

**ENVIRONMENTAL HEALTH AND SAFETY
PLAN**

1 INTRODUCTION

This report is on the Environmental Health and Safety Plan (EHSP) for the MML operation is prepared as part of the Environmental and Social Management Plan (ESMP) for this ESIA study.

The Environmental Health and Safety Plan identifies the principles, approach, procedures and methods that will be used to control and minimize the adverse environmental and social impacts of all underground mining and processing activities associated with project development. It is intended to complement the project's Environmental and Social Impact Assessment (ESIA) and ensure that commitments made by MML to minimize project related adverse environmental and social impacts are upheld throughout all project phases.

It is intended that this EHSP will serve both as a checklist and framework to effectively manage the implementation of all environmental mitigation actions and monitoring to meet the requirements of Sierra Leone's environmental legislations and other requisite guidelines.

The MML ESMP has been prepared in line with the requirements of the MML Environmental Policy, which provides the overarching guidance to the company for controlling and managing its environmental impacts and aspects.

This EHSP relates specifically to the technical environmental aspects/impacts associated with the MML Project as described in the MML ESIA.

1.1 Plan Ownership & Maintenance

The MML Environment Manager is responsible for implementation and maintenance of this plan.

As the mine progresses and matures, this EHSP will be updated and reissued for use on an annual basis or sooner when:

- Changes or updates to Sierra Leone legislation or regulations occur;
- The mine's environmental aspects/impacts profile changes including mine expansion, modifications in process, expansion of mine footprint or other aspect with the potential for significant impacts on the environment; and
- Lessons learned from incidents, non-compliances, audits and ongoing monitoring.

1.2 Structure of EHSP

The MML EHSP is structured as follows:

Section 1: INTRODUCTION – An introduction to the environmental management approach adopted by MML. A description of the structure and layout of the EHSP is also contained within this section.

Section 2: REFERENCE DOCUMENTS – A brief description of legislation, standards, conventions, policies and guidelines with which the Project shall comply.

Section 3: MML OPERATIONS– This section provides a brief description of the key project activities, processes and areas of operation.

Section 4: RESOURCES AND RESPONSIBILITIES – This section defines the roles and responsibilities of key MML personnel and the resources allocated by MML to effectively manage identified environmental issues.

Section 5: ISSUE MANAGEMENT - This section describes the approach that MML will take to managing environmental issues associated with the MML Project.

Section 6: ENVIRONMENTAL MANAGEMENT ACTIVITIES TABLE – A table of all the key environmental aspects and their management.

2 REFERENCE DOCUMENTS

This section provides an overview of the Sierra Leone legislative framework and describes the relevant Sierra Leonean Legislation that the company will comply with.

2.1 National environmental policies and legislation

2.1.1 Environment Protection Agency Act, 2008

The Environment Protection Agency Act of 2008 establishes the authority, responsibility, structure and funding of the Environmental Protection Agency of Sierra Leone (EPASL).

Part III of the Act describes the functions of the EPASL, which includes the issuing of environmental licenses and the promotion of national environmental standards. Part IV of the Act sets out the environmental permitting process and the issuance of licenses.

The Environment Protection (Mines and Minerals) Regulations 2013 are enabled under Section 62 of the EPA Act of 2008. These cover the following areas:

- further direction on the permitting process to be undertaken;
- detailed guidance on the contents of key documents (e.g. ESIA, EHSP, etc);
- requirements for stakeholder engagement and participation;
- lists environmental discharge and emission standards; and
- Describes closure requirements.

2.1.2 The Mines and Minerals Act, 2009

The Sierra Leone Mines and Minerals Act of 2009 established the authority and responsibility of the Ministry responsible for mining regulation and management.

In relation to the MML project, the following parts of the Act have the most relevance:

Part III – establishes responsibility for exercising regulatory supervision over mining operations, including inspections of sites.

Part IV – establishes types of licences that may be granted under this Act, including a large scale mining licence with prescribed conditions.

Part IV – delineates between mineral (i.e. mining) and surface rights (i.e. landholder). This includes stipulating separation distances from sensitive receptors as well as stipulating the right of access to mining lease areas for landholders to farm, build houses etc, and the compensation payable.

Part VII – outlines the process by which a mining company would need to surrender the lease (i.e. upon closure), including the need for a plan to obtain lease relinquishment that includes assets to be left in place. Also includes the ability to suspend a licence for a gross violation of health and safety or environmental harm, using child labour etc.

Part XII – Outlines the requirements for a large scale mining lease which includes the need to submit details on a range of issues relating to HSE including progressive rehabilitation of the site, the environmental and social effects of the project, resettlement, particular risks of the project to health or otherwise, details on landholders, training and an EIA with mitigation measures described. The Environmental Health and Safety Plan shall be included in the licence. It also covers Temporary and permanent production suspension on large scale mining leases.

Part XV – Describes the environmental protection measures required in order to operate. Includes the need for an EP licence approved under the EPA Act of 2008, the need for a baseline reflecting international best practice, the contents of an environmental impact assessment, in addition to any requirements set out in the EPA Act of 2008. Also identifies reporting requirements, updates to the project EHSP, outlines the need for a closure bond, and identifies penalties.

Part XVI – Requires a community development agreement to be developed. The contents of such an agreement are listed and any unique circumstances that need to be considered for inclusion.

Part XVII – Outlines Occupational Health & Safety (“OHS”) duty of care requirements for project proponent but also the proponent Employees. It also identifies the right to refuse to work for reasons of safety and the requirement by companies to report serious injuries or fatalities. Also, provides the Ministry responsible with the authority to develop regulations pertaining to safety and health for mining operations.

The Mines and Minerals Operations Regulations 2013 are enabled under Section 176 of the Mines and Minerals Act. They cover the following areas:

- General obligations of MML
- Waste dump, pit and TSF design requirements
- Occupational Health and Safety
- Blasting and explosives use
- Mine site closure

2.1.3 The MML Mine Lease & Agreement

- The Mining Lease Agreement is still under negotiation and to be ratified by the Sierra Leone parliament.

2.1.4 Other Sierra Leone legislation

Table 2-1 provides a list of other Sierra Leonean legislation, plans and policies that are followed.

Table 2-1: National Legislation

Sierra Leone Legislation	
The Constitution of Sierra Leone, 1991	The Wildlife Conservation Act, 1972
National Environmental Policy of 2013	Forestry Act, 1988
National Lands Policy 2016	The Ports Authority Act, 1964
The Factories Act, 1974	Maritime Administration Act, 2000
The Explosives Ordinance, 1955	The Merchant Shipping Act, 2003
The National Minerals Agency Act, 2012	Road Traffic Act, 2007
The Water Company Act 2001	Protection from Radiation Act 2001
The Fisheries (Management & Development) Act 1994 (Amended 2007)	National Lands Policy 2005
National Protected Area Authority Act 2012	The Sierra Leone Electricity & Water Regulatory Commission Act, 2011

2.1.5 Other licences

- All radioactive sources (e.g. densitometers) require a license from the Radiation Board of Sierra Leone. This should include a return to sender agreement for disposal of the units at decommissioning.
- Water abstraction requires a license from the Ministry of Water Resources. MML will acquire a water abstraction license prior to commencement of mining operations.

2.2 International conventions

Sierra Leone has ratified a number of international conventions that apply to the MML Mine:

- Convention on the Ban of the Import into Africa and the Control of Trans-boundary Movement of Hazardous Wastes within Africa 1991 (Bamako Convention).
- International Convention on Pollution, Preparedness and Response Cooperation, 1995.
- Convention for the Prevention of Marine Pollution from Ships (MARPOL 73/78).
- Convention on International Trade in Endangered Species of Wild Fauna and Flora 1995 (CITES).
- Stockholm Convention on persistent organic pollutants (2003).
- The Convention on Wetlands 1971 (RAMSAR Convention).
- UN Framework Convention on Climate Change (1997).
- Convention on Biological Diversity (1992).
- Vienna Convention for the Protection of the Ozone Layer (1987) and the Montreal Protocol on Substances That Deplete the Ozone Layer.
- Convention for the Control and Management of Ships Ballast Water and Sediments.

- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 and 1996 (London Protocol).
- The Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region, 1981 (Abidjan Convention).
- United Nations Convention to Combat Desertification (UNCCD).
- The Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention)

2.3 Compliance Hierarchy

The compliance (legal and internal) requirements associated with the activities and operations of MML Mines operational/production activities are defined in a descending hierarchy of order as follows:

1. Compliance requirements imposed by the Sierra Leone Regulatory Framework;
2. International conventions and guidelines to which Sierra Leone is a signatory or with which MML must comply (e.g. Bamako Convention);
3. MML corporate requirements including those recommended by organisations which MML is a member.

Where there is no specific Sierra Leone environmental legislation coverage, MML may adopt an appropriate industry or international standard.

2.4 Project Environmental Standards

The following project standards are based on Sierra Leone legislation and regulations, conventions to which Sierra Leone is signatory (e.g. MARPOL) and in areas where there are no Sierra Leonean regulations, good industry practice such as IFC EHS Guidelines, WHO Standards etc will be adopted.

2.4.1 Water Quality

The EPA does not prescribe standards for water quality with the exception of effluent water quality standards. As such the World Health Organisation (WHO) guidelines will be used to compare existing water quality conditions in the MML Project Area.

The primary purpose of the WHO guidelines is the protection of public health and they also provide recommendations for managing the risk from hazards that may compromise the safety of drinking water (WHO, 2011). Table 2-2 lists the WHO guidelines.

Table 2-2: World Health Organisation Guidelines for Drinking-Water Quality, 4th Ed.

Parameter	Units	Guideline
pH		6.5-8.5
Total Dissolved Solids (TDS)	mg/l	600
Total Hardness	mg/l	200

Parameter	Units	Guideline
Sulphate	mg/l	250
Total Aluminium	µg/l	100*
Total Arsenic	µg/l	10
Total Barium	µg/l	700
Total Cadmium	µg/l	3
Total Chromium	µg/l	50
Total Copper	µg/l	2000
Total Iron	µg/l	300*
Total Lead	µg/l	10
Total Manganese	µg/l	100*
Total Mercury	µg/l	6
Total Nickel	µg/l	70
Total Zinc	µg/l	3000*

*Guideline value derived from taste and not health issues.

Table 2-3 lists the terrestrial effluent guidelines from the Environmental Regulations and IFC EHS Mining Guidelines. Compliance with the Environmental Standards listed is for “end of pipe”; dilution as a means of pollution control is also explicitly prohibited. Where a parameter is not listed, MML shall refer to an internationally recognized effluent limit.

Table 2-3 Effluent Guidelines from Environmental Regulations and IFC EHS Mining Guidelines

Parameter	Environmental Regulations		IFC Guideline Value
	Maximum at any moment	Annual average maxima	
TSS	50 mg/L	25 mg/L	50 mg/L
pH	6-9 pH units	6-9 pH units	6 - 9 pH units
COD	-	-	150 mg/L
BOD5	-	-	50 mg/L
Oil and Grease	10 mg/L	16 mg/L	10 mg/L
Total Arsenic	0.1 mg/L	0.08 mg/L	0.1 mg/L
Total Cadmium	0.05 mg/L	0.04 mg/L	0.05 mg/L
Total Chromium (VI)	0.1 mg/L	0.08 mg/L	0.1 mg/L
Total Copper	0.6 mg/L	0.4 mg/L	0.3 mg/L
Iron (total)	-	-	2.0 mg/L
Iron (dissolved)	2.0 mg/L	1.6 mg/L	-
Total Lead	0.2 mg/L	0.16 mg/L	0.2 mg/L

Parameter	Environmental Regulations		IFC Guideline Value
	Maximum at any moment	Annual average maxima	
Total Mercury	0.002 mg/L	0.0016 mg/L	0.002 mg/L
Total Nickel	-	-	0.5 mg/L
Phenols	-	-	0.5 mg/L
Total Zinc	1.5 mg/L	1.2 mg/L	0.5 mg/L

Table 2-4 provides guideline values for sewerage discharge from terrestrial facilities at the mine site and Thofayim based on the IFC General EHS Guidelines.

Table 2-4 IFC Sewerage Effluent Guidelines for Terrestrial Discharge

Parameter	Unit	Guideline Value
pH	pH	6 - 9
BOD	mg/L	30
COD	mg/L	125
Total nitrogen	mg/L	10
Total Phosphorous	mg/L	2
Oil and Grease	mg/L	10
TSS	mg/L	50
Total coliform number	MPN*/100ml	400

* MPN - most probable number

Table 2-5 provides the standards to be applied to effluent levels from the Marampa Project transshipment vessels and tugs.

Table 2-5 Standards for Effluent Discharges from Transshipment and Tugs

Source	Project Standards
Cooling Water (from Transshipment vessels only)	The effluent should result in a temperature increase of no more than 3°C at 100 m from point of discharge as per IFC EHS Guidelines.

Source	Project Standards
Sewage	<p>Discharge of treated sewerage allowed within the SL estuary below Tasso Island. Sewerage to be treated with approved marine sanitation unit as per MARPOL Annex IV; pH 6-8.5, BOD 25 mg/l max, COD 125 mg/l max, TSS 35 mg/l max, Thermotolerant (Faecal) Coliform number 100MPN max, Free chlorine residual <0.5 mg/l</p> <p>No discharge above Tasso Island or within Port Loko Creek</p> <p>No discharge of untreated sewerage.</p> <p>Sewerage may be sent ashore for treatment at shore based facilities.</p>
Food Waste	<p>Within the SL estuary below Tasso Island, food waste (no plastics or non-food items to be discharged) shall be macerated to <25mm and discharged.</p> <p>No discharge above Tasso Island or within Port Loko Creek.</p>
Bilge Water	<p>Treat to 15 ppm oil concentration as per MARPOL 73/78 Annex I requirements.</p> <p>Discharge of treated bilge water within the SL estuary below Tasso Island.</p> <p>No discharge of any bilge water above Tasso Island or within Port Loko Creek - bilge water to be sent ashore for treatment.</p>
Ballast Water	Discharge of segregated ballast water only.
Deck Drainage	Maximum of 15 ppm oil concentration as per MARPOL 73/78 Annex I requirements and 50 mg/l TSS.
Desalination brine	Mix with other discharge streams if feasible.

2.4.2 Air Quality

Due to a lack of national standards, air quality guidelines from the IFC will be adopted.

The key documents considered are:

- IFC (2007) EHS Guidelines: General EHS Guidelines;
- IFC (2007) EHS Guidelines General Guidelines: Environmental Air Emissions and Ambient Air Quality;
- IFC (2007) EHS Guidelines: Mining; and
- IFC (2008) EHS Guidelines: Thermal Power Plants.

The IFC guidelines for ambient air quality are based upon the World Health Organisation (WHO) Air Quality Guidelines for Europe 2000 and 2005 update (*Table 2-6*). The guideline values are aspirational and are intended to confer a maximum degree of protection of human health. Interim targets are set at points to allow the staged achievement of air quality standards, with the Interim 1 targets representing concentrations in ambient air above which it could be reasonably expected that health effects would begin to be observed. Although the aim will be to achieve the Guidelines where practicable, meteorological conditions during the dry season in Sierra Leone result in elevated background concentrations of particulate matter (PM₁₀ and PM_{2.5}) and dust deposition. Therefore in regards to AQS for PM₁₀ and PM_{2.5} achieving the Guidelines is not considered practicable and this assessment will refer to the interim targets.

Table 2-6 Air Quality Guidelines for the Protection of Human Health

Pollutant	Averaging period	IFC/WHO (µg/m ³)
Dust (Total Suspended Particulates)		No AQS
PM ₁₀	24 hour mean	150 (Interim target 1)
		100 (Interim target 2)
		75 (Interim target 3)
		50 (Guideline)
	Annual mean	70 (Interim target 1)
		50 (Interim target 2)
		30 (Interim target 3)
		20 (Guideline)
PM _{2.5}	24 hour mean	75 (Interim target 1)
		50 (Interim target 2)
		37.5 (Interim target 3)
		25 (Guideline)
	Annual mean	35 (Interim target 1)
		25 (Interim target 2)
		15 (Interim target 3)
		10 (Guideline)
NO ₂	1 hour mean (as third highest hourly mean)	200
	Annual mean	40
SO ₂	10 minute mean	500

Pollutant	Averaging period	IFC/WHO ($\mu\text{g}/\text{m}^3$)
	24 hour mean	125 (Interim target 1)
		50 (Interim target 2)
		20 (Guideline)

With regards to dust deposition standards, there are several standards and guidelines published by various bodies (Table 2-7).

Table 2-7 Dust Deposition Nuisance Thresholds

Potential for complaint	Measure of soiling ($\text{mg}/\text{m}^2/\text{day}$)	Data source
National Guidelines		
Possible Nuisance	350 (monthly mean)	Germany TA-Luft (2002)
Very Likely Nuisance	650	Germany TA-Luft (2002)
First Loss of Amenity	133 (monthly mean)	West Australia Nuisance Standard
Unacceptable reduction in air quality	333	West Australia Nuisance Standard
Serious nuisance	200	UK recommended nuisance dust deposition rate
Nuisance dust deposition	133	Malaysia air quality standard

There is no clear prediction as to the level of dust deposition that is likely to result in nuisance. The following standards will be used by the project

- Not Significant: $<120\text{mg}/\text{m}^2/\text{day}$;
- Minor: $120 - 200\text{mg}/\text{m}^2/\text{day}$;
- Moderate: $200 - 350\text{mg}/\text{m}^2/\text{day}$; and
- Major: $>350\text{mg}/\text{m}^2/\text{day}$.

There is limited evidence available on levels at which dust deposition affects plants. However, one key source, Farmer (1993) summarises evidence for damage to vegetation due to dust soiling. The study shows that impacts vary considerably between species and with different dust types. Broadly however, the evidence suggests that damage to vegetation due to dust deposition will occur at approximately the same rate as nuisance will occur for human receptors. On this basis, the same criteria have been used to determine the point at which nuisance issues for sensitive human receptors may arise and damage to vegetation may occur.

The Environmental Regulations identify maxima of 6mg/m³ for NO₂ and 10mg/m³ total suspended solids (Table 2-8). For SO₂, the emission limits are based on total emission limits (Table 2-9).

Table 2-8 Air Quality Maxima Listed in the 2013 Environment Regulations

Parameter	Limit at any moment
Arsenic (mg/m ³)	5.0
Carbon monoxide (mg/m ³)	29.0
Copper (mg/m ³)	1.0
Free silica (mg/m ³)	5.0
Hydrogen cyanide (mg/m ³)	11.0
Hydrogen sulphide (mg/m ³)	14.0
Lead - dust and fumes (mg/m ³)	0.15
NO ₂ (mg/m ³)	6.0
Particulate (interior nuisance dust) (mg/m ³)	10.0

Table 2-9 SO₂ emission limits in t/day listed in the 2013 Environment Regulations

Sulphur input (t/day)	SO ₂ emission limit (t/day)
<10	20
11-15	25
16-20	30
21-30	40
31-40	50
41-50	60
51-70	66
71-90	72
91-120	81
121-150	90
151-180	99
181-210	08
211-240	117
241-270	126
271-300	135
301-400	155
401-500	175
501-600	195

Sulphur input (t/day)	SO ₂ emission limit (t/day)
601-900	201

2.4.3 Noise and Vibration

As there are no relevant national standards for environmental noise in Sierra Leone, direction is sought from international guidance and standards. The requirements of the IFC's Performance Standards, which are derived from the World Health Organisation guidelines, will be used as guidance when considering impacts relating to environmental noise.

The IFC Environmental, Health, and Safety (EHS) Guidelines provide noise level guidelines. The guideline states:

Noise impacts should not exceed the levels presented in Table 1.7.1, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

Table 2-10 (of the IFC EHS Guidelines) is reproduced as Table 2-10 below directly from the guidance.

Table 2-10 IFC EHS Guideline Values for Noise

Receptor	Maximum Allowable Ambient Noise Levels, LAeq,1hr, dB(A) Free field	
	Daytime	Night-time
	07:00 – 22:00	22:00 – 07:00
Residential, institutional, educational	55	45
Industrial, commercial	70	70

In addition to the General EHS Guidelines, the IFC has developed industry specific guidelines such as the EHS Guidelines for Mining¹ which are applicable to underground and open-pit mining, alluvial mining, solution mining, and marine dredging.

The IFC general EHS guidelines (2007) are used to assess impacts on people caused by disturbance and consequential annoyance from industrial noise. The guidelines use LAeq,1hr levels for daytime and night-time to assess disturbance effects on people. The IFC EHS guidelines indicate that significant disturbance effects on people have a threshold of 55 dB LAeq,1hr, and 45 dB LAeq,1hr for daytime and night-time respectively. In cases where ambient noise levels are already above these threshold levels significant disturbance impacts are deemed to arise if LAeq,1hr levels are increased by more than 3 dB.

(1) IFC/ World Bank Environmental, Health, and Safety Guidelines - MINING

2.4.3.1 *Vibration (Other than Blasting)*

In the absence of quantitative local guidelines specific to mining, quarry and/or construction operational vibration, vibration criteria have been developed with reference to the following international structural damage and human annoyance guidelines:

- German Institute for Standardisation DIN 4150 Part 3 - Structural Vibration: Effects of Vibration on Structures, February 1999 (DIN4150-3);
- Department of Environment and Conservation NSW (Australia) - Assessing Vibration: a Technical Guideline (AVTG), February 2006;
- British Standards Institution BS 6472: 2008, Guide to evaluation of human exposure to vibration in buildings - Part 1: Vibration sources other than blasting; and
- British Standards Institution BS 5228-2 - Code of Practice for Noise and Vibration Control on Construction and Open Sites, 2009 Part 2 - vibration.

Table 2-11 summarises the structural damage and human annoyance vibration criteria applicable to residential premises, which have been adopted as the project-specific vibration criteria by which the magnitude of potential impacts may be quantified at vibration sensitive receptor locations in the vicinity of the site. The more stringent night time criteria (preferred) is the limiting values for project vibration.

Table 2-11 Vibration Impact Assessment Criteria (other than blasting)

Factor		Vibration Criterion	Trigger Action Level, PPV
Structural Damage ¹		3 mm/s PPV	3 mm/s
Human Disturbance	Daytime	0.2 VDV, m/s ^{1.75}	3 mm/s
	Night time	0.13 VDV, m/s ^{1.75}	1 mm/s
Haul Road Vibration			
1- In consideration of the structural integrity of local buildings, a conservative level has been adopted.			

2.4.3.2 *Blasting Emissions Criteria*

Blasting from mining activities can have impacts on surrounding residential receptors, ecological receptors, structural and infrastructure receptors including plant, machinery, buildings and pipelines with regard to airblast (overpressure) and ground vibration.

In lieu of Sierra Leone or international blasting guidelines a review of the following blast emissions criteria has been conducted:

1. Ontario Limits for Quarries (Canada);
2. Office of Surface Mining Reclamation and Enforcement (OSMRE), USA;
3. Australian and New Zealand Environment and Conservation Council (ANZECC) Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration (ANZECC, 1990);

4. British Standard BS6472: 2008 Guide To Evaluation of Human Exposure to Vibration in Buildings Part 2: Blasting Induced Vibration;
5. British Standard BS5228 (2009) Code of Practice for noise and vibration control on construction and open sites;
6. Minerals Technical Advice Note 2: Coal (MTAN), January 2009 (Wales);
7. Minerals Planning Guidance Note 9 (MPG), 1992 (UK) and Scottish Government Circular 26/1992; and
8. Australian Standard AS 2187.2 (2006) Explosives – Storage, Transport and Use.

From review of the various international standards and guidelines the following evaluation criteria was developed:

- Overpressure airblast should not exceed 115 dB(Z) for 5 % of blasts over a 12 month period and should never exceed 125 dB(z) at any time; and
- Ground vibration should not exceed 3 mm/s.

3 MML OPERATIONS - PLANNED

Key mining and processing requirements at the start of operations include having the Project being able to treat primary ore as well as produce a consistent high grade and clean concentrate product (grading at least 65% Fe). A phased approach, primarily reflecting changes in ore type available to process, as well as limitations in the infrastructure required to support the Project over time will be used. Mining and processing will initially be concentrated on the mining and reprocessing of highly weathered and moderately weathered ore in the existing processing plant. Later, through engineering and construction, MML will re-design and upgrade the current configuration of the Project to produce high grade concentrate.

A summary of the project phasing follows.

- Phase 1 is a continuation of what was in existence before the mine shut down. It entails mining weathered ore initially at 2 million tonnes per annum and gradually ramp it up to 3.25 million tonnes per annum. There is enough weathered ore at this production rate to last for 6.5 years. The processing plant had already been modified during the previous operation to include a grinding circuit and other features to enable processing to be done efficiently.
- Phase 2 is essentially a transitory stage to gradually introduce unweathered rock into the plant. Feed will be introduced in the ratio 80% unweathered ore to 20% weathered ore. This will be introduced after about two years and the plant would have been expanded after year 1 to enable this to be done. Production would be gradually ramped up to 6 million tonnes per year. The plant flowsheet would essentially be the same as with phase 1 but with similar equipment added to handle the increased tonnage. This transitory stage will continue until the weathered rock is exhausted.
- Phase 3 represents the ultimate stage when the plant will treat 6 million tonnes a year of weathered rock.

Life of Mine (LOM) is expected to be about 30 years over which 430 Mt of ore will be processed. A mineral resource model for the primary deposits (Ghafal Hill, Ghafal Southeast Masaboin Hill, Campbell Town Ridge, Hospital Ridge and Masaboin Northern Extension) as at September 2011 identified 832 Mt of Indicated Resources grading 31.8% Fe and 208 Mt of Inferred Resources grading 30.7% Fe at a 15% Fe cut-off. Approximately 86% of the available indicated resources is comprised of harder fresh rock, with the remainder (i.e. 116Mt) being highly weathered and moderately weathered ore. The ore deposit in Area 2 of the MIOL Area will also feature into the mine plan during this period.

MML will use the same following export logistics:

- 43km haulage road to the Thofayim River Terminal (TRT) on the banks of the Port Loko Creek. TRT is capable of handling the output of the mine with no significant upgrades to barge loading and handling facilities.

- Barging of concentrate from TRT down the Port Loko Creek to a transhipment vessel in the Freetown Port Area. Ore transferred from transhipper to ocean going vessels and overseas market.

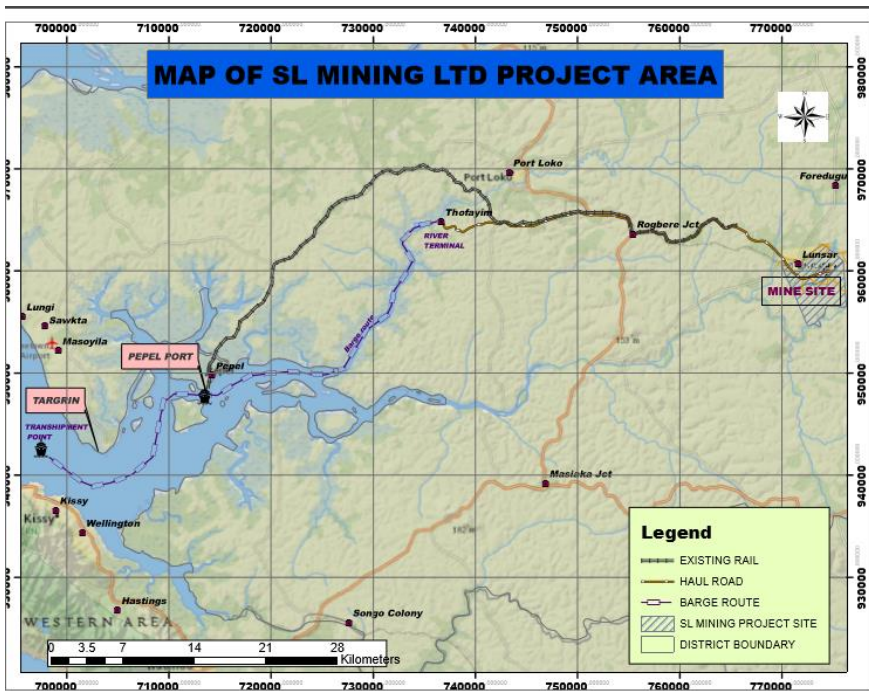


Figure 3-1: Map of MML Project Area

4 RESOURCES & RESPONSIBILITIES

4.1 Human Resources

MML is committed to providing the human resources required to implement this plan. MML will have a dedicated Environmental Department headed by an Environmental Manager. Divisional oversight and support will be provided by a General Manager Health Safety and Environment (GM HSE).

The environmental department will be well resourced with a dedicated environmental laboratory and environmental monitoring equipment. Additional resources e.g. external consultants and laboratory analysis will be mobilised as and when required.



Figure 4-1: Environmental Department Organogram

4.2 Financial Resources

Table 4-1 summarises the key financial resources that will be required by MML to both set up the Environment Department (i.e. purchase additional monitoring equipment, maintenance existing equipment and nursery) and for operational expenses. These costs exclude salaries for personnel and services (e.g. power).

Once the Department is set up meet the requirements of the MML Project, the costs associated with Monitoring, Waste Management and Administration should reduce in subsequent years as the initial capital expenditure will no longer be required and there will only be a need to cover operational costs, maintenance or replacement of equipment, reporting, etc.

Table 4-1: MML Indicative Environmental Financial Commitments

Environmental Management Area	Description	Annual Budget Estimate (US\$)
Waste Management	Initial purchase of additional equipment e.g. bins, spill kits	\$20,000
	Operations costs	\$18,000
Monitoring	Purchase / servicing monitoring equipment	\$10,000
	Routine monitoring requirements incl external analysis	\$30,000
Rehabilitation	Equipment rental for rehabilitation	TBC
	Planting for stabilisation	\$15,000
Administration	Overheads including vehicles, fuel, etc.	\$30,000
Other	EPA annual license fee, etc.	TBC

4.3 Responsibilities

MML follows the concept of Duty of Care. This means that it is not just MML Environmental Department that is responsible for environmental performance but **every individual** on site including contractors. Training and information will be provided to Employees to ensure they understand how to work safely and maintain a safe, healthy working area that minimises adverse environmental effects. Each individual in turn has a responsibility to abide by the procedures and rules put in place.

4.3.1 MML Environmental Department

The responsibility of the MML Environmental Department is to:

1. Audit, monitor, record and report the environmental impacts of the operation;
2. Rehabilitate areas affected by the operation;
3. Communicate with stakeholders and government on environmental issues;
4. Advise MML's Employees and contractors on appropriate environmental management practices and improve general awareness of environmental issues;

5. Provide technical advice as required to enable individual departments to fulfil their environmental responsibilities; and
6. Facilitate the implementation of the Environmental Policy, this Environmental Health and Safety Plan and subordinate management plans across all areas of the project.

4.3.2 Responsibility of the Individual

Every individual working for MML and its contractors bears responsibility for the company's environmental performance and it is up to every Employee and contractor to ensure that environmental impacts of the operation are minimised.

All Employees and contractors shall:

1. Work with due care and consideration to safeguard their own health and safety, the health and safety of others and of the surrounding environment;
2. Adhere to the requirements set out in the Environmental Policy, this document and MML procedures;
3. Review their work areas for potential environmental issues (e.g. leaking pipes, spills) and opportunities to improve environmental performance;
4. Report all actual/potential hazards, sub-standard equipment/practices and accidents/incidents to their immediate supervisor;
5. Ensure chemicals and oils/fuels are only stored in bunded/secured containment areas;
6. Comply with environment-related regulations;
7. Understand that each person is responsible for preventing accidents or environmental harm;
8. Fully support management in maintaining active and effective accident prevention plans;
9. Integrate care of people and the environment into daily activities;
10. Continuously monitor safety and environmental performance;
11. Ensure that activities performed are effectively and responsibly managed and that wastes are disposed of in accordance with site plans and procedures;
12. Support environmental management initiatives of the company;
13. Attend, when directed, any course of training or instruction related to loss control;
14. Observe all instructions issued to protect their own health and safety, the health and safety of others and of the surrounding environment;
15. Use any equipment that is issued for Personal or Environmental Protection, and to ensure that it is maintained in proper order;
16. Not wilfully, recklessly or intentionally interfere with, remove, misuse or damage anything that is provided in the interests of health, safety, environmental protection and welfare nor wilfully place at risk the health and safety of any person at their workplace; and
17. Be proactive in identifying environmental issues and talk about the environment with other Employees, through toolbox meetings and other staff meetings, to raise the overall awareness of environmental issues at MML.

4.3.3 Key Personnel

Error! Reference source not found. summarises the main environmental responsibilities for key personnel within the MML operations.

The provision of a safe and healthy workplace, which is environmentally acceptable, is a key management responsibility. No controls can be successful without the full support of management. All levels of senior management shall show active commitment to the program through their own personal involvement with loss control issues in their area of responsibility. Senior Management includes the Managing Director, General Manager, Departmental Managers and their respective delegates.

Table 4-2: Key Responsibilities for MML Staff

Responsible Party	Responsibilities
Managing Director/	<ul style="list-style-type: none"> • Ensure the necessary resources (financial, manpower etc) to satisfactorily implement and successfully complete the proposed environmental management controls and initiatives, etc, are provided. • Actively and visibly support the implementation of the MML Environmental policy and site environmental initiatives. • Shall conduct meetings with Department General Managers at least once per month in which environmental performance is an integral part of the agenda. Minutes of the meetings must be kept and filed. • Shall define individual environmental responsibilities for General Managers and assess their performance annually. • Shall ensure that environmental objectives for the operation are identified and integrated into the operational plans. On an annual basis, objectives must be reviewed and updated as required. • The Managing Director may also be required to undertake loss control tasks outside their normal area of responsibility. These include Risk Analyses, Accident Investigation, communications with external parties (e.g. Media), and emergency response management
HSE General Manager / Environment Manager	<ul style="list-style-type: none"> • Oversee and coordinate all activities pertaining to the Environmental aspects of the project. Ensure delivery of the environmental targets. • Ensure that the Project and its contractors/subcontractors operate in accordance with applicable regulatory and company environmental requirements and plans. • Responsible for execution and updates to the emergency response plan including spill contingency planning aspects therein. • Ensure effective communication with all internal/external (where applicable) stakeholders. • Identify the necessary resources (financial, manpower <i>et al</i>) to successfully implement the environmental management controls and initiatives. • Provide ongoing oversight of the implementation of the proposed environmental protection and management measures, and provide individual MML departments with technical advice to develop and implement the project management controls and initiatives.

Responsible Party	Responsibilities
	<ul style="list-style-type: none"> • Shall ensure the MML Environmental Policy is displayed in prominent places in each work location. • Ensure an Environmental Management System (EMS) is developed to implement this EHSP and environmental commitments. • Submit records and status reports as appropriate to MML Management, and Sierra Leone authorities as required. • Ensure that staff are trained so that they can effectively execute their environmental responsibilities. • Ensure any issues arising from the undertaking of waste management activities are addressed in a timely manner and in accordance with project requirements. • Ensure that all Project personnel on site undergo environmental management awareness as part of the project induction/orientation. • In conjunction with the other Departments establish Environmental objectives. These objectives shall include the development and improvement of both the actual environmental performance for the Project and the management system.
Environment Staff	<ul style="list-style-type: none"> • Support and implement the EHSP and management system at the operational level on a daily basis. • The collection, compilation and analysis of performance statistics to ensure compliance. • Liaise with operational management and personnel to ensure that duties and commitments in support of this EHSP are expedited efficiently and in a timely manner. • Inspecting and auditing of site work areas and activities. • Investigating and reporting any non-compliance.
All Department General Managers and Section Managers General Manager - Export and Security (GM-E) General Manager - Operations (GM-O) General Manager - Procurement, Materials & Contracts (GM-PMC)	<ul style="list-style-type: none"> • Shall develop and implement programs and procedures to ensure compliance with the relevant health, safety and environmental legislation, industry standards, codes of practice or policies. • Shall encourage the involvement of all people in achieving a healthy and clean workplace. • Actively and visibly support the implementation of the MML Environmental policy, EHSP and site Environmental initiatives. • Shall provide an appropriate workplace, plant and equipment in order to avoid (preferably) or minimise environmental discharges and consumption of consumables in line with Project goals. • Shall maintain plant, equipment and machinery to a high standard in order to minimise environmental discharges and consumption of consumables and maximise safety and health standards. • Shall provide systems of work and safe working procedures to ensure that people are able to work safely and without risk to their health or to the surrounding environment. • Shall provide training and instruction for all Employees to ensure that they understand their responsibilities to work without risk to themselves and others and maintain a safe and healthy working environment.

Responsible Party	Responsibilities
General Manager - HR and Community Relations (GM-HRCR) General Manager - Finance and Administration (GM-FA) General Manager - Construction (GM-C) All Division General Managers and Department Managers <i>continued</i>	<ul style="list-style-type: none"> • Shall, in the event of any damage to the environment or non-compliance, ensure that the incident is fully reported, recorded and investigated, the relevant people notified, the damage/spill is cleaned up in accordance with Project criteria and adequate controls are implemented to prevent re-occurrence. • Shall ensure safe procurement, handling, use, labelling and storage of chemical and other hazardous substances, and to obtain Material Safety Data Sheets (MSDS) for all relevant materials used. • Shall involve the Environment Section and HSE Department during the planning and development stages of any: <ul style="list-style-type: none"> • Modification to existing plant, equipment, processes, procedures, pits and other work areas; • Purchase or development of new plant, equipment, chemicals, processes, procedures, pits, dumps and related areas. • Shall ensure that department personnel, contractors and site visitors understand and observe the MML policies, practices and procedures. • Shall ensure that all members of their Department, including contractors and site visitors, receive a formal induction to environmental and OH&S requirements. • Shall personally conduct regular inspections of their areas of responsibility. • Shall have awareness of the environmental aspects and impacts of all on-site activities under their control or influence. • Provide the necessary resources (financial, manpower et al) to satisfactorily implement the requirements of the MML EMS. • In conjunction with the other Departments establish environmental objectives. These objectives shall include the development and improvement of both the actual Environmental performance for the site and the management system. • Shall ensure that responsibilities for occupational health and safety and for protecting the environment are clearly defined in all job descriptions. <p>Shall be familiar with the environmental compliance and performance standards outlined in this document and implement them across the Project.</p>
General Manager - Procurement, Materials & Contracts (GM-PMC)	<ul style="list-style-type: none"> • Integrate environmental standards and requirements into procurement procedures and contracts, with specific reference to compliance with Project standards, policies and this EHSP. • Maintain relevant Material Safety Data Sheets (MSDS's) for chemicals. • Maximise use of "return to sender" or reusable containers from suppliers. <p>Ensure that new or substitute chemicals comply with Project requirements.</p>
Community Relations Manager (CRM)	<p>Liaise with community including the public on the project's behalf for issues relating to the environment with support of HSE department</p>

Responsible Party	Responsibilities
Supervisor Responsibilities	<p>The supervisory role is a line management function and has a great deal of impact on an organisation. Supervisors are directly responsible for task delivery, and for organising and directing Employees. Responsibility for the health, safety and welfare of people and the working and natural environment is an important and integral part of the supervisor's role.</p> <ul style="list-style-type: none"> • Shall ensure that approved standard working practices and procedures are developed, implemented and adhered to. • Shall ensure that plant and equipment is maintained in a safe condition, with all guards and safety devices (OH&S and Environmental) are in place and a regular program of maintenance is established. • Shall through regular Planned General Inspections, identify potential environmental and safety problems or hazards. When necessary, arrange assessment of possible hazards and institute control measures. • Shall ensure all hazards, incidents and accidents are reported, investigated and remedial/preventative action is taken. • Shall ensure that appropriate Personal Protective Equipment (PPE) and spill clean-up materials are available and used and that all Employees are instructed in its correct use, maintenance, cleaning, storage, limitations and disposal. • Shall encourage the involvement of all Employees in achieving a safe and environmentally aware workplace by personally being involved with HSE initiatives, arranging toolbox meetings and inviting input from personnel on matters relating to work processes as well as to safety and environmental issues. • Shall ensure that contractors and site visitors in the supervisor's area of responsibility observe MML policies, procedures and use the appropriate Personal Protective Equipment (PPE). • Shall keep management informed of all matters relating to the environment. • Shall ensure the safe handling, use, storage, labelling and movement of all chemicals and other hazardous substances. • Shall ensure that Material Safety Data Sheets (MSDS) are available for all Employees and to complete inventories of all hazardous substances in the work locations.

4.3.4 Contractor Interface

MML is ultimately responsible for the management and supervision of all Project activities. Of strategic importance to the effective management of the Project is the supervision and oversight of contractor/subcontractor activities.

All contractors/subcontractor engaged on the MML Project are responsible for performing agreed production related activities:

- in compliance with relevant national and international HSE legislation and regulations and with other requirements to which the project subscribes;
- in full conformance with the MML Project environmental license conditions, MML EHSP (this document) and the overall HSE management system; and
- in accordance with contractual technical and quality specifications.

MML's EHSP and related EMS are the overarching contractual documents; all contractors HSE management plans/ documents will be bridged with and aligned to the MML EHSP and other key plans (e.g. waste management, emergency response plan, and environmental

monitoring plan). Where there is conflict between Project and contractor management systems, the MML requirements shall prevail.

During all stages of the Project, the EHSP will be implemented and controlled using the management systems of both MML and the prime contractors with the former being the controlling instrument. The relative company/contractor management systems (plus any related 'bridging' documentation):

1. provide the framework that regulates the HSE activities both on location and at the shore/beach support bases;
2. define responsibilities and reporting relationships for expediting, mitigation and monitoring actions as specified/scheduled in the EHSP; and
3. specify the mechanisms for inspecting and auditing to ensure/be certain that the agreed actions are implemented.
4. Management system responsibilities are defined in the applicable management plans and the procedures and specifications that support them.

Table 4-3: Responsibilities of MML Contractors

Responsible Party	Responsibilities
Contractor Site Manager or on site representative	<ul style="list-style-type: none"> • Shall develop and implement programs and procedures to ensure compliance with the relevant health, safety and environmental legislation, industry standards, and MML EMS. • Shall encourage the involvement of all personnel in achieving a healthy and clean workplace. • Shall provide and maintain a safe workplace with appropriate plant, equipment and machinery in order to avoid environmental or minimise discharges and consumption of consumables and maximise safety and health standards. • Shall provide systems of work and safe working procedures to ensure that people are able to work safely and without risk to their health or to the surrounding environment. • Shall provide training and instruction for all Employees to ensure that they understand their responsibilities to work without risk to themselves and others and maintain a safe and healthy working environment. • Ensure that HSE incidents and non-compliances are fully reported, recorded and investigated as per MML requirements, MML personnel are notified and adequate controls are implemented to prevent re-occurrence. • Shall ensure safe procurement, handling, use, labelling and storage of chemical and other hazardous substances, and to obtain Material Safety Data Sheets (MSDS) for all relevant materials used. • Shall ensure that all personnel and site visitors understand and observe the MML policies, practices and procedures. • Shall conduct regular inspections of their areas of responsibility.

Responsible Party	Responsibilities
	<ul style="list-style-type: none"> • Have awareness of the environmental impacts of on-site activities under their control or influence. • Provide the necessary resources (financial, manpower et al) to satisfactorily implement the MML EMS requirements. • Ensure that all HSE reporting requirements stipulated by MML, and all/any HSE bridging requirements are met in a timely manner. • Develop and maintain their own environmental management systems that are compliant with the MML EHSP (this document) and the overall HSE management system. • Actively and visibly support the implementation of the MML Environmental policy, EHSP and site Environmental initiatives.

4.4 Training and Awareness

Training and raising awareness of environmental issues and responsibilities form a key element of both operational control and as means of expediting the implementation of this EHSP. Key staff members will therefore, be appropriately trained with core skills and competencies in crucial areas of environmental management and operational control being validated on an ongoing basis. Training and awareness requirements will be the responsibility of the MML Human Resources (HR) section with input from relevant departments.

A training and awareness gap analysis will be performed for key members of staff from time to time to help identify training requirements. These requirements shall also be reviewed for efficacy on an ongoing basis.

In order to communicate the basic environmental rules and standards that all Employees must abide by, MML will include environmental information in its induction process that all Employees must undertake. This will be followed with toolbox talks on selected topics. The Environment Manager will be responsible for identifying the information package required for the inductions and creating toolbox information packs.

Commented [V01]:

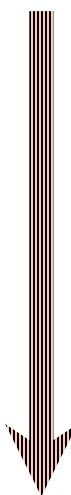
5 ISSUE MANAGEMENT

5.1 Mitigation Hierarchy

The principles for developing an EHSP lie in the underlying requirement to translate the mitigation measures identified in the project ESIA (i.e. the assessment of project environmental impacts) into management measures, controls and processes.

The **impact mitigation hierarchy** (and hence the principle by which this EHSP is built upon) describes practical, commensurate and cost effective mitigation/management measures that avoid, reduce, control, remedy or compensate for negative impacts and enhance positive benefits. These environmental/EHS mitigation measures can, where appropriate, be implemented at any project phase, i.e. from 'concept selection/definition through to operations and onto to mine site closure (i.e. decommissioning and rehabilitation).

The approach taken to defining mitigation measures is based on a hierarchy of decisions and measures as follows:



- 1. AVOID or REDUCE AT SOURCE:** Avoidance or reduction at source is designing and engineering the project so that a feature causing a potential negative impact is designed out (e.g. a waste stream is eliminated) or altered (e.g. reduced waste volume)
- 2. ABATE at SITE:** This mitigation level involves the addition of a design or engineering measure resulting in the abatement of the potential impact e.g. pollution 'controls'
- 3. ABATE at the IMPACT RECEPTOR:** If an impact cannot be avoided, reduced or abated on-site, then measures can be implemented off-site (e.g. noise or visual screening at properties)
- 4. REPAIR or REMEDY:** Some impacts involve unavoidable damage to a resource, e.g. land disturbance. 'Repair or Remedy' essentially involves restoration and reinstatement type measures
- 5. COMPENSATE in KIND:** Where other mitigation approaches are not possible or not fully effective, then compensation in some measure for loss or damage may be deemed appropriate

The greater majority of environmental mitigation measures proposed for this project, and hence within this EHSP, fall into levels 1 and 2 in the above hierarchy.

5.2 Management and Monitoring Activities

The proposed management actions to address the potential project impacts, and associated monitoring to evaluate whether the proposed mitigation/management measures are having the desired effect, are presented in Section 6. For clarity and ease of use, the section comprises ten sub-sections as listed below:

Environmental Legacies - Relates to the identified environmental impacts arising from the 'presence' project environmental legacies including waste dumps, tailings storage facilities (TSFs) etc;

Project Footprint - Relates to the identified environmental impacts arising from the 'presence' of the project, including structures, its relationship with the local environs and construction or expansion of current facilities and support services e.g. process plants, waste dumps, TSFs etc;

Operational Discharges - Mitigation and management of the environmental impacts associated with the liquid discharges associated with the project;

Air/Noise/Vibration - Details and describes the emissions to air, noise and vibration originating/arising from all fixed and mobile (e.g. transportation) point sources and their associated environmental impacts;

Waste Management - Relates to solid/liquid waste materials derived from the Project and the measures to be applied to mitigate and manage the associated environmental impacts;

Loss of Containment - Specifically relates to 'loss of containment' scenarios and the contingencies and plans to be implemented should a loss of containment occur;

Chemical Management - Identifies and relates the environmental impacts of and the management controls/mitigation measures associated with the volumes and types of chemicals that will be stored and utilised during operations/production;

Audits & Inspection - It is intended to develop and implement an audit programme/process that will cover both MML and contractor activities to ensure compliance with the EHSP;

Mine Closure - Details the envisaged closure of the mine site, environmental impacts associated with the decommissioning of the plant site and final lease relinquishment to the Government of Sierra Leone; and

Water Management - Outlines practices by which MML will maximise water efficiency on site and manage surface and groundwater requirements.

The management activities tables are divided into nine columns as follows:

1. Individual reference number
2. Lists the major project activity
3. Identifies the corresponding sources of potential impact
4. Describes the potential impacts
5. Specific mitigation measures or management actions are listed

6. Pertinent legislation, standards, relevant MML Management Plans etc are referenced
7. Identifies the party responsible for implementing/monitoring
8. Key Performance Indicators (KPIs) and Related Targets
9. Related MML Management plans

General note: When a reference is made to “Project” assets, activities or personnel, it refers to any asset/activity/personnel that are working on the Project whether under direct MML control or its contractors. For example “Project vehicles” refers to all vehicles that are owned/leased by MML or its contractors that are in use for Project related work or business.

5.3 Reporting Requirements

MML will provide an annual report to the EPASL and NMA that will cover:

- An analysis of the environmental monitoring results for the year.
- Environmental initiatives completed for the past 12 months, including anticipated rehabilitation work.
- Environmental non-compliances, incidents and actions MML took to mitigate and prevent re-occurrence.
- A summary of the site rehabilitation program and work completed.
- Activities for the coming 12 months.

Periodic environmental management/monitoring status reports will also be submitted to the EPA-SL and Mines Department.

It should be noted that as per Section 134 of the Sierra Leone Mines and Minerals Act of 2009, annual reports are non-confidential and shall be made public by the NMA. This also applies to the Environmental Health and Safety Plan.

6 ENVIRONMENTAL HEALTH AND SAFETY ACTIVITIES TABLE

6.1 Environmental Legacies

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
1.1.1	Waste Dumps and Tailings Storage Facilities from previous operators of Marampa Mine. Facilities vary in terms of rehabilitation.	Wind erosion	Reduced air quality in immediate vicinity	Minimise windblown erosion by vegetating slopes of legacy waste dumps and TSFs. Priority to be given to facilities situated in the vicinity of communities and water sources.	ESIA	Env Manager	All legacy waste dumps and tailings facilities vegetated	Marampa Mine Environmental Legacies Report, Mine Closure Plan
1.1.2		Soil surface Erosion	Reduction in water quality (increased sediment load). Material from facilities deposited in surrounding areas e.g. farmlands leading to reduced yield.	Shape and terrace slopes to reduce runoff velocity. Slopes angled preferably to no more than 25° with terraces at 10m elevation but preferably no more than 15m Runoff directed to dedicated drainage that prevents erosion. Drainage to include interceptor drains to catch runoff along slopes, silt traps or settling areas prior to discharge into sensitive areas such as rivers and streams.	ESIA	GM-O	Erosion levels and slope stability at par with similar land forms in the vicinity unaffected by mining activities.	Marampa Mine Environmental Legacies Report Mine Closure Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
			Siltation of water courses.	<p>Vegetate facilities for slope stability and to reduce erosion levels to those at par with similar landforms in the vicinity not affected by mining activities.</p> <p>Clearing of land or water source inundated with escaped material using manual labour or mechanical equipment as appropriate.</p> <p>Manual labour to be prioritised as it helps to reduce tensions between local communities and the company and for the economic benefits to the locality. Labour to be sourced from surrounding villages with focus on those immediately affected.</p>				
1.1.3		Wall failure	Uncontrolled tailings ingress into surrounding areas	Engineering solutions to be pursued based on in-house expertise or from external engineering consultations.	ESIA	GMO GM HSE	Stable walls that do not pose a safety or environmental risk to the surrounding environment	Marampa Mine Environmental Legacies Report
1.2	Tailings mine pits	Surface water runoff	Reduction in water quality of Batabana Creek and other water courses	<p>Physical barriers between water courses and adjacent tailings areas.</p> <p>Riparian zones bordering creeks are to be propagated where possible</p>	MML ESIA	GMO	90% Surface flow from tailing areas bordering rivers reporting to creek via silt traps.	Marampa Mine Environmental Legacies Report

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				Surface runoff to report to silt traps before entering water courses where there is a significant risk of erosion				
1.3	Batabana Lake / Manonkoh Flooding and Batabana Creek bursting its banks	Rainfall during rainy season and lack of capacity of creek to discharge heavy rain events	Flooding of farmland, safety concerns and impact on inter village transport routes	<p>De-silting Batabana Creek on an annual basis using a combination of mechanical equipment and manual labour from surrounding villages where appropriate.</p> <p>River bank protection using gabion basket, sand bags etc in areas prone to flooding during heavy rain events.</p> <p>Increase in culvert size or capacity along creek in areas in which flow is constricted by culverts.</p> <p>Monitoring of Batabana Lake water level daily during the rainy season. This information will allow for timely interventions if required to alleviate possible flooding.</p>	MML ESIA	GMO	<p>Batabana Lake causeway motorable all year round.</p> <p>No significant crop destruction caused by river bank failure along Batabana Creek in MML concession</p>	Marampa Mine Environmental Legacies Report
1.4	Abandoned Building	Asbestos cladding Building collapse	Asbestosis Injury to personnel or equipment damage	<p>Access to the vicinity of abandoned buildings with asbestos cladding forbidden for health and safety reasons.</p> <p>If abandoned building are be repurposed they must be inspected by a qualified individual e.g. engineer.</p> <p>If they need to be dismantled a risk assessment is to be conducted and appropriate steps taken to ensure they are demolished safely.</p>	MML ESIA			Marampa Mine Environmental Legacies Report ,

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				Demolition of any buildings containing asbestos must be done with asbestos related risk factors are appropriately mitigated. The mitigation methods should receive prior approval from a suitably qualified occupational health and safety professional.				
* MML is not liable for LMC/TMC legacy issues. All interventions with regards to these legacies will be done on approval from at the discretion of MML Limited.								

6.2 Project Footprint

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
2.1.1	Project Construction (Expansion/upgrades to Marampa plant site, power generations facilities ROM pad, camp site, TRT, Haul Road, TSFs, waste dumps, dredge spoils, etc; Construction of new	Brownfield and greenfield landtake.	Alienation of land for life of mine	Minimise landtake required for each facility. Maximise brownfield landtake in order to minimise greenfield areas affected. Rehabilitation of site on closure.	ESIA	GM-C GM-O Env Manager	Land should not be cleared more than 2 months prior to being required for construction. All areas to be rehabilitated at end of mine life.	Mine Plan Mine Closure Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact Consequence /	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
	TSFs, waste dumps, supports facilities, etc).							
2.1.2			Habitat Loss	<p>Minimise the footprint of planned disturbances through advanced planning.</p> <p>Plans must indicate the maximum acceptable footprint of each activity, which includes material laydown areas, vehicle turning areas, parking, Temporary toilet facilities, overburden piles and drainage, etc.</p> <p>These boundaries must be clearly marked on the ground at the start of each activity and staff and contractors must be instructed to respect these boundaries and to restrict their activities to within these boundaries.</p>	ESIA	Env Manager GM-O GM-HSE GM-C	<p>Progressive Rehabilitation of the sites.</p> <p>90% of area available for rehabilitation within the concession area is stabilised with vegetation.</p>	Mine Plan Mine Closure Plan
2.1.3			Habitat Loss	<p>Minimise the footprints of dredge waste disposal sites at Thofayim and Magbangba. Any further dredging activities from dredging must dispose of dredge spoils either <i>in situ</i> or on these existing dredge spoil sites, with minimal increase in the footprint of these terrestrial disposal sites.</p> <p>Where land disposal is to be used, effluent from dredge ponds are not to exceed 50mg/l TSS. The Dredging Management Plan shall describe how the dredging contractors will achieve this level.</p>	EPA-SL Env Regulations 2013	Env Manager GM-O GM-HSE	Comply with EPA-SL 2013 Regulations on effluent discharge	Dredging Management Plan (developed if dredging required) Environmental Monitoring Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact Consequence /	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
2.1.4			Reduced capacity to rehabilitate habitats	<p>Develop and implement a land clearing procedure that includes assessment of alternatives prior to clearing land.</p> <p>Protection of trees or thickets that can act as buffers, wildlife refuges and seed sources for later rehabilitation.</p> <p>Stockpiling and management of top soil and vegetative matter. Identify suitable soil types that can substitute for topsoil to make up shortfall from previous operations, i.e. laterite.</p> <p>No burning of vegetated areas or vegetative matter.</p> <p>Cultivate indigenous species for purposes of site rehabilitation. This to be done by starting a small nursery managed by the environmental department which will be scaled up to meet demand.</p>	ESIA	Env Manager GM-O GM-HSE	<p>Evidence of small thickets and pockets of near-natural habitat dispersed between mine activities.</p> <p>Stockpile of sufficient quantity of topsoil, vegetative matter and topsoil like material to rehabilitate site.</p> <p>Functioning on site nursery with endemic species, including Red Book listed species</p>	Mine Closure Plan
2.1.5		Loss of Biodiversity	Introduction or spread of alien plant or animal species.	<p>Implement measures to control feral dog populations.</p> <p>Develop and implement measures to control invasive alien plant species.</p> <p>Introduced species will be considered by MML for the rehabilitation program where they are not considered a nuisance (i.e. weed) species, will contribute to the site rehabilitation program, and</p>	ESIA PS6	Env Manager	<p>Reduced evidence of feral dogs or expanded invasive alien plant identifications</p> <p>Use of any introduced species in rehabilitation</p>	

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact Consequence /	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				<p>are already present or are approved for use by the Government of Sierra Leone (e.g. Forestry or Agriculture departments)</p> <p>Cultivate indigenous species for rehabilitation purposes.</p> <p>Introduce Dog Control Policy to reduce population of feral dogs onsite:</p> <ul style="list-style-type: none"> • Ban on staff feeding feral dogs • Consider sterilising onsite population • Waste management controls to limit food sources for feral dogs • etc 			<p>program with approval of SL regulators.</p> <p>List of invasive alien plant species developed</p>	
2.1.6		Loss of Biodiversity	Reduced populations of mammals, birds, reptiles or frogs.	<p>Implement measures to enforce the protection of wildlife through prohibiting harmful activities, including hunting, fishing, purchase sale or transport of bush meat or any wildlife products, collection of animal or animal products, keeping of wild or domestic pets or the intentional killing of creatures such as snakes, lizards, birds or other animals.</p> <p>Relocation of problem animals and animals at risk from active mine sites.</p> <p>Avoid dangerous situations for fauna such as open trenches and pits.</p>	ESIA PS6	Env Manager	<p>No evidence of trade in wildlife or keeping of pets.</p> <p>Records of removal of wildlife to safe areas.</p> <p>Support programs that have tangible and demonstrable benefits to protect biodiversity in SL.</p>	HSE Induction Procedure

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact Consequence /	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				<p>Training and sensitisation of drivers to avoid unnecessary road kills.</p> <p>Minimise non-haul road night driving wherever possible.</p> <p>Raise staff and contractor awareness of the local ecology, including biodiversity and sensitive habitats, and need to protect them by inclusion into induction programmes and sensitisation activities.</p> <p>Support environmental program to protect biodiversity/critical habitats in Sierra Leone as offset for impacts to project areas</p> <p>Clearing of vegetation for new landake to be focussed on the dry season as far as practicable when the least amount of bird nesting occurs.</p>				
2.1.7		Clearing of Land	Unnecessary loss of species and habitats due to lack of care or awareness.	<p>Raise staff and contractor awareness of the local ecology, including biodiversity and sensitive habitats, and need to protect them by inclusion into induction programmes and sensitisation activities.</p> <p>Conduct community environmental awareness activities.</p> <p>Also refer to 1.1.2 & 1.1.6</p>	ESIA	Env Manager	Staff and contractors demonstrate awareness of importance of biodiversity conservation	HSE Induction Procedure

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
2.1.8		Clearing of land	Erosion of exposed soils Loss of topsoil Sediment laden runoff reporting to land adjacent to construction sites and watercourses.	Ensure erosion control measures are in place, including silt ponds, site drainage, stabilising vegetation, erosion matting, silt fences. Silt ponds to be regularly inspected and cleaned. Silt pond waste to be disposed of on managed tailings facilities. Structures (e.g. silt ponds) for management of construction run off to be designed to accommodate a 1/25 year 24 hour storm event. All permanent structures to be designed to accommodate a 1/100 year 24 hour storm event. Drainage to be protected against erosion (e.g. riprap) where required and not to report directly to watercourses. Maintenance of riparian zones along Rokel River, Baki and Batabana creek as far as practicable and prioritise rehabilitation/stabilisation where the riparian zone has been damaged, i.e. planting, silt fence, berms to divert water, erosion matting	ESIA IFC General/ Mining EHS Guidelines ANZECC aquatic ecology guidelines WHO drinking water standards Env Regs	GM-O GM-HSE	TSS in watercourses < 50mg/L at any time. Runoff water exiting silt ponds meet EPA-SL effluent guidelines. Topsoil stockpiled to match mine closure plan 90% of area available for rehabilitation within the concession area is stabilised with vegetation.	Mine Closure Plan Environmental Monitoring Plan
2.1.9			Aesthetic impacts	Maintain vegetative screens Use of earth berms Progressive rehabilitation of site. Maintain separation distance between facilities and roads as far as practicable.	ESIA	GM-O GM-C GM-HSE	Land should not be cleared more than 2 months prior to being required for new landfill 90% of area available for rehabilitation within	Mine Closure Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact Consequence /	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				Final landforms should be physically stable and consistent with natural landscape.			the lease area is stabilised with vegetative cover.	
2.1.10		Construction and use of roads and tracks (excl. the haul road)	Road kills	<p>Focus vehicle activity onto fewer roads; restrict MML vehicles to mine site roads and the haul road unless for authorised work programs (e.g. monitoring, CR work etc).</p> <p>Where practicable, close off small side roads wherever possible through placing of barriers that prevent the through-passage of vehicles, and to restrict traffic to pedestrian use.</p> <p>Driver training to avoid road kills.</p> <p>Night driving to be restricted as far as practical to active mining areas and the haul road during night hours.</p>	<p>HSE Induction Programmes</p> <p>ESIA</p>	<p>Env Manager</p> <p>GM-O</p> <p>GM-E</p>	100% of all drivers through driver induction training	
2.2.1	Dredging	Maintenance of safe passage in Port Loko Creek	<p>Physical disturbance to river bed</p> <p>Increased turbidity, metals and TSS</p>	Dredging Management Plan to be developed prior to each campaign of work, addressing: (i) Location of areas and depths to be dredged; (ii) Volumes to be dredged and how these can be minimised; (iii) Dredging methods to be used, including <i>in situ</i> or land disposal; (iv) Analysis of sediments is required prior to dredging to guide most appropriate disposal option; (v) site rehabilitation/stabilisation; (vi) community safety and stakeholder engagement.	<p>ESIA</p> <p>IFC EHS Guidelines for Ports, Harbours, and Terminals</p>	<p>GM-E</p> <p>GM-HSE</p>	<p>TSS in watercourses < 50mg/L above background level at 100m from dredge.</p> <p>Dissolved metals not significantly elevated above background levels during dredging and return to</p>	<p>Dredging Management Plan</p> <p>Environmental Monitoring Plan</p>

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact Consequence /	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				Appropriate survey of Port Loko Creek to be used to assess dredging requirements and sediment movement in creek. Dredging only to be conducted if necessary to maintain safe passage for barges			baseline levels within 24 hours. Access for other river uses maintained 100% of time	
2.2.2		<i>in situ</i> deposition of dredged sediments on river bed. For land-based disposal see 1.1.4	Physical disturbance to river bed Smothering Increased turbidity/TSS Impacts to mangroves	Subsurface placement of spoil only for coarse river bed materials. Bank material at Thofayim to be sent to land based settling pond. Spoil only to be placed in deeper holes in stream channel and not in mangrove areas (either Temporary or permanent), shallow drainage areas or tributaries. Maintain minimum depth in all places after placement to ensure free flow on river and avoid causing nuisance to other users.	ESIA	GM-HSE GM-E	No placement of spoil in mangrove areas. No land placement of spoil except on existing dredge waste sites. Maintain minimum depth >2m in all places after <i>in situ</i> placement.	Dredging Management Plan Environmental Monitoring Plan
2.2.3		Creation/maintenance of safe passage for Cape size bulk carriers in Freetown Port shipping lane	Physical disturbance to estuary floor Increased turbidity, metals and TSS	Dredging Management Plan to be developed prior to each campaign of work, addressing: (i) Location of areas and depths to be dredged; (ii) Volumes to be dredged and how these can be minimised; (iii) Dredging methods to be used, including <i>in situ</i> or land disposal; (iv) Analysis of sediments is required prior to dredging to guide most appropriate disposal option; (v) site rehabilitation/stabilisation; (vi) community safety and stakeholder engagement.	ESIA IFC EHS Guidelines for Ports, Harbours, and Terminals ANZECC sediment	GM-E GM-HSE	TSS < 50mg/L above background level at 100m from dredge. Dissolved metals not significantly elevated above background levels	Dredging Management Plan Environmental Monitoring Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				<p>Survey of Freetown Port shipping lane to be used to assess dredging requirements and sediment movement.</p> <p>Dredging only to be conducted if necessary to maintain safe passage for bulk carriers.</p>	<p>and water quality guidelines</p> <p>Env Regs</p>		Dredging management plan	
2.3.1	Barging	Wake created by barges and associated boats (e.g. security)	Erosion of shoreline along Port Loko Creek.	<p>Maximum speed of tugs and barges within Port Loko Creek and above Tasso Island to be kept at 4.5-6 knots, or speed at which “no wake” is produced.</p> <p>Small MML vessels should maintain speeds under 10 knots in the middle and upper reaches of the Port Loko Creek.</p> <p>Barges and tugs to use designated channel in Port Loko Creek and Sierra Leone estuary.</p> <p>Small boats should stay in middle of main Port Loko Creek channel, not cut corners and preferably follow the designated channel in order to avoid interference with fishing nets.</p> <p>Restrictions applies to all MML staff and contractors using the Port Loko Creek.</p> <p>Avoid damage to large mangrove trees by movement and turning of barges at Thofayim terminal.</p>	ESIA	GM-E	No exceedance of barge speed of six knots or “no wake” speed.	<p>Transport Management Plan</p> <p>Environmental Monitoring Plan</p>

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
2.3.2		Physical proximity	Disruption to wildlife in the adjacent mangroves and mud flats by being in close proximity	<p>Barges and tugs to use designated channel in Port Loko Creek and Sierra Leone estuary.</p> <p>Small boats should stay in middle of main Port Loko Creek channel, not cut corners and preferably follow the designated channel.</p> <p>Project vessels should not travel close to the banks or mud flats other than for emergency purposes.</p>	ESIA	GM-E	Tugs stay within marked channel	Transport Management Plan
2.3.3			Collisions with marine megafauna	<p>Maximum speed of tugs and barges within Port Loko Creek and above Tasso Island to be kept at 4.5-6 knots, or speed at which "no wake" is produced.</p> <p>Small MML vessels should maintain speeds under 10 knots in the middle and upper reaches of the Port Loko Creek.</p> <p>Barges and tugs to use designated channel in Port Loko Creek and Sierra Leone estuary.</p> <p>Small boats should stay in middle of main Port Loko Creek channel, not cut corners and preferably follow the designated channel.</p> <p>If megafauna sighted, Project vessels should not approach. If possible, take photos, note location and notify MML Environment Section.</p> <p>Report any identified strike or sighting of dead animal to Environment Dept</p>	ESIA	Env Manager GM-E	No strikes	Env Monitoring Plan Wildlife Management Plan

6.3 Operational Discharges

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
3.1	Areas of operations (i.e. process plant, Thofayim terminal, support infrastructure)	Surface run-off water	Impacts to water quality and aquatic ecology	<p>Drainage will be constructed to manage runoff and prevent runoff from plant areas reporting directly to water courses.</p> <p>Temporary infrastructure will be designed to control a 1: 25 year 24 hour storm event and permanent structures designed to manage a 1:100 year 24 hour storm event.</p> <p>Erosion controls including slope breakers, drainage controls and silt ponds, maintaining/ creating vegetation buffer zones (including riparian), progressive rehabilitation of the site, strategic use of silt fences and ensuring mine road runoff does not report directly to watercourses.</p> <p>Silt ponds are to be regularly inspected and cleaned out in order to maintain effectiveness. Removed solids shall be placed on managed waste dumps and not on spoil piles next to the pond.</p> <p>Runoff water diverted around plant and other infrastructure (e.g. maintenance areas, fuel storage) to reduce potential "dirty water" to be treated.</p> <p>Maintain vegetation cover on non-active mine areas.</p> <p>Land should not be cleared more than 1 month prior to being required for mining/waste dumps etc in dry</p>	<p>ESIA</p> <p>EPA-SL regulations</p>	<p>GM-O</p> <p>GM-HSE</p> <p>GM-E</p> <p>GM-C</p>	<p>TSS in watercourses < 50mg/L at any time.</p> <p>TPH<10mg/l</p> <p>Discharge does not affect water quality of receiving waters</p> <p>Discharge meets EPA-SL discharge criteria in 2013 EPA Regulations</p>	Environmental Monitoring Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				season and 2 weeks in wet season unless full erosion/runoff controls in place.				
3.2	Pit dewatering	Discharge of groundwater to surface catchments.	Increase in surface flow volume in watercourses Impact to water quality Lower groundwater table in vicinity of pits.	Water minimisation and recycling to be implemented. Pit/TSF water to be recycled as far as possible to reduce requirement for discharge. Runoff water diverted around pits and waste dump facilities to reduce potential "dirty water" to be treated. Where pit water is not used for dust suppression or process water, it should first report to a silt pond to reduce sediment load to <50mg/1 and ensure water fully aerated prior to discharge to natural systems. A two stage siltation/polishing pond system is preferred. No discharge directly to streams under any circumstances. Monitor groundwater levels in Marampa Mine Lease. Where monitoring has identified impacts to community wells or other water sources, MML will ensure that communities have a water resource equal to, or better than, what was present pre-impact. MML will monitor wells in the general project area for both water quality and level to assess potential impacts to nearby users.	ESIA EPA-SL regulations WHO drinking water standards.	GM-O GM-HSE GM-E GM-C Env Manager	TSS in watercourses < 50mg/L at any time. TPH<10mg/1 Discharge does not affect water quality of receiving waters Discharge meets EPA-SL discharge criteria in 2013 EPA Regulations No flooding downstream as a result of dewatering discharge. Surface water flow maintained in Baki and Batabana creeks similar to baseline	Environmental Monitoring Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				Water release to the Batabana or Baki creeks will be monitored. Pit dewatering used as make-up water in plant or as dust suppression water.			levels for dry season. No direct discharge to creeks	
3.3	Mining and waste dumps including dredge spoil.	Leachate from pit/waste dumps/dredge spoil	Potential contamination of groundwater and surface water	Monitor water quality in seepage from pits, waste dumps and dredge spoils. Monitor water levels around pit to determine volume of seepage water. Evaluate ARD/leachate potential and integrate appropriate planning into management of each waste stream Encapsulate any issue materials to minimise mobilisation of contaminants from wastes.	EPA-SL regulations	GM-O GM-E Env Manager	Waste dump and dredge spoil runoff and leachate comply EPA-SL effluent guidelines Water quality in nearby streams not adversely affected.	Environmental Monitoring Plan Mine Plan Dredging Management Plan
3.4	TSF	Discharge of TSF runoff water to surface catchments and groundwater. Leachate from TSF reports to groundwater	Increase in surface flow volume in watercourses - potential positive impact in dry season.	The soil at the base of tailings facilities should be compacted to reduce permeability and reduce seepage where soil conditions allow. Monitor TSF leachate to assess potential impacts to groundwater. TSF design to include return water system so that runoff water is captured and used as make-up water in plant or as dust suppression water.	ESIA EPA-SL regulations Mining Regulations	GM-O GM-C	Minimise surface water discharge from TSF under normal operating conditions. Minimise make-up water requirements	Environmental Monitoring Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
			Impact to water quality	In the event that any discharge occurs, water to pass through two stage siltation/polishing pond system to reduce sediment load and ensure water fully aerated prior to discharge to natural systems. Runoff water diverted around TSF to reduce potential "dirty water" to be treated.				
3.5.1	Barge loading and related activities at Thofayim	Surface water run-off at Thofayim in general	Increased turbidity in the Port Loko Creek. Impacts to water quality Sedimentation in wetlands	Surface water run-off at Thofayim will be directed to silt ponds for settling of suspended solids before discharge. Silt ponds to be regularly cleaned and maintained. Runoff from Thofayim site should not report directly to Port Loko Creek.	EPA-SL regulations ESIA	GM-O GM-E Env Manager	TSS in discharge <50mg/l Compliance with EPA-SL effluent guidelines Port Loko Creek water quality not adversely affected.	Environmental Monitoring Plan
3.5.2		Concentrate fallout (conveyor, dust) and runoff from stockpile	Impacts to water quality Sedimentation in creek.	The distance dropped by concentrate to be minimised. Dust suppression sprays. Conveyor system to have concentrate retaining system to minimise concentrate falling from conveyor into Creek. Surface water run-off from concentrate stockpile to be directed to silt ponds for settling of suspended	ESIA EPA-SL regulations	GM-E Env Manager	TSS in discharge <50mg/l Compliance with EPA-SL effluent discharge guidelines	Environmental Monitoring Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				solids before discharge. Silt ponds to be regularly cleaned and maintained. Work area at Thofayim to be maintained in clean and orderly manner. Leachate from stockpile to be monitored.			Port Loko Creek water quality not adversely affected.	
3.6.1	Dredging	Discharge of sediment laden waters from land based dredge spoil piles.	Increased turbidity in rivers and sedimentation	Design of dredge spoil pond to ensure adequate residence time to allow sediments to settle. Analysis of sediments is required prior to dredging so that information on the sediment quality can be used to assess the most appropriate disposal option. Analyses to include EC, pHf and pHox, Acid Volatile Sulphide and/or Suspension Peroxide Oxidation Combined Acidity & Sulphur, total and bioavailable metals, grain size analysis and total organic carbon. Dredging Management Plan (DMP) to be developed prior to dredging activities.	ESIA EPA-SL regulations	GM-O GM-HSE	Effluent from dredge ponds are not to exceed 50mg/l TSS. The DMP shall describe how the dredging contractors/sub-contractors will meet this level.	Environmental Monitoring Plan Dredging Management Plan
3.6.2		Creation of sand resource from dredged material at Magbangba and Thofayim	Positive impact if the community could make use of any such Dredge Waste.	The dredge waste at Magbamba and Thofayim potentially represents good quality building sand which is used for local community construction activities. Use of the dredge waste along the Port Loko Creek could help alleviate, even to a small extent, impacts associated with sand mining along the Rokel River.		GM-E GM-HSE CR Manager		Dredging Management Plan
3.7	Marampa mine site and Thofayim	Sewerage	Increase N/P/coliform/BOD	Sewerage to be collected and treated in sewerage treatment plant that is suited to the load	ESIA	GM-O Env Manager	Compliance with IFC sewerage effluent guidelines	Environmental

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
			levels in streams and groundwater	requirements and capable of discharging treated effluent in compliance with EPA-SL guidelines. Treated effluent to report to soak-away system or other system. Treated effluent not to report directly to creek systems.	IFC EHS General Guidelines			Monitoring Plan Waste Management Plan
3.8.1	Barging, transshipment operations and other project vessels	Discharge of sewage, food waste and bilge water from any Project vessels	Increase N/P/coliform/BOD/TPH/TSS levels in Port Loko Creek and S.L. Estuary.	No discharge of raw sewerage or untreated bilge water at any time by any Project vessel. No discharge of treated sewerage, food waste or bilge water in the Port Loko Creek or in the Sierra Leone Estuary above Tasso Island at any time. Discharge of treated sewerage, food waste or bilge water in the Sierra Leone Estuary between Freetown Port and Tasso Island permitted only when in compliance with MARPOL discharge criteria.	ESIA EPA-SL regulations MARPOL	GM-E Env Manager	Compliance with MARPOL criteria for food waste, sewerage and bilge water TPH in waters near transshipment vessels < 15mg/L.	Environmental Monitoring Plan Waste Management Plan
3.8.3		Concentrate leachate and fallout (i.e. conveyor, dust) and runoff from Project vessels	Impacts to water quality Sedimentation in creek.	Conveyor system to have concentrate retaining system to minimise concentrate falling from conveyor into Port Loko Creek or Sierra Leone Estuary. Concentrate will be covered in barges to reduce risk of runoff entering the waterways, including both metals and sediments. Run-off from transshipment vessels to comply with 50mg/l TSS requirement. Work area on transshipment vessels to be maintained in clean and orderly manner.	MARPOL	GM-E	TSS in waters near transshipment point < 50mg/L.	Environmental Monitoring Plan Waste Management Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				No disposal of residual concentrate overboard from barges or transshipment barges. Residual to be sent to export bulk carrier.				
3.9.1	Workshop and maintenance areas	Washing of vehicles to allow maintenance and for routine cleaning (bodies and wheels).	Potential for mobilised contaminants (oil, sediments) to report to streams.	Vehicles only to be washed at dedicated wash bays and effluent to pass through sediment trap followed by oily water separator. No Project vehicles to be washed in streams or water bodies.	ESIA EPA-SL regulations	GM-O GM-E	Max 10mg/L total petroleum hydrocarbons in discharge. Max 50mg/L TSS in discharge	Environmental Monitoring Plan
3.9.2		Contaminated runoff from workshops, powerhouse, fuel areas, etc	Potential for mobilised contaminants (oil, sediments) in runoff	Runoff from workshop areas to pass through sediment trap followed by oily water separator Rainwater from within the bunded areas will report to an oily water separator before discharge to environment.	ESIA EPA-SL regulations	GM-O GM-E	Max 10mg/L total petroleum hydrocarbons in discharge. Max 50mg/L TSS in discharge	Environmental Monitoring Plan

6.4 Air, Noise & Vibration

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
4.1.1	Mining operations	Mining activities in lease area 24/7	Increased noise from mining activities and waste dumps. Light from mining at night.	Preventative maintenance programs and regular inspections of all vehicles fitted with noise controls such as mufflers and dampening. Selection of mining haul trucks and other heavy equipment (e.g. dozers, shovels) by either the implementation of a noise reduction package (e.g. hushpak systems) or the procurement of heavy equipment that can achieve a sound power level of 112 dBA. Avoid working at night in elevated locations or close to sensitive receptors. Incorporate bunds into the design of the waste dumps such that mobile equipment is working behind a barrier at all times. Wherever possible, implement the use of working noise barriers in pits and haul roads into the mine design such that equipment are always working behind an earthen bund, which may include benches or other features such as waste dumps. Light plants facing in towards work areas and not outwards. Monitoring at sensitive receptors.	ESIA EPA-SL regulations Mining Regulations	GM-O GM-HSE	Vehicles do not exceed stipulated Project speed limits. Noise emissions from mining and processing operations do not exceed 55 dB LAeq,1hr during daytime and 45 dB LAeq,1hr during the night time.	Environmental Monitoring Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact Consequence /	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				Switch reversing alarms off at night when working in elevated locations. Consider white noise reversing alarms. Heavy vehicle drivers have awareness training regarding night time noise.				
4.1.2		Windblown/ traffic generated dust from unpaved haul roads	Increased dust in immediate areas	Use of water sprays and/or application of chemical dust suppressants on in-pit "permanent" haul roads and waste dump haul roads during the dry season. Note that use of oil and oil by-products are not preferred methods to control dust and should be avoided. Assess use of permanent dust suppression systems on long-term pit and waste dump roads such as sprinkler systems as substitute for truck based water sprays.	IFC General Guidelines ESIA	GM-O GM-HSE	Dust concentration at sensitive receptors do not exceed PM10 150µg/m ³ 24 hour average or 70µg/m ³ annual at sensitive receptors or 350mg/cm ² /day for deposition gauges. Note: If background levels exceed KPI, KPI adjusted to background plus 25%.	Environmental Monitoring Plan
4.1.3		Windblown dust from drilling and blasting activities	Increased dust in immediate areas	Use of watering prior to drilling and blasting	IFC General Guidelines ESIA	GM-O GM-HSE	Dust concentration at sensitive receptors do not exceed PM10	Environmental Monitoring Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact Consequence /	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
							<p>150µg/m³ 24 hour average or 70µg/m³ annual average at sensitive receptors or 350mg/cm²/day for deposition gauges.</p> <p>Note: If background levels exceed KPI, KPI adjusted to background plus 25%.</p>	
4.1.4		Elevated emissions of sulphur dioxide and nitrogen dioxide.	Impacts on health sensitive receptors.	<p>Use of 1000ppm sulphur fuel in mine vehicles.</p> <p>Use of USEPA Tier II compliant engines in heavy equipment.</p>	USEPA emission limits for diesel engines.	GM-O GM-HSE GM-PMC	<p>At sensitive receptors:</p> <p>SO₂<125µg/m³/24 hrs</p> <p>SO₂<500µg/m³/10 minutes</p> <p>NO₂<200µg/m³/hr</p> <p>NO₂<40µg/m³ annual mean</p>	Environmental Monitoring Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact Consequence /	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
4.1.5		Blasting	Vibration and air blast affect nearby communities	<p>Design and manage each blast so that the maximum instantaneous charge does not result in airblast and vibration levels that exceed Project compliance limits.</p> <p>Blast design software will be used to identify safe practices to comply with Project requirements</p> <p>All blasts will be designed and managed in accordance with good industry practices to minimise fly rock, vibration, air blast and use optimal powder factor to minimise NOx and SOx emissions.</p> <p>Supervised by qualified and trained personnel</p> <p>Use of buffer holes to minimise transmission</p> <p>Stem all blast holes with an appropriate packing material</p> <p>Conduct test blasts to train MML personnel, develop the most appropriate blasting methods, verify the predictions made in the ESIA relating to noise and vibration and educate communities about the potential risks of blasting and the practices that MML will follow.</p> <p>Where possible, blasting will be avoided altogether and the material mined by free digging.</p> <p>Where the ore/waste material is harder and free digging is not possible, it may be deep ripped first instead of blasted.</p> <p>Use of 500m exclusion zone around blasting area</p>	ESIA	GM-O GM-HSE	<p>Overpressure airblast should not exceed 115 dB(Z) for 5 % of blasts over a 12 month period and should never exceed 125 dB(z) at any time; and</p> <p>Ground vibration should not exceed 3 mm/s</p> <p>Fly rock should never pose a risk to sensitive receptors</p>	<p>Environmental Monitoring Plan</p> <p>Blasting procedures</p> <p>Resettlement Management Plan</p>

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact Consequence /	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				<p>Where blasting only occurs for short periods and/or intermittently, potentially affected communities may be asked to vacate the area in question for the short duration of the blast (i.e. 1 hour). This will be combined with inspections of the buildings for potential damage, compensation for inconvenience and any identified damage will be repaired.</p> <p>In the event that a Temporary vacation of the property is not appropriate, then permanent resettlement of the affected structures.</p> <p>Survey condition of houses at sensitive receptors prior to blasting to obtain baseline condition with regards to cracks, stability, etc.</p>				
4.2.1	Concentrate haulage	Haul trucks driving 24/7 on haul road to/from Thofayim.	Increased noise and vibration from vehicle movement on roads at sensitive receptors	<p>Haul trucks maximum speed is 50km/h in the day and 40km/h in the night.</p> <p>Light vehicle max speed in 60km/hr at any time except for residential areas of Lunsar and Rogbere Junction where it is 40km/hr.</p> <p>The option of installing permanent paving in areas within 200m of significant settlements in Rogbere Junction and Lunsar should be explored.</p> <p>Maintenance of non-paved sections of haul road to be kept smooth; compacted surface free of significant pot holing.</p>	<p>ESIA</p> <p>Sierra Leone Mining Regulation</p> <p>EPA-SL Regulations</p>	GM-HES	<p>Vehicles do not exceed stipulated speed limits.</p> <p>Noise emissions from the haul road operations within 50m of the haul road do not exceed 55 dB Laeq,1hr during daytime and 45 dB Laeq,1hr during the night time.</p>	Environmental Monitoring Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact Consequence /	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				<p>Use acoustic barriers such as earth berms, brick walls and vegetation barriers to minimise noise/light transmission, and reduce aesthetic impacts.</p> <p>Maintain vegetative buffers along the haul road wherever practicable.</p> <p>Vehicle lights on low beam in built up areas.</p> <p>Do not use exhaust brake at night in built up areas.</p> <p>No revving of trucks near urban areas.</p> <p>Do not use horn unless for emergency purpose.</p> <p>Preventative maintenance programs and use of mufflers in all vehicles.</p> <p>Integrated vehicle management systems.</p>				
4.2.2		Haul trucks driving 24/7 on haul road to/from Thofayim.	Increased dust in immediate areas	<p>Explore option of installing permanent paving in areas within 200m of Rogbere Junction and 200m either side of Lunsar.</p> <p>Use of water sprays and/or application of chemical dust suppressants on the haul road during the dry season. Note that use of oil and oil by-products are not preferred methods to control dust should be avoided.</p> <p>Haul trucks maximum speed is 50km/h in the day and 40km/h in the night.</p> <p>Maintain vegetative buffers along the haul road wherever practicable</p>	IFC General EHS Guidelines - AIR	GM-O GM-HSE	<p>Dust concentration at sensitive receptors do not exceed PM10 150µg/m³ 24 hour average or 70µg/m³ annual average at sensitive receptors or 350mg/cm²/day for deposition gauges.</p> <p>Chemical suppressants do</p>	Environmental Monitoring Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact Consequence /	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				Targeted dust suppression on haul road sections within 200m of sensitive receptors where monitoring indicates dust levels are elevated			not adversely affect water quality in runoff from haul roads	
4.3	Power generation	Power house exhaust and engines	Increase in greenhouse gas emissions Increase in SOx and NOx emissions Increase in noise	Preventative maintenance programs and regular inspections of fixed plant. Powerhouse generators to be enclosed to reduce noise emissions. Assess means to minimise power usage, improve efficiency and reduce GHG emissions on site such as high efficiency motors, compact fluoro tubes, insulated buildings, etc. Education of Project workforce on energy efficiency and conservation to support ways to reduce power usage. Encourage Project personnel to suggest ways in which to further increase energy efficiency and undertake training on the benefits of reducing GHG emissions Use fuel with S content $\leq 1.5\%$ and preferably lower. Quantify annually total GHG emission from power production activities as an aggregate in accordance with internationally recognised methodologies and reporting procedures. Exhaust stack complies with good industry practices. Noise controls such as mufflers and dampening.	IFC General EHS Guidelines (Air, Energy) IFC PS3	GM-O GM-HSE	IFC powerhouse air emission guidelines Records that include education on energy efficiency Noise emissions at sensitive receptors do not exceed 55 dB Laeq,1hr during daytime and 45 dB Laeq,1hr during the night time. At sensitive receptors: SO ₂ <125 μ g/m ³ /24 hrs SO ₂ <500 μ g/m ³ /10 minutes NO ₂ <200 μ g/m ³ /hr	Environmental Monitoring Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact Consequence /	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				Assess ability to offset emissions by supporting a GHG offset program, e.g. forestry programs.1			NO ₂ <40µg/ m ³ annual mean	
4.4	Incinerator	Emissions to air	Increase in greenhouse gas emissions Incomplete combustion products	Use of 1000ppm sulphur fuel. Follow manufacturer's specifications on loading and temperature controls. Do not incinerate PVC or similar plastics.	ESIA	GM-HSE	Refer to 3.3	Environmental Monitoring Plan Waste Management Plan
4.5	Processing plant/Thofayim	Dust at feed hoppers and stockpiles	Increased dust in immediate areas	MML will maintain ore concentrate at a moisture content to minimise dust generation during barge loading. Due to the need to keep moisture content down for shipping requirements (i.e. there is a maximum moisture content that can be accepted by bulk carriers to avoid liquefaction), use of dust suppression sprays on the concentrate will be avoided if possible. MML will monitor these areas and use this option should it prove necessary. Minimisation of drop heights when handling ore and waste materials	IFC General Guidelines	GM-O GM-C GM-HSE	Dust concentration at sensitive receptors do not exceed PM10 150µg/m ³ 24 hour average or 70µg/m ³ annual average at sensitive receptors or 350mg/cm ² /day for deposition gauges. Note: If background levels exceed KPI, KPI adjusted to background plus 25%.	Environmental Monitoring Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact Consequence /	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
4.6.1	All Project activities and areas	Windblown dust from exposed surfaces, stockpiles etc	Increased dust in immediate areas	Progressive rehabilitation of mine site Vegetation screens to reduce fetch. Monitor dust at sensitive receptors	IFC General Guidelines	GM-O GM-HES Env Manager	Dust concentration at sensitive receptors do not exceed PM ₁₀ 150µg/m ³ 24 hour average or 87.5µg/m ³ annual average at sensitive receptors or 350mg/cm ² /day for deposition gauges. Note: If background levels exceed KPI, KPI adjusted to background plus 25%.	Mine Closure Plan Environmental Monitoring Plan
4.6.2		Elevated exhaust emissions of sulphur dioxide and nitrogen dioxide	Impacts on health at sensitive receptors	Use of 1000ppm sulphur fuel in mine vehicles Use of Tier II compliant engines in heavy vehicles	IFC General Guidelines USEPA emission guidelines	GM-PMC	Refer to 3.3	Environmental Monitoring Plan
4.6.3		Elevated noise from machinery and plant	Elevated noise at sensitive receptors	Locate plant (e.g. compressors, generators) as far from the nearest potential sensitive receptors as possible, orienting it to direct emissions away from receptors as	EPA-SL Regulation	GM-C GM-O	Noise emissions at sensitive receptors do not exceed 55 dB	Environmental Monitoring Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact Consequence /	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				far as possible, and using on-site structures and terrain to screen sensitive locations wherever practicable Mandatory ear protection for workers in vicinity of elevated noise sources (>85dA)	Sierra Leone Mining Regulations		Laeq,1hr during daytime and 45 dB Laeq,1hr during the night time.	
4.7.1	Barging of concentrate	Disturbance of natural habitats and faunal communities.	Reduced presence of faunal species	Minimising use of barge horn other than for emergency purposes Do not shine spotlights into surrounding habitats. Selection of tugs and self- propelled barges to have a maximum sound power level of 102 dBA and preferably lower.	ESIA	GM-HES		
4.7.2		Elevated emissions of sulphur dioxide and nitrogen dioxide from engine exhaust	Impacts on health at sensitive receptors	Use of low sulphur fuel in tugs and transshippers Preventative maintenance program in place to maintain engine efficiency	IFC General Guidelines	GM-PMC GM-HES	Refer to WHO Ambient air quality guidelines	Environmental Monitoring Plan
4.8	All Project activities and areas	Release of ozone depleting substances	Release of ozone depleting substances	No equipment or products containing regulated ozone depleting substances is purchased or used. Assess means to capture air conditioner refrigerant for reuse when servicing	EPA Act	GM-PMC	No non-compliant equipment purchased	EHSP

6.5 Waste Management

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
5.1.1	All areas of project	Inappropriate storage, containment, transportation and management of waste materials.	<p>Potential contamination of soils and waters (surface and ground)</p> <p>Aesthetic impacts from loose rubbish</p> <p>Loose rubbish washes into watercourses</p>	<p>Implement project specific Waste Management Plan (WMP) that addresses both hazardous and non-hazardous wastes.</p> <p>Avoid waste (hazardous and non-hazardous) generation and maximise reuse, recycling and recover as far as practicable.</p> <p>All wastes to be stored and transported in a safe manner, in accordance with Material Safety Data Sheet (MSDS) information. Appropriate containers, segregation and bunding required.</p> <p>Waste management practices must be environmentally sound.</p> <p>Project only to use waste contractors appropriate for waste type, have been pre-audited by MML to ensure disposal methods/facilities are adequate and they are approved by EPASL.</p> <p>Limit transboundary movement of wastes as far as practicable.</p> <p>In absence of suitable contractors, MML will construct waste storage and management facilities appropriate for waste types being generated at the Marampa Mine site and Thofayim.</p>	Bamako and Basel conventions	All departments GM-PMC Env Manager	<p>Maximise number of 'recycling' options</p> <p>> 95% of all scrap metal produced will be recycled</p> <p>0% loss of containment during storage, transport and handling of waste by MML</p>	Waste Management Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				<p>Purchase liquid materials in reusable containers where practicable (i.e. med and high volume consumables). Avoid use of 200/20l drums in favour of 1000l IBC, 5000l tote tanks, 20K L tanktainers where suitable and ensure appropriate facilities and/or equipment are in place for their safe use.</p> <p>No open burning of any waste is permitted.</p> <p>Refer to 3.7 for sewerage treatment.</p>				
5.1.2		Hazardous wastes	Potential contamination of groundwater, air, soils, surface water	<p>Develop procedures to effectively and appropriately manage and handle hazardous wastes, including those that may result from a spill.</p> <p>Review waste streams and input chemicals used. Assess whether substitution to a less hazardous alternative is possible, creating less hazardous wastes.</p> <p>Hazardous wastes to be segregated from non-hazardous wastes and stored on hardstanding as per requirements outlined in Section 7 – Chemicals Management.</p>		ALL Depts	Minimise use of hazardous chemicals on site	Waste Management Plan
5.2	Landfill for non-hazardous wastes	Clearing of land and landtake	Loss of flora and fauna in areas cleared for construction.	<p>Assess potential to co-dispose with waste dumps to minimise landtake.</p> <p>Minimise waste volumes produced</p>		GM-HSE	Land should not be cleared more than 2 months prior to being	Waste Management Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
			<p>Erosion of exposed soils</p> <p>Loss of topsoil.</p> <p>Sediment laden runoff reporting to land adjacent to construction sites and watercourses.</p> <p>Potential leachate to groundwater</p>	<p>Minimise areas cleared and only clear when required for new landfill.</p> <p>Ensure erosion control measures are in place.</p> <p>Rehabilitation of used sites</p> <p>Stockpile topsoil and weathered material for cover and backfilling.</p> <p>No untreated/non-stabilised hazardous wastes shall sent to landfill that affect groundwater quality. Stabilised hazardous wastes may be sent to landfill and only in compliance with WMP.</p> <p>Minimise wind blow rubbish by use of vegetation buffers, wind breaks, fences and other means.</p> <p>Regular clean up of area.</p> <p>Discourage scavenging in landfill.</p>			<p>required for new landfill.</p> <p>Disused landfills covered with suitable soil and rehabilitated with Phase 1 planting within 3 months of decommissioning.</p> <p>No hazardous wastes sent to landfill that affect groundwater quality and that are not specified in the WMP.</p>	

6.6 Loss of Containment

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
6.1	Plant site	Process upsets at plant	Potential impacts to water quality. Sedimentation of watercourses.	<p>Plant site is bunded with overflow containment.</p> <p>Drainage controls within plant area with runoff/ overflow reporting to an overflow pond and not directly to watercourses.</p> <p>Storm water management to prevent clean water entering the plant site.</p> <p>All permanent structures to be designed to manage a 1/100 year 24 hour storm event.</p> <p>High level alarms and emergency shutdown procedures including loss of power.</p>	IFC Mining Guidelines	GM-O	<p>Zero loss of containment at the process plant site resulting in direct discharge of tailing/slurry to watercourses</p> <p>Emergency shutdown training and drills once per year including loss of power</p>	
6.2	Project oil/fuel storage areas	Accidental spillages	Contamination to soil and water, with impacts to aquatic ecology	<p>MML will ensure there are appropriate plans and procedures for spill prevention, control and response consistent with international practices.</p> <p>MML will have appropriate spill response equipment and trained personnel at Thofayim and Mine site to manage potential spills on land.</p> <p>Spill response equipment to address both containment and recovery of spilled oil, including waste.</p> <p>Include potential fuel spills in Port Loko Creek and SL Estuary in Emergency Plan.</p> <p>Spill kits located near transfer points on mine site and Thofayim</p>	<p>IFC General EHS Guidelines</p> <p>IFC EHS Guidelines - Ports and Harbours</p> <p>MARPOL</p>	<p>GM-O</p> <p>GM-E</p> <p>GM-C</p> <p>GM-HSE</p> <p>GM-PMC</p>	<p>Spill response included in emergency response training.</p> <p>Presence of spill response equipment and trained personnel</p>	Emergency Response Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				Personnel trained in spill response and clean up All vessels to have ship board spill plans (i.e. SOPEP) and equipment Also see Section 6.2				
6.3.1	Field activities	Oil spills resulting from vehicle related incident such as fuelling in the field, transport of fuel, etc.	Potential impacts to surface and groundwater quality. Soil contamination	MML will have appropriate spill response equipment and trained personnel at Thofayim and Mine site to manage potential spills on land and creeks. Service and fuel trucks to have spill kits on board. Fuel spill response plan addressing truck rollover.	IFC EHS Guidelines ESIA	GM-O GM-PMC	Spill response included in emergency response training.	Emergency Plan
6.3.2		Transport of fuel from Thofayim to site	Potential impacts to surface and groundwater quality. Soil contamination	Drivers trained in hazardous good and defensive driver training. Speed limit of 50kph. Daylight movement only. Trucks maintained in good condition. Spill response equipment for handling creek and roadside spills. Training of personnel. Haul road maintained in good condition.		GM-HES GM-PMC	No spills	Emergency Plan
6.4	Tailing Storage Facility	TSF failure or overflow	Potential impacts to water quality	TSF to be designed, built, managed and decommissioned in line with recognised international standard such as SANS 10286 – Code of Practice for Mine Residue or ICOLD3.	IFC EHS Mining Guidelines	GM-O	Zero discharge resulting from failure of dam wall.	Env Monitoring Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
			Sedimentation of watercourses	<p>Tailing to be stored in engineered tailing storage facility designed for 1 in 100 year rain events.</p> <p>Inspection schedule and maintenance.</p> <p>TSF safety and emergency management.</p> <p>Emergency spillway to divert flows from the dam during events exceeding 1/100 year events.</p> <p>Monitoring groundwater in TSF perimeter.</p> <p>TSF management plan to include response options for elevated groundwater level in TSF or detected failures or slumps</p> <p>Develop TSF management plan.</p>	<p>ESIA Chapter 2</p> <p>SANS 10286 - Code of Practice for Mine Residue</p> <p>ICOLD3</p>			
6.5	Chemicals	Chemical spill from storage areas.	<p>Potential impacts to surface and groundwater quality.</p> <p>Soil contamination</p> <p>Storage of incompatible chemicals.</p>	<p>Chemicals to be stored on impervious surfaces and in accordance with appropriate segregation/separation.</p> <p>Storage tanks / containers will meet international standards.</p> <p>Loading and unloading activities will be conducted by appropriately trained personnel according to pre-established formal procedures.</p> <p>Spill control and response plans and equipment.</p>	<p>IFC EHS Guidelines</p> <p>ESIA</p>	<p>GM-O</p> <p>GM-PMC</p>	<p>Zero loss of containment</p> <p>Storage of chemicals will follow international practices.</p>	<p>Emergency Plan</p> <p>Operations Manual</p>

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
6.6	All areas	Any loss of containment on site	<p>Potential impacts to surface and groundwater quality.</p> <p>Soil contamination</p> <p>Storage of incompatible chemicals.</p>	<p>Full investigation and reporting of incidents and remedial actions taken to prevent re-occurrence.</p> <p>Undertake risk assessment that identifies potential consequences, likelihood of event and identifies mitigation strategies required to reduce risks to acceptable levels.</p> <p>Develop and resource plans that outlines training, resources, responsibilities, communication (internal and external), procedures and other aspects to respond effectively to emergency situations</p> <p>Develop Incident investigation procedure</p>	IFC PS1/PS3 /PS4	GM-HSE		Emergency plan

6.7 Chemical Management

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
7.1	All areas	Storage, transport or use of chemicals on Project Chemicals refer to all process chemicals, glues, pesticide, oils, thinners, paints, lubricants, fuel, radiation sources and explosives.	Potential impacts to surface and groundwater quality. Soil contamination Storage of incompatible chemicals.	Develop chemical control procedures for storage and use of chemicals Use process chemicals that are non bio-accumulating and biodegradable. Development of a chemicals inventory to include chemical properties (i.e. hazard potential, toxicity and health and safety recommendations as described in Material Safety Data Sheets), use, storage site and quantities. Document appropriate transport, storage and handling procedures and training of personnel, including potential waste disposal. Identify and document potential recycling opportunities and disposal procedures. Chemical transport procedures and storage areas designed to comply with United Nations Recommendations on the Storage and Transport of Dangerous Goods and take account of: proximity to equipment and facilities (fire water, appropriate drainage systems et al); separated areas for incompatible products; correct bunding arrangements, canopying and drainage systems for hazardous chemicals; the correct storage of drums and containers (e.g. drums stored vertically,	IFC EHS Guidelines IFC Gen EHS Guidelines (hazmat) United Nations Recommendations on the Storage and Transport of Dangerous Goods	GM-HSE GM-PMC GM-O	Identify and replace (where technically feasible) those process chemicals which are bio-accumulating and non-biodegradable. Develop a chemicals database (including material safety data sheets - MSDS - and ecotoxicity data).	Environmental Monitoring Plan Waste Management Plan

Ref #	Project Activity	Potential Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				<p>horizontal drums appropriately wedged, stacking heights are limited etc.).</p> <p>Liquid chemicals shall be kept in bunded areas on hardstanding, whether in use or in storage.</p> <p>Use risk assessment to identify hazards and control measures (substitution, management, engineering controls).</p> <p>Audit and inspect transport providers and facilities storing hazardous materials and ensure compliance with Project standards.</p> <p>Use high level alarms in storage tanks.</p> <p>Regularly inspect all Project tanks, transport assets (i.e. barges, fuel trucks, etc) and distribution systems for leaks, faulty fittings, corrosion etc. Repair immediately.</p> <p>Preventative maintenance of systems.</p>			Chemicals appropriately stored and transported	
7.2.1	Project fuel facilities	Fuel storage on land	Potential for spill and contamination of soils and groundwater	<p>All fuel tanks will be located in concrete bunds with a minimum net capacity of 120% of the single largest tank within the bund.</p> <p>Any venting or overflow valve/outlet must be positioned so that any accidental discharge is contained by the bund.</p> <p>High level alarms on bulk and day tanks.</p>	IFC EHS Port and Harbour guidelines	GM-PMC GM-O GM-E		Environmental Monitoring Plan

Ref #	Project Activity	Potential Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				Rainwater from within bunded areas reports to an oily water separator before discharge to environment. Audit fuel distribution/tanks system to identify fuel losses that may be due to leaks/spills.				
7.2.2		Potential leakages and small spills from fixed point fuel transfers on water	Potential for spill and contamination of water	Fit for purpose (i.e. certified for hydrocarbon transfer) and dedicated fuel transfer hoses with safety break valves to be used at all times, with replacement as per manufacturers recommendations. All fuel hoses must have either a valve or a dry shut fitting (e.g. automatic fuel nozzle) at the hose terminal to allow control of flow at the point of fill. All fuel transfers to comply with the requirements specified in the Project Description. Monitor work procedures to ensure that fuel distribution and refuelling is conducted according to requirements. All fuel transfers shall be undertaken by trained and competent personnel.	MARPOL	GM-PMC	Max 10mg/L total petroleum hydrocarbons in discharge.	Environmental Monitoring Plan
7.2.3		Lubricants and oils	Potential for spill and contamination of soils and groundwater	Maximise use of returnable bulk tanks as opposed to one-use drums. All lubricants and oils stored in tote tanks or drums will be located in or stored in concrete bunds with a minimum net capacity of 120% of the single largest tank (bulk/tote/day tanks) or for drums of	IFC Mining EHS Guidelines API American Petroleum Institute and United Nations	GM-PMC	Max 10mg/L total petroleum hydrocarbons	Environmental Monitoring Plan Waste Management Plan

Ref #	Project Activity	Potential Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				200L or less, the total bund capacity should be 25% of the total volume that can be stored within the bund. Preferably in covered area. Use of pallet bunds and other portable containment appropriate to drum size.	Recommendations on the Storage and Transport of Dangerous Goods		ns in discharge.	
7.2.4		Potential leakages and small spills from fixed point fuel transfers on land	Potential for spill and contamination of soils and groundwater	All fixed fuel transfer and dispensing areas, including pumps, gauges, filter units and manifolds, shall be located on impervious hard standing (e.g. concrete) and designed to contain any spills (i.e. secondary containment). Impervious surfaces will be in place at unloading areas that are large enough to manage the truck being unloaded/loaded. Fit for purpose (i.e. certified for hydrocarbon transfer) and dedicated fuel transfer hoses with safety break valves to be used at all times, with replacement as per manufacturers recommendations. All fuel hoses must have either a valve or a dry shut fitting (e.g. automatic fuel nozzle) on the end to allow control of the fuel at the point of fill. Annual pressure testing of all fixed and flexible fuel transfer systems and replacement at manufacturers recommendations All fuel transfers to comply with the requirements specified in the Project Description.	IFC Mining EHS Guidelines API American Petroleum Institute and United Nations Recommendations on the Storage and Transport of Dangerous Goods EPA-SL Regulations	GM-PMC	Max 10mg/L total petroleum hydrocarbons in discharge.	Environmental Monitoring Plan

Ref #	Project Activity	Potential Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				<p>Monitor work procedures to ensure that fuel distribution and refuelling is conducted according to requirements.</p> <p>All fuel transfers shall be undertaken by trained and competent personnel.</p>				
7.3	Use of pesticides	Vector control and weed control	<p>Water and soil contamination</p> <p>Adverse impacts to ecosystem</p>	<p>Select pesticides that are known to be low in human toxicity, are effective against the target species and have minimal effect on non-target species.</p> <p>The pesticide program will be designed to avoid the risks associated with the development of resistance in pests and vectors.</p> <p>Personnel trained in use and risks of storing and applying pesticides.</p> <p>Assess alternate methods to control identified pests.</p> <p>Waste management to be included as part of the procedures, including both spills and management of residue.</p> <p>Pesticides to be stored correctly following good international practice (e.g. FAO Intl Code of Conduct on the Distribution and Use of Pesticides)</p> <p>MML will not use pesticides that fall in the WHO Recommended Classification of Pesticides by Hazard Class Ia (extremely hazardous); or Ib (highly hazardous).</p>	<p>WHO Recommended Classification of Pesticides by Hazard</p> <p>FAO Intl Code of Conduct on the Distribution and Use of Pesticides</p>	GM-HSE	<p>No use of Class Ia/b pesticides</p> <p>No reportable incidents associated with pesticide use, storage and disposal.</p>	<p>Pesticide procedures</p> <p>Waste Management Plan</p>

Ref #	Project Activity	Potential Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				MML may use Class II (moderately hazardous) pesticides, where the appropriate controls on use of these chemicals are in place, including proper training, equipment, and facilities to handle, store, apply, and dispose of these products properly. Only use pesticides approved for use in Sierra Leone				
7.4	Use of radioactive sources	Use of densitometers in process plant that contain Cs137	Potential leaks and damage leading to radiation leaks Disposal of used meters	Trained Radiation Protection/Safety Officer to oversee installation and permitting any hotwork undertaken near installed meters. MML will purchase a radiation dose meter capable of detecting beta and gamma rays and routinely inspect meters. Meters to be purchased with a "return to provider" agreement MML to ensure that return to provider agreement is still valid for sources bought by LMC.	Radiation Act	GM-EHS	Return to provider agreement in place Radiation dose meter purchased. Radiation permits obtained	WMP Control of hazardous substances procedure
7.5	Use of explosives	Transport, storage and use of explosives	Risk of accidental explosion/fire. Risk of theft	Explosives magazine to be built so it is secure and fully fenced with 24/7 security Explosives and detonators to be stored separately and in storage that meets recognised international standard Intrinsic protection in explosives areas	Explosives Ordinance Act Sierra Leone Mining Regulations AS 2187 Explosives -	GM-EHS GM-O GM-PMC	No unaccountable loss of product	Explosives transport and storage management procedures

Ref #	Project Activity	Potential Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
				<p>All drivers and storage personnel, involved with the handling, storage and transportation of explosives, are to have attended Explosives Storage and Transportation Course</p> <p>Trained personnel for use of explosives</p> <p>Maintain 400m exclusion zone around magazine</p> <p>The facility will comply with Sierra Leone safety regulations and recognised international standard.</p> <p>Audit all activities related to explosives; handling, transport, storage, charging, blasting, and destruction of unused or surplus explosives) in accordance with relevant national or internationally recognized safety codes</p>	Storage, transport and use			

6.8 Audits & Inspections

Ref #	Project Activity	Potential Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
8.1	All Operations	Ongoing and continuous environmental oversight and review.	Potential environmental harm, asset damage, reputational	MML will audit key operational departments and contractors and ensure that facilities and activities operate to Project standards.		GM-HSE	Minimum of 4 HSE audits per annum (MML and contractor).	

Ref #	Project Activity	Potential Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
			damage and operational downtime.	<p>Define the HSE management and planning activities that are undertaken to support MML's activities in relation to its HSE management system.</p> <p>Verify that there is compliance with the MML HSE management system process and management plans.</p> <p>Identify opportunities to improve the HSE management system and its implementation.</p> <p>Ensure compliance by project contractors with the requirements and stipulations of the MML HSE management system process and any other contractual HSE stipulations.</p> <p>Verify compliance with applicable laws and regulations.</p> <p>Ensure identified HSE non-compliances are communicated and tracked to successful close out.</p> <p>Train personnel in HSE auditing and inspection.</p>			<p>Audit programme areas of focus to be based upon perceived risk:</p> <ul style="list-style-type: none"> • Mining; • TSF Management; • Concentrate haulage – land; • Concentrate haulage – riverine/marine ; • Operational discharges. • Waste management • Chemical transport, storage and handling • General housekeeping <p>Ensure that a minimum of 95% of all audit and inspection actions are closed out</p>	

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
							within the given time frame.	

6.9 Mine Closure

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
9.1.1	Marampa Mines decommissioning and closure.	Rehabilitation of impacted areas to create productive landscapes and aquatic ecosystems (eg in pit lakes). Removal of mine infrastructure.	Water quality improved via erosion controls in place. Landscape is productive and available for a range of end land uses including either agriculture or forest. Habitat creation and	Implementation of Mine Closure Plan. MML will use the following four guiding principles to drive the overall process: <ul style="list-style-type: none"> • Future public health and safety are not compromised; • The site is left in a stable state, both physically and chemically, that prevents deterioration of natural resources; • The site should be handed back to landholders in a productive and sustainable state that is both practicable and compatible with the surrounding landscape; and • Adverse socio-economic impacts are minimized and benefits are maximized. 	Mines Act ESIA EPA-SL Regulations Sierra Leone Mining Regulations	HSE GM GM-O	Update Mine Closure plan every 2 years minimum to include latest life of mine plan. 90% of area available for rehabilitation within the lease area is stabilised with Phase 1 planting. All areas to be rehabilitated at end of life or sooner if available for progressive rehabilitation.	Mine Closure Plan

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
			<p>promotion of biodiversity.</p> <p>Pit lakes to support self-sustaining populations of aquatic fauna including species of use to the local communities.</p>	<p>Stakeholder dialogue should commence as early as possible to discuss and agree potential end land uses.</p> <p>Post decommissioning monitoring program to last for three years.</p> <p>Progressive rehabilitation of the site to be actively pursued.</p> <p>Stockpiling and management of top soil and vegetative matter. Identify suitable soil types that can substitute for topsoil to make up shortfall from previous operations, i.e. laterite</p> <p>Erosion control measures in place that are suited to the rainfall and protect waterways and soil, including silt traps, silt fences, riprap, slope breakers & erosion matting.</p> <p>Protection of trees or thickets that can act as buffers, wildlife refuges and seed sources for later rehabilitation.</p> <p>Final landforms should be physically stable and conform to pre-impact landscape as far as practicable</p>			<p>Productive landforms are created by rehabilitation program</p> <p>Evidence of small thickets and pockets of near-natural habitat dispersed between mine activities.</p> <p>Stockpile of sufficient quantity of topsoil, vegetative matter and topsoil like material to rehabilitate site</p>	
9.1.2		Creation of Legacy issues	Unstable landscape	Any asset handed over must have a practical, beneficial and sustainable use to the receiving party.	Mines Act Mining Regulations	GM-HSE	No legacy issues created.	Mine Plan Closure

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
			Derelict buildings Contaminated soils Non-productive landscapes	Any asset that poses a potential safety risk or has an associated contamination risk will also be removed. MML will only hand over infrastructure in a safe state with waste issues managed. MML will not leave potential legacy issues for landholders or the Government of Sierra Leone regardless of any requests. It will be made clear to any receiving parties that the liability for maintaining and decommissioning the asset once handed over belongs to that party and is no longer the responsibility of MML. All buildings or infrastructure handed over will first need the approval of the EPA and Mines Department.	ESIA Mine Lease Agreement EPA-SL Regulations			Environmental Monitoring Plan

6.10 *Water Management*

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
-------	------------------	--	-----------------------------------	---------------------------------	-----------	-------------------	--------------------------	----------------------------------

9.1	All sites	Water extraction required for dust control, wash bays, fire water, potable water, process water.	Deplete groundwater aquifer reserves, water flow in water courses.	<p>Monitor surface water flows fluctuations</p> <p>Avoid depletion of aquifers</p> <p>Monitor wells and groundwater levels in mine area</p> <p>Maximise use of pit/tailing dewatering discharge for non-potable uses.</p> <p>Maximise water recycling in process plant to reduce make-up water requirements.</p> <p>Environmental flows to be maintained in Baki, Batabana and Warf creeks.</p> <p>Water extraction from watercourses in dry season for dust suppression (Dec-March) is only to occur when water flow is sufficient to maintain environmental connectivity as well as for downstream users (e.g. farming).</p> <p>Maximise water use and efficiency on site</p> <p>Identify and repair leaks in water systems to avoid unnecessary losses.</p> <p>Develop site water balance to include all mine concession area activities and develop a mine site water management plan that outlines sustainable use of all water resources by MML.</p>	<p>Guidelines (water)</p> <p>EPA-SL Regulations</p> <p>ESIA</p>	<p>GM-O</p> <p>GM-HSE</p> <p>GM-E</p>	Sensitive receptors not adversely affected by water abstraction.	Environmental Monitoring Plan
-----	-----------	--	--	--	---	---------------------------------------	--	-------------------------------

Ref #	Project Activity	Potential Impact Source/ Environmental Aspect	Potential Impact / Consequence	Mitigation or Management Action	Reference	Responsible Party	KPIs and Related Targets	Applicable Document Reference(s)
9.1.2		Water discharge to mine concession creeks (pit dewatering, runoff).	Flooding of downstream catchments Water quality covered under 2.1 and 2.2.	Monitor surface water flows Maximise use of pit/tailing dewatering discharge for non-potable uses, including process make-up water and dust control. Minimise discharge of pit-dewatering to creeks in wet season Minimise sediment reporting to creeks so that creek bed is not silted and flow maintained – see 3.1 and 3.2.	IFC EHS Guidelines for Mining ESIA	GM-O GM-HSE	Flooding of downstream catchments to be within expected range Sedimentation levels in creek beds within expected ranges	Environmental Monitoring Plan
9.1.3		Reduction in water flow in Batabana Creek	Increase in water level on Batabana Lake leading to flooding of causeway and lakeside communities	Monitoring water levels on Batabana Lake monthly in the dry season and daily in the wet season to ensure veracity of flooding claims. Annual desilting of Batabana Creek unless deemed unnecessary.		GM-O GM-HSE		Environmental Monitoring Plan