competent authority must be advised immediately would it prove impossible to contain spillage of a hazardous waste on the site.
Protection against effect of accident	The waste generator – or his representative, i.e. transporter – must ensure that adequate steps are taken to minimise the effect an accident or incident may have on the public and on the environment.
Spillage on site	The waste generator must initiate remedial action to clean up any spillage remaining on a site after an accident.
Notification	All road accidents must be reported to the competent transport authority on the prescribed documentation.

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ENVIRONMENTAL AWARENESS AND TRAINING MMP

6 ENVIRONMENTAL AND SOCIAL AWARENESS AND TRAINING MANAGEMENT AND MITIGATION

6.1.1 COMPONENTS

This plan is made up of the following components:

- General environmental and social awareness and training

6.1.2 MANAGEMENT AND MITIGATION

6.1.2.1 General environmental and social awareness and training

Objectives

- *To ensure that all persons working at the smelter are aware of the objectives of the ESMP as well as the consequences of their individual actions*

Actions

TABLE 13: ACTIONS RELATING TO ENVIRONMENTAL AND SOCIAL AWARENESS AND TRAINING

No	Issue	Management/Mitigation	Responsibility	Schedule	Reference
DPMT Smelter Plant					
1	Environmental and social awareness and training	Environmental and social induction training is to be undertaken by all persons undertaking work at the smelter (to be incorporated into normal induction training) including permanent workers, contractors and consultants.	Environmental Manager and Health & Hygiene Manager/ Social Performance Advisor/ People Development Manager	Ongoing	Standard ESMP requirement, Section 7.6 of ESIA Report
2		Environmental and social aspects and controls are to be included in the area specific induction training.	Environmental Manager/Health & Hygiene Manager/ Plant Managers/ Social Performance Advisor/ People Development Manager		
3		An environmental and social awareness and risk / job specific training programme to be implemented for smelter work force addressing pertinent topics as required, building on current awareness programmes.	Environmental Manager and Health & Hygiene Manager/ Social Performance Advisor/ People Development Manager	Ongoing	

14

CLOSURE PHASE

7 CLOSURE PHASE

In preparation for the closure phase of the DPMT smelter operations, a draft Closure Plan has been compiled that is continuously updated as changes are made to smelter operations and new specialist information and rehabilitation methodology becomes available. This Closure Plan is due to be revised during 2019/2020. The broad closure objectives as included in the draft Closure Plan are listed below:

- **Physical stability:** To remove and/or stabilise surface infrastructure and unavoidable mining and mineral processing residue which are present on the DPMT site to facilitate the implementation of the planned end land use;
- **Environmental quality:** To ensure that local environmental quality is not adversely affected by possible physical effects and chemical contamination arising from the DPMT site during the tenure of DPMT, as well as to sustain catchment yield as far as possible after closure;
- **Health and safety:** To limit the possible health and safety threats to humans and animals using the rehabilitated site as it becomes available;
- **Land use and land capability:** To re-instate suitable land capabilities over the various portions of the site to facilitate the progressive implementation of the planned land use;
- **Aesthetic quality:** To leave behind a rehabilitated DPMT site that, in general, is not only neat and tidy, giving an acceptable overall aesthetic appearance, but which in terms of this attribute is also aligned to the respective land uses;
- **Biodiversity:** To encourage, where appropriate, the re-establishment of indigenous vegetation on the rehabilitated sites such that terrestrial biodiversity is largely re-instated over time; and

- **Socio-economic mitigation:** To ensure that the infrastructure transfers, if applicable, measures and/or contributions made by the facility towards the long-term socio-economic benefit of the local communities are sustainable.

Table 14 sets out closure objectives/measures as included in previously approved EMPs and lists specific objectives included in the 2016 draft version of the Closure Plan (Golder, 2016). Specific measures to be implemented in order to meet the closure objectives will be further refined as part of the continuous updating of the Closure Plan. Closure planning will be conducted progressively and refined as information becomes available, resulting in an appropriate and up-to-date final closure plan at the time of closure. The draft Closure Plan is due to be revised during 2019/2020. Recommendations/mitigation measures from the revised Closure Plan must be incorporated into the ESMP once finalised. Any updated ESMP must be provided to MET and disclosed to stakeholders by DPMT.

TABLE 14: CLOSURE OBJECTIVES

No	Issue	Objectives
DPMT Smelter plant		
1	Soils	Regain pre-disturbance soil depth and slope where possible; maximise 'topsoil' depth utilising all stockpiled 'topsoil' reserves; limit compaction; limit contamination; optimise fertility; and limit erosion.
2	Land Capability	<ul style="list-style-type: none"> • Leave a rehabilitated site behind that is physically stable with limited residual contamination on land and in groundwater, to facilitate pre-disturbance land capability wherever possible. • Exclude agricultural activity and the harvesting of wild fruit and vegetables until test work has established that it would be safe for these activities and consumption. Aim for a pre-determined land capability and end land use and rehabilitate to a "wilderness" land use as defined in the SA Chamber of Mines definition.
3	Land Use	<ul style="list-style-type: none"> • Re-vegetate with sustainable indigenous (to the area) plants. • Implement Phytoremediation and Phytostabilisation utilizing indigenous trees and shrubs (mostly). • Zone the original operational area (i.e. smelter and old tailings storage facilities) as for commercial or industrial use only.
4	Soils	<ul style="list-style-type: none"> • Maintain/optimize fertility. • Limit contamination/pollution. • Limit erosion.

No	Issue	Objectives
5	Contaminated Land Management	<ul style="list-style-type: none"> • The recommendations/mitigations measures related to closure from the Contaminated Land Assessment must be incorporated into this ESMP once finalised. Any updated ESMP must be provided to MET and disclosed to stakeholders by DPMT. • Maintain post-disturbance capability by maintaining soil fertility and limiting further soil contamination/pollution, thus resulting in a high grass basal cover and healthy ‘woodlands’ ‘compartments’ (Phytoremediation); that limit soil erosion, and function effectively to reduce water-tables (evapotranspiration) and ameliorate the existing soil (uptake of certain pollutants) and air (covering litter layer and reduced wind flow) pollution. • Provide the required measures to limit at source the generation of contaminants which could adversely affect soils and land capability, surface and groundwater quality. • Remove all potential process-related contaminants, for safe disposal, to ensure that no hazardous waste is present on the respective sites once these have been rehabilitated. • Remove hazardous/contaminated material on an on-going basis and appropriately treating/disposing of. As removal is an on-going process, no hazardous waste build-up on-site should occur; • Demonstrate by means of suitable sampling and analysis that the threshold levels of salts, metals and other potential contaminants over the rehabilitated sites are acceptable, aligned to the end land use plan. • Limit dust generation on the rehabilitated sites that could cause nuisance and/or health effects to surrounding landowners/communities.
6	General Surface Rehabilitation	<ul style="list-style-type: none"> • Upfront zoning of the overall operational site to align to the end land use, thus creating ecological “management” units; • Ensure that the rehabilitated portions of the site are safe and stable in the long-term; • Limit the possible loss of topsoil by committing the available topsoil to key pre-determined rehabilitation areas; • Stabilise disturbed areas to prevent erosion in the short- to medium-term until a suitable vegetation cover has established; • Establish viable self-sustaining vegetation communities that will encourage the re-introduction of local fauna, as far as possible, once rehabilitated areas are established; • Assess whether the rehabilitated facilities, with limited intervention and change, could be adapted to provide suitable habitats for fauna, improving the overall biodiversity; • Identify those aspects/obstacles once site rehabilitation has been completed which could inhibit and/or deter animal life from returning to the rehabilitated site; • Remove the identified obstacles without compromising the adopted final land use(s).

No	Issue	Objectives
7	Infrastructure	<ul style="list-style-type: none"> • Close, dismantle, decontaminate, remove and dispose of all surface infrastructure and equipment, that has no beneficial post-closure use. • Shape and level disturbed footprint areas to create landforms that emulate the surroundings landscape as far as possible. • Shape, rip and vegetate access roads that do not have a post-closure use, haul roads and hardstand areas, and integrate these areas with the surrounding surface topography as far as possible. • Shape remaining earth embankments of dams to stable slopes, integrate with surrounding surface topography as far as possible, and establish vegetation. • Ensure that the rehabilitated site is free-draining and that run-off is routed to local/natural drainage lines as far as possible. • Remove, for safe disposal, all potential process-related contaminants to ensure that no hazardous waste is present once the site has been rehabilitated. • Remove hazardous material on an on-going basis off-site or at an appropriate and licenced facility onsite. • As removal and/or appropriate disposal is an on-going process, no hazardous waste build-up should occur.
8	Water Management	<ul style="list-style-type: none"> • Provide the required measures to limit at source the generation of contaminants which could adversely affect surface and groundwater quality. • Provide additional measures to abstract contaminated groundwater according to existing geophysical site characteristics and preferential flow paths. • Reinstate natural drainage lines as far as possible. • Ensure that the rehabilitated site is free-draining and run-off is routed to local/natural drainage lines as far as possible. • Demonstrate by means of suitable sampling and analysis that the threshold levels of salts, metals and other potential contaminants over the rehabilitated sites allocated in terms of the end land use plan are acceptable. • Demonstrate through a review of monitoring data that no possible surface and/or groundwater contaminant sources remain on the rehabilitated sites that could compromise the planned land use and /or pose health and safety threats. Groundwater monitoring is to continue up to at least five years after closure.
9	Ecology	<ul style="list-style-type: none"> • Actively remove invasive species established in rehabilitated areas. • Monitor vegetation establishment on rehabilitated areas after the first rain season following rehabilitation in terms of species diversity and density to ensure it resembles surrounding natural vegetation cover. • Based on monitoring results, vegetation establishment is to be augmented where required by seeding and hand planting prior to the following rain season. • Repair eroded areas.

No	Issue	Objectives
Residue and Stockpile Facilities		
10	Post-closure management	<ul style="list-style-type: none"> • Provide the required measures to limit at source the generation of contaminants which could adversely affect soils and land capability, surface water and groundwater quality; i.e. limit/prevent the water ingress into the facility which could result in seepage from the facility. • Rehabilitate residue facilities via shaping/profiling and/or additional environmental engineering to be physically stable and safe. • Demonstrate, through a review of monitoring data and/or predictive modelling, if required, that the effect of contaminants that could arise from the facilities could be managed via at-source controls. • Demonstrate by means of suitable sampling and analysis that the threshold levels of constituents of concern (CoCs) are acceptable. • Limit dust generation from remnant residue facilities that could cause nuisance and/or health effects to surrounding landowners/communities. • Landscape remnant residue facilities to render these “soft”, blending in with the surrounding landscape, as far as possible.
General Waste Site		
11	Post-closure management	<ul style="list-style-type: none"> • Monitor rehabilitated areas in terms of vegetation establishment and erosion. • Augment vegetation establishment where required by reseeded. • Repair eroded areas. • Ground and surface water monitoring should continue to be monitored post-closure. • Ensure that health and safety of people, flora and fauna are safeguarded from hazards resulting from the decommissioned waste site. • Ensure that environmental damage or residual environmental impacts are minimised to the extent that they are acceptable to all parties involved. • Rehabilitate land to achieve a condition approximating its natural state, where possible, or so that the envisaged end use of commercial or industrial land capability can be achieved. • The physical and chemical stability of the remaining structures must be such that risk to the environment through naturally occurring forces is eliminated. • Ensure that the waste site closure is achieved efficiently, cost effectively, and in compliance with the law.
Hazardous Waste Site		
12	Groundwater	Placement of capping and cover materials at the end of each phase in accordance with the Rehabilitation and revised Closure Plan.

No	Issue	Objectives
13	Environment	Leachate collection systems including return water dam to remain after closure.
14	Surface Water Environment	Provide suitable surface water drainage to ensure free drainage, as well as erosion protection.
15	Air Quality Environment	<ul style="list-style-type: none"> • Capping and cover to be put in place at the end of each phase, in accordance with the Rehabilitation and revised Closure Plan. • Limit dust generation that could cause nuisance and/or health effects to surrounding landowners/communities. • Progressively close if long-term storage of arsenic dust is reduced due to other arsenic dust treatment processes being implemented.
16	Land use	<ul style="list-style-type: none"> • Cap and cover any exposed areas of the waste body prior to site closure. • Retain leachate management measures (seepage collection manhole and return water dam) on site. • Retain fencing, access gates and warning signage on site after decommissioning. • All infrastructure not required in the future is to be removed from site and where necessary the footprint areas remediated and the rubble disposed of. • Provide the required long-term permanent (at least 100 years) solution/measures to limit at source the generation of contaminants which could adversely affect the environment and adjacent land uses and users, while being sufficiently robust to withstand the effects of the elements over this period (including resistance to animal burrows and the like); • Progressively cap the site as soon as final height and slopes are achieved on practically sized sections or phases of the landfill.
17	Post closure Management (Cover System)	<ul style="list-style-type: none"> • Must be sufficiently robust to minimise the risk of human intervention through the cover into the waste body. • Must accommodate long-term consolidation settlement. • Must not be adversely affected by the chemicals within the waste and possible leachate emanating from the landfill. • Must be stable on the landfill slopes under all conditions and be able to withstand long-term erosion. • Must have low maintenance requirements.
Kliplime Quarry		
18	Waste Management	<ul style="list-style-type: none"> • Demolish and remove all infrastructure (if applicable) upon closure of the quarry. No machinery may be left behind. • Check all demolished material and footprint areas for contamination with hazardous substances and remove hazardous material for disposal as hazardous waste. • Separate waste materials. • Remove salvageable waste from site for re-use. • Dispose of general waste (not contaminated with hazardous substances) at a general waste disposal facility. • Dispose of hazardous waste at a hazardous waste facility.

No	Issue	Objectives
19	Land use	<ul style="list-style-type: none"> • Rehabilitate footprint areas using available soil. • Topsoil stripped (if any) is to be used to cover all laydown areas and access roads. • Where soil supply is insufficient or not available, compacted surfaces are to be ripped (to a minimum of 300 mm) at intervals of no more than 2 m to provide for an effective rooting depth required to the establishment of self sustaining vegetation. • Shape and level rehabilitated areas to create landforms that emulate the surroundings as far as possible and that are physically stable and safe. • Ensure that rehabilitated areas are free draining.
Closure Plan Revision		
20	Closure planning	DPMT must ensure that post closure socio-economic impacts and opportunities are adequately addressed as part of the Closure Plan revision planned for 2019/2020.
21	Closure planning	DPMT should ensure annually that its Asset Retirement Obligations are accurate and current in order to fund the revised Closure Plan objectives
Social Impacts		
22	Retrenchment	DPMT must ensure that retrenchment packages are provided for all staff who stand to lose their jobs when the smelter is closed.
23	Skills training	DPMT must carry out a market needs assessment in view of developing a targeted skills training programme.
24	Skills development	DPMT must implement a skills training programme to equip employees with skills they can use when the smelter closes. The skills development programme should be designed to take into account current education and skills levels of employees. The skills training programme should be implemented from the outset of the operational phase and should be funded by DPMT.
25	Financial management	DPMT must provide employees with a basic financial management course to enable them to make informed decisions with regard to investing their earnings.

No	Issue	Objectives
26	Closure funding	DPMT must establish an Environmental Rehabilitation Fund to cover the costs of decommissioning and rehabilitation of disturbed areas, including the hazardous waste site and associated arsenic contamination (based on the revised Closure Plan cost calculations).

8 ENVIRONMENTAL MONITORING

8.1 SURFACE WATER MONITORING

The existing surface water monitoring programme is to be improved by including annual sampling (after rain events) of surface run-off water leaving the site and entering the Jordan River.

Sampling sites are to include five sampling locations along the Jordan River to the west of the smelter complex as indicated in Figure 6-1. An additional sampling site (SW6) downstream (north) of SW5 at a point beyond where the main drainage line from the site enters the Jordan River is to be added. This would enable monitoring of water discharged from the DPMT site. A site approximately 1 km north of SW5 near the BH18 groundwater monitoring borehole (see Figure 6-2) could be sufficient for this purpose and for comparison to water flowing towards the site (as sampled at SW2).

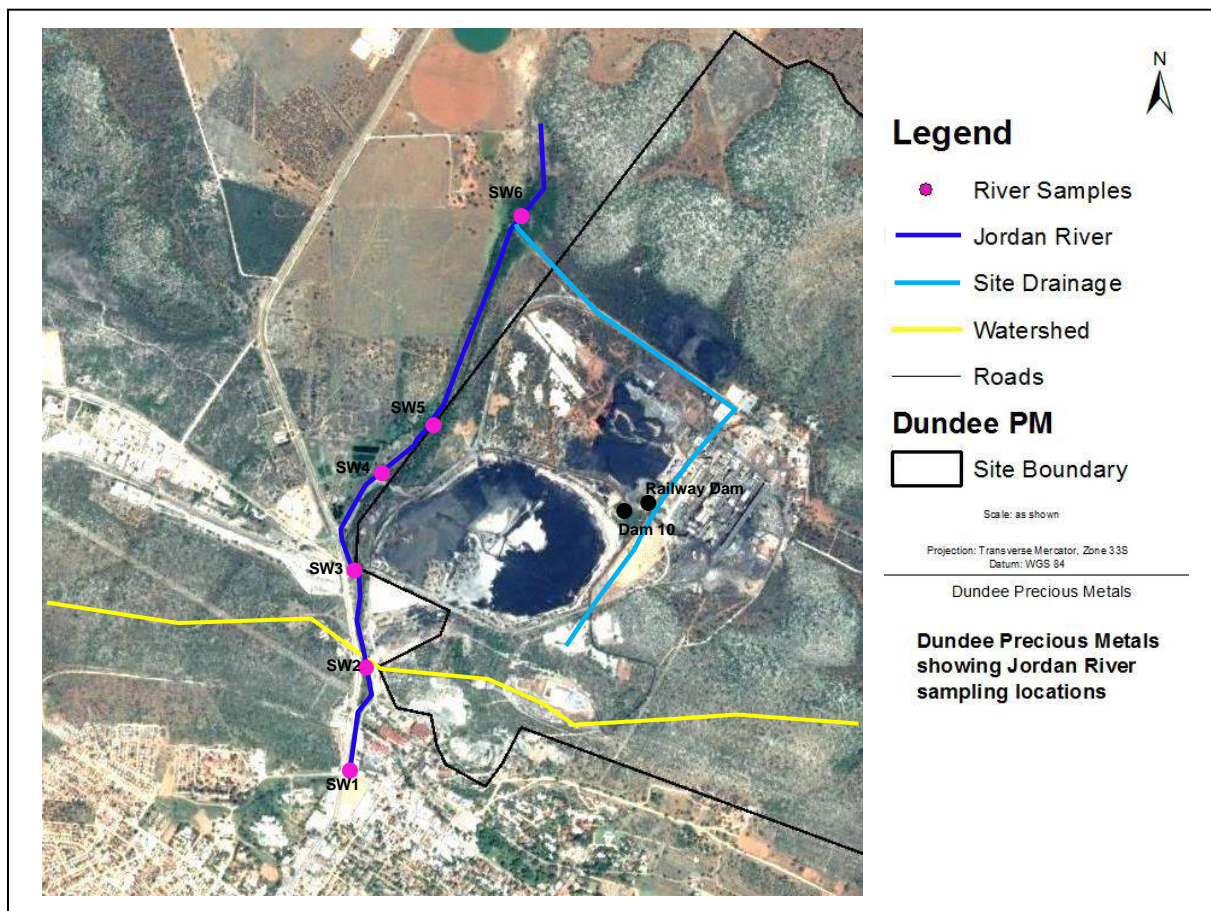


FIGURE 6-1: JORDAN RIVER WATER SAMPLING LOCATIONS

8.2 LEACHATE MONITORING

Leachate from the hazardous waste disposal site is drained to a contaminated stormwater pond and then pumped from a sump to the west of the facility where it is sprayed over the deposited waste as a form of dust suppression and to help reduce the liquid content through evaporation and aid compression to maximise storage space.

Leachate should be monitored for quality purpose from the stormwater pond. Leachate monitoring should be undertaken on a monthly basis for indicator parameters, with a full analytical suite undertaken on a quarterly basis.

The proposed analytical suite for leachate monitoring is presented in Table 6-1.

TABLE 6-1: PROPOSED ANALYTICAL SUITE FOR LEACHATE

Monthly Suite	Quarterly Suite
pH	pH
Electrical Conductivity	Electrical Conductivity
Alkalinity as CaCO ₃	Alkalinity as CaCO ₃
Total dissolved solids	Total dissolved solids
Ammonia as N	Ammonia as N
Chloride as Cl	Chloride as Cl
Sulphate as SO ₄	Sulphate as SO ₄
Arsenic as As	Fluoride as F
Cadmium as Cd	Nitrate as N
	Nitrite as N
	Aluminium as Al
	Arsenic as As
	Calcium as Ca
	Cadmium as Cd
	Chromium as Cr
	Copper as Cu
	Iron as Fe
	Potassium as K
	Magnesium as Mg
	Manganese as Mn
	Sodium as Na
	Nickel as Ni
	Phosphorus as P
	Lead as Pb
	Sulphur as S
	Antimony as Sb
	Selenium as Se
	Vanadium as V
	Zinc as Zn

8.3 GROUNDWATER MONITORING

A Water Monitoring Programme was initiated at the Tsumeb Smelter in 2010. Eight additional monitoring wells were constructed within the smelter area for this purpose. Monitoring commenced in March 2011. Since 2011, the groundwater monitoring points have been increased to 20 boreholes within the smelter precinct. The groundwater monitoring locations are provided in Figure 6-2. The groundwater monitoring parameters to be tested at the monitoring boreholes are set out in Table 6-2.

The groundwater monitoring schedule should include quarterly on-site and biannual off-site (regional) monitoring. The off-site monitoring should be conducted at water supply boreholes of the down-gradient groundwater users and at proposed additional monitoring boreholes to the north of the smelter complex.

TABLE 6-2: GROUNDWATER MONITORING PARAMETERS

Parameter	Units	Applicability to Monitoring Points
pH	pH-unit	All monitoring points
Electrical Conductivity	mS/m	All monitoring points
Total Dissolved Solids	mg/l	All monitoring points
Total Alkalinity as CaCO ₃	mg/l	All monitoring points
Chloride as Cl	mg/l	All monitoring points
Sulphate as SO ₄	mg/l	All monitoring points
Fluoride as F	mg/l	All monitoring points
Nitrate as N	mg/l	All monitoring points
Orthophosphate as P	mg/l	All monitoring points
Free & Saline Ammonia as N	mg/l	All monitoring points
Sodium as Na	mg/l	All monitoring points
Potassium as K	mg/l	All monitoring points
Calcium as Ca	mg/l	All monitoring points
Magnesium as Mg	mg/l	All monitoring points
Aluminium as Al	mg/l	All monitoring points
Arsenic as As	mg/l	All monitoring points
Cadmium as Cd	mg/l	All monitoring points
Cobalt as Co	mg/l	All monitoring points
Copper as Cu	mg/l	All monitoring points
Iron as Fe	mg/l	All monitoring points
Lead as Pb	mg/l	All monitoring points
Manganese as Mn	mg/l	All monitoring points
Mercury as Hg	mg/l	All monitoring points
Zinc as Zn	mg/l	All monitoring points

Parameter	Units	Applicability to Monitoring Points
Molybdenum as Mo	mg/l	All monitoring points
Selenium as Se	mg/l	All monitoring points
Phenols	µg/l	Tar monitoring point only
Total Petroleum Hydrocarbons	µg/l	Tar monitoring point only

All water released from the plant must comply with the recommended maximum limits for livestock watering in accordance with the South African Guidelines for Livestock Watering. These limits are recognised as a minimum requirement by the Namibian Ministry of Agriculture, Water and Forestry.



FIGURE 6-2: GROUNDWATER MONITORING BOREHOLE SITES

8.4 AMBIENT AIR QUALITY AND STACK EMISSIONS MONITORING

DPMT currently owns and operates five ambient air quality monitoring stations in and around Tsumeb. The location of the monitoring stations are provided in Figure 6-3. The parameters to be tested on a daily basis are listed in Table 6-3. The stack emission parameters to be tested and the associated targets are provided in Table 6-4.

TABLE 6-3: AMBIENT AIR QUALITY MONITORING PARAMETERS

Parameter	Applicability to Monitoring Stations
Weather	All monitoring stations
Sulphur Dioxide as SO ₂	All monitoring stations
Arsenic as As	All monitoring stations
Copper as Cu	All monitoring stations
Lead as Pb	All monitoring stations
Cadmium as Cd	All monitoring stations
Particulate Matter as PM ₁₀	All monitoring stations
Particulate Matter as PM _{2.5}	Community monitoring stations

TABLE 6-3: STACK EMISSIONS MONITORING PARAMETERS

Parameter	Target
Mercury	< 0.05 mg/Nm ³
Dust (PM ₁₀)	< 5 mg/Nm ³ (75 µg/m ³ *)
Total VOC	< 30 mg/Nm ³
Dioxins (PCDD/F)	< 0.1 ng I-TEQ/dNm ³
SO ₂	< 500 mg/Nm ³ (125 µg/m ³ *)
BaP (as PAH)	< 0.01 mg/Nm ³
HF (Fluoride)	< 0.5 mg/Nm ³
Arsenic	< 0.1 mg/Nm ³
Sulphuric acid	< 10 mg/Nm ³

*These are the prescribed 24-hour limits (the rest are EU Directive targets for future improvement)

As part of this ESMP DPMT should evaluate and action the following recommendations for the air quality monitoring procedure:

- Add a new ambient monitoring station approximately 1 to 2 km northwest of the smelter boundary (see Figure 6-3); and
- Improve data availability on the PM₁₀ analysers installed at the DPMT monitoring stations and maintain data availability for all other parameters by implementing a monitoring equipment maintenance programme.

Within the plant operational area

- Undertake continuous SO₂ monitoring at the sulphuric acid plant emissions stack;
- Undertake stack emission testing for the full operational cycle of the Rotary Holding Furnace (RHF) once it is operational;
- Undertake stack emissions testing on the outlet of the converter baghouse over the full converter cycle; and
- Measure building fugitive emissions once the RHF is operational. These emissions need to be updated given the decommissioning of the reverberatory furnace as well as to determine the extent of fugitive emissions from the charging and pouring RHF.



FIGURE 6-3: LOCATION OF DPMT AIR QUALITY MONITORING STATIONS

AFRICAN OFFICES

South Africa

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SOMERSET WEST

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Namibia

WINDHOEK

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