



OSINO

RESOURCES

Submitted to: Osino Gold Exploration and
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REPORT ON:

TWIN HILLS GOLD PROJECT – FINAL ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

PROJECT NUMBER: ECC-103-332-REP-18-A

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DEFINITIONS AND ABBREVIATIONS

ABBREVIATIONS	DESCRIPTION
ECC	Environmental Compliance Consultancy
EMA	Environmental Management Act
EMP	Environmental management plan
EPL	exclusive prospecting licences
ESIA	environmental and social impact assessment
ESMP	Environmental and social management plan
HOD	Heads of Department
KTC	Karibib Town Council
LOM	Life of mine
MAWLR	Ministry of Agriculture, Water and Land Reform
MEFT	Ministry of Environment, Forestry and Tourism
MME	Ministry of Mines and Energy
MSDS	Material safety data sheet
NHC	National Heritage Council
NSR	Noise sensitive receptor
OGEM	Osino Gold Exploration and Mining (Pty) Ltd
ToR	terms of reference
TSF	tailings storage facility
WRD	waste rock dump

1 INTRODUCTION

1.1 COMPANY BACKGROUND

Environmental Compliance Consultancy (ECC) has been contracted by Osino Gold Exploration and Mining (Pty) Ltd (OGEM), a Namibian company and subsidiary of Osino Resources Corp. Osino Resources Corp. manages operations in Namibia through its wholly owned subsidiary, Osino Namibia Holdings (Pty) Ltd, which is the parent company of OGEM. ECC conducted an environmental and social impact assessment (ESIA) for the proposed mining of precious metals on Mining Licence 238 (ML 238), located near the town of Karibib, Erongo Region, Namibia, see Figure 1.

The proponent has focused on the acquisition and development of potential gold projects in Namibia through extensive exploration programmes. The advanced and successful exploration programme has resulted in the discovery and decision to develop the Twin Hills Gold Project. The proposed project will be a conventional open pit mine with a gold extraction process similar to existing gold mines in Namibia, for example the Otjikoto and Navachab mines. The proposed project will be referred to herein as the “Twin Hills Gold Project” or the “project”.

ECC has compiled this environmental and social management plan (ESMP) in compliance with the Environmental Management Act (EMA) of 2007 and its regulations of 2012. The purpose of this ESMP is to support the full environmental and social impact assessment (ESIA) report.

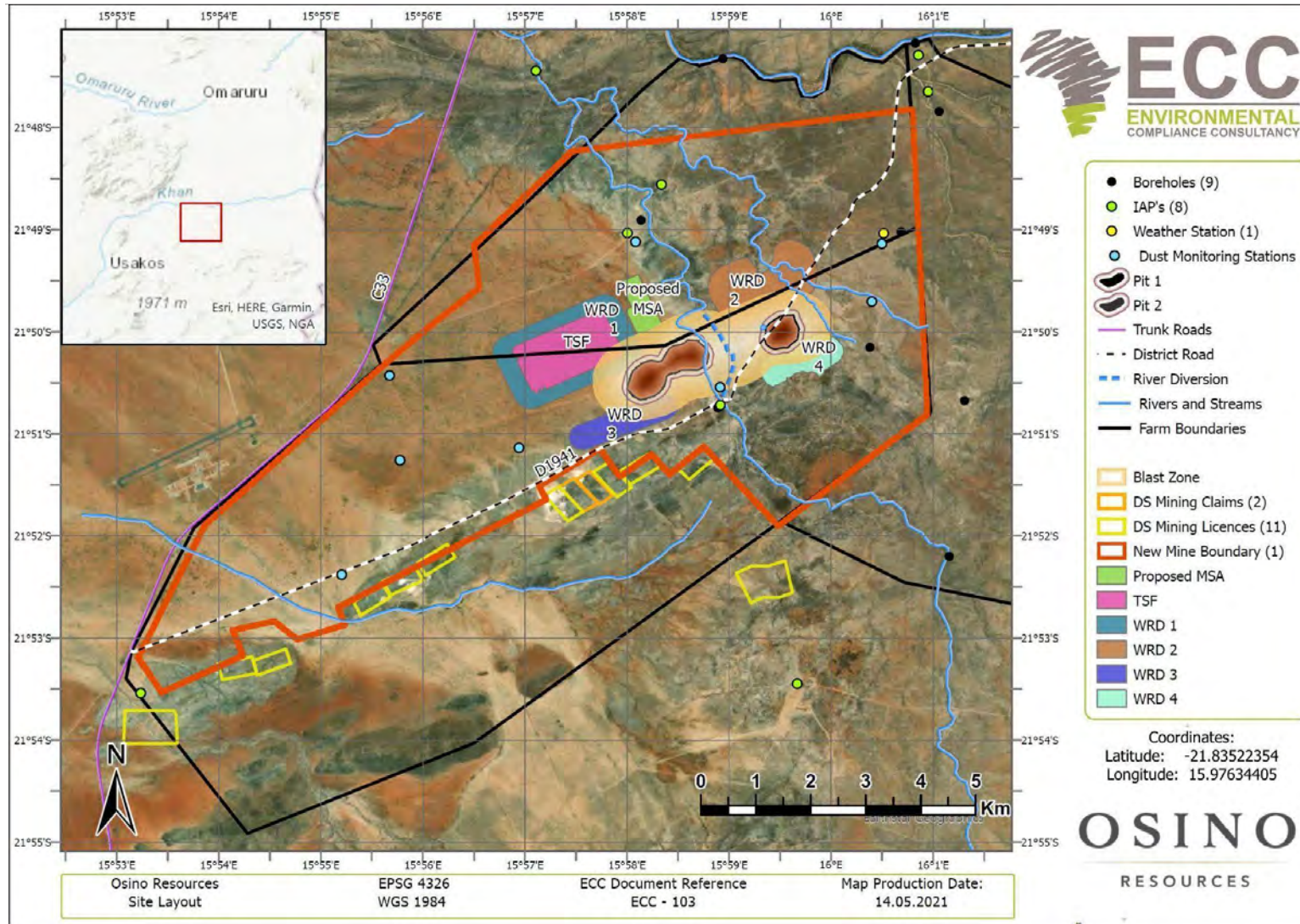


Figure 1 - Locality map showing the location of the proposed Twin Hills Gold Project

1.2 PURPOSE OF THE ESMP

The environmental and social management plan (hereafter referred to as the ESMP) provides a logical framework, mitigation measures and management strategies for the mining activities associated with the proposed project, in this way ensuring that the potential environmental and social impacts are curbed and minimised as far as practically possible and that statutory and other legal obligations are adhered to and fulfilled. Outlined in the ESMP are the protocols, procedures and roles and responsibilities to ensure the management arrangements are effectively and appropriately implemented.

The ESMP forms an appendix to the environmental scoping report and is based on the findings of the assessments carried out to date. The environmental scoping report should be referred to for further information on the proposed project, baseline information of the project area, assessment methodology and terms of reference (ToR), applicable legislation, and assessment findings.

This EMP is a live document and shall be reviewed at predetermined intervals, and updated during the ESIA process, or when the scope of work alters, or when further data or information becomes available. All personnel working on the project will be legally required to comply with the requirements set out in the EMP that is approved by Government.

1.3 ENVIRONMENTAL REGULATORY REQUIREMENTS

The Environmental Management Act, 2007, and its regulations, stipulates that an environmental clearance certificate is required before undertaking any of the listed activities that are identified in the Act and its regulations. The project triggers a number of listed activities as outlined in the scoping report.

This report presents the ESMP and has been undertaken in terms of the requirements of the EMA of 2007 and its regulations. The final ESMP was prepared once the assessment phase had been completed

1.4 SCOPE OF THIS REPORT

The site's Environmental and Social Impact Assessment (ESIA) scoping report as well as the experience and knowledge of the authors have been used to compile this ESMP. This ESMP aims to avoid repeating information, procedures or guidance that are available in other site and company reports and has been written in line with the Namibian Government guidance document titled "Draft Procedures and Guidelines for Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP), 2008".

The scope of this ESMP includes all activities associated with the construction of all mining, processing, fuel storage, waste management and linear infrastructure; the operation of these

infrastructures; and the decommissioning of these infrastructures and closure of the site and its facilities.

1.5 ENVIRONMENTAL AND SOCIAL ASSESSMENT PRACTITIONER

Environmental Compliance Consultancy (ECC) (Reg. No. CC 2013/11401) has prepared this ESMP on behalf of the proponent.

This report has been authored by employees of ECC, who have no material interest in the outcome of this report, nor do any of the ECC team have any interest that could be reasonably regarded as being capable of affecting their independence in the preparation of this report. ECC is independent from the proponent and has no vested or financial interest in the project, except for fair remuneration for professional fees rendered which are based upon agreed commercial rates. Payment of these fees is in no way contingent on the results of this report or the assessment, or a record of decision issued by Government. No member or employee of ECC is, or is intending to be, a director, officer, or any other direct employee of Osino. No member or employee of ECC has, or has had, any shareholding in Osino.

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1.6 MANAGEMENT OF THE APPROVED ESMP

The proponent will hold the environmental clearance certificate for the proposed project and shall be responsible for the implementation and management of the approved ESMP. Before the mining activities commence, the approved ESMP will be reviewed, amended as required and reapproved on a three-year cycle. The implementation and management of the approved or final ESMP is also carried out through monitoring compliance to the requirements thereof. Various aspects are monitored daily duties, weekly, monthly, and annual inspections. Reporting to the Department of Environmental Affairs is carried out biannually and renewal of the environmental clearance certificate requires an additional audit report upon application for reapproval of the current ESMP.

The final approved ESMP must be circulated and or communicated to all relevant employees and contractors.

1.7 STRUCTURE OF THIS ESMP

As this is an environmental and social management plan it is assumed that the reader is familiar with the site. If the reader requires further details on the site and its operations, refer to the environmental and social impact assessment scoping report for the Twin Hills Gold Project.

The layout of this ESMP has been set up to provide site specific and relevant information in the main sections of the report and provides supporting or supplementary information in the appendices, thereby providing the end user with an operational document for ease of use.

The targeted users of this ESMP are Heads of the Departments (HODs), the site environmental team and the authorities or stakeholders with a vested interest in how the Twin Hills Gold Project manages its environment and social responsibilities. The ESMP structure is summarised in Table 1.

Table 1 – Structure of the ESMP report

CHAPTER	WHAT THIS CHAPTER ADDRESSES
Chapter 1	Broad overview of the site and the purpose of the ESMP
Chapter 2	Sets out the company integrated management system and how this ESMP is managed and enforced
Chapter 3	Communication and training
Chapter 4	Incident reporting
Chapter 5	Compliance and enforcement
Chapter 6	Biodiversity Management Programme
Chapter 7	Traffic Management Programme
Chapter 8	Soil Aspects
Chapter 9	Surface and groundwater management programme
Chapter 10	Waste management programme
Chapter 11	Spill management programme
Chapter 12	Air quality management programme
Chapter 13	Archaeological and heritage programme
Chapter 14	Implementation of ESMP

1.8 LIMITATIONS, UNCERTAINTIES, AND ASSUMPTIONS OF THIS ESMP

This ESMP does not include measures for compliance with statutory occupational health and safety requirements. This will be provided in the safety management plan to be developed by the proponent.

Where there is any conflict between the provisions of this ESMP and any contractor's obligations under their respective contracts, including statutory requirements (such as licences, project approval conditions, permits, standards, guidelines, and relevant laws), the contract and statutory requirements are to take precedence provided they are not in conflict with any environmental law or will in any way damage the environment beyond the limits set in the final approved ESMP.

The information contained in this ESMP has been based on the project description as provided in the environmental scoping report and its associated specialist studies. Where the design or construction methods have been altered during the ESIA process, this ESMP will be updated to reflect the additional data as the assessment phase proceeds.

2 ENVIRONMENTAL MANAGEMENT FRAMEWORK

This ESMP provides measures, guidelines, and procedures for managing and mitigating potential environmental impacts. The ESMP also indicates monitoring and reporting guidelines and sets responsibilities for those carrying out management and mitigation measures.

2.1 OBJECTIVES AND TARGETS

Environmental objectives and targets have been developed so that mining activities can minimise potential impacts on the environment, as far as reasonably practicable. Environmental objectives for the project are as follows:

- Zero pollution incidents
- Minimal vegetation clearing and earthworks
- Protect local flora and fauna
- Use natural resources effectively and efficiently, especially water

2.2 ORGANISATIONAL STRUCTURE, ROLES AND RESPONSIBILITIES

The proponent shall provide a project team to oversee and undertake the preparation and mining activities, which will be composed of the proponent's personnel and contractors. A nominated role shall be identified to ensure the management and implementation of this ESMP is carried out throughout the project LOM. The proponent shall be responsible for:

- Ensuring all members of the project team, including contractors, comply with the procedures set out in this ESMP
- Ensuring that all persons are provided with sufficient training, supervision, and instruction to fulfil this requirement
- Ensuring that any persons allocated specific environmental responsibilities are notified of their appointment and confirm that their responsibilities are clearly understood
- Contractors shall be responsible for ensuring and demonstrating that all personnel employed by them are compliant with this ESMP, and meet the responsibilities listed above

The key personnel and environmental responsibilities of each role through the project life are presented in Table 2.

Table 2 – Roles and responsibilities

ROLE	RESPONSIBILITIES AND DUTIES
Proponent	– Responsible for the management and implementation of the ESMP. – Ensure environmental policies are communicated to all personnel throughout the proposed project and that employees understand the guidelines of the ESMP. – Responsible for providing the resources required to complete the project tasks. – Appoint a site manager and project manager. – Ensure all workers are inducted on safety measures.
Mining management	– Oversee mining activities. – Monitor daily operations and ensure adherence by personnel to the ESMP. – Maintain the community issues and concerns register and keep records of complaints. – Maintain an up-to-date register of employees who have completed site induction.
Site manager	– Ensure that all contract workers, sub-contractors and visitors to the site are aware of the requirements of this ESMP, relevant to their roles and always adhere to this ESMP. – Report any non-compliance or accidents to management. – Receive, recording and responding to complaints. – Ensure adequate resources are available for the implementation of the ESMP. – Ensure safe and environmentally sound operations. – Responsible for the management, maintenance, and revisions of this ESMP.
Employees	– Adhere to measures set out in the ESMP. – Ensure they have undertaken a site induction. – Report any operations or conditions which deviate from the ESMP as well as any non-compliant issues or accidents to the environmental manager.

2.3 CONTRACTORS

Any contractors hired during the mining activities of the open pit operations and accessory works for the project duration shall be compliant with this ESMP and shall be responsible for the following:

- Undertaking activities in accordance with this ESMP as well as relevant policies, procedures, management plans, statutory requirements, and contract requirements
- Implementing appropriate environmental and safety management measures

- Reporting of environmental issues, including actual or potential environmental incidents and hazards, to the site manager and or management
- Ensuring appropriate corrective or remedial action is taken to address all environmental hazards and incidents reported by employees and subcontractors

2.4 EMPLOYMENT

The proponent and all contractors shall comply with the requirements of the Republic of Namibia Regulations for Labour, Health and Safety, and any amendments to these regulations. The following shall be complied with:

- In liaison with local government and community authorities, the proponent shall ensure that local people have access to information about job opportunities and are considered first for construction/maintenance contract employment positions
- The number of job opportunities shall be made known together with the associated skills and qualifications
- The maximum length of time the job is likely to last for shall be indicated
- Foreign workers with no proof of permanent legal residence shall not be hired
- Every effort shall be made to recruit from the group of unemployed workers living in the surrounding area

2.5 REGISTER OF ENVIRONMENTAL RISKS AND ISSUES

An environmental review of the proposed project has been completed to identify all the commitments and agreements made. A list of environmental commitments and risks has been produced, which details deliverables including measures identified for the prevention of pollution or damage to the environment during the mining phase.

3 COMMUNICATION AND TRAINING

To ensure potential risks and impacts are minimised it is vital that personnel are appropriately informed and trained on how to properly implement the ESMP. It is also important that regular communications are maintained with stakeholders (if applicable) and made aware of potential impacts and how to minimise or avoid them. This section sets out the framework for communication and training in relation to the ESMP.

3.1 COMMUNICATIONS

During construction and operations, the project manager and site manager shall communicate site-wide environmental issues to the project team through the following means (as and when required):

- Ensure all personnel are afforded the opportunity to attend an environmental site induction that sets out their requirements in relation to this ESMP
- Ensuring audits and inspections are undertaken regularly on a risk-based schedule
- Toolbox talks, including instruction on incident response procedures
- Deliver project- and task-specific environmental briefings where required
- Ensure all personnel have access to the ESMP
- Ensure operators of key activities and environmentally sensitive operations are briefed and understand their requirements

This ESMP shall be distributed to the mining team including any contractors and personnel working on the mining site to ensure that the environmental requirements are adequately communicated. Key activities and environmentally sensitive operations shall be briefed to workers and contractors.

During the mining activities, communications between the management team shall include discussing any complaints received and actions to resolve them; any inspections, audits, or non-conformance with this ESMP; and any objectives or target achievements.

3.2 ENVIRONMENTAL EMERGENCY AND RESPONSE

Table 3 – Emergency contact details

TOWN	AMBULANCE	POLICE	FIRE BRIGADE
Otjiwarongo	+264 (67) 30-3734	+264 (67) 1-0111	+264 (67) 30-4444
Karibib	+264 (64) 55-0073	+264 (64) 1-0111	+264 (64) 55-0020
Omaruru	+264 (64) 57-0037	+264 (64) 1-0111	+264 (64) 57-0028

All employees need to be made aware of emergency procedures and what to do in the event of an emergency. This must be included in the training of employees. Regular documented drills also need to be carried out to ensure competence of all employees in different emergency situations. An effective early warning method must be developed and installed to timeously warn personnel, both in the pit and on surface, in the event of an emergency.

3.3 COMPLAINTS HANDLING AND RECORDING

Any complaints received verbally (from the public) by any personnel on the project site shall be recorded by the receiver including:

- The name of the complainant
- The contact details of the complainant
- Date and time of the complaint
- The nature of the complaint

The information shall be given to the project manager who is overall responsible for the management of complaints. The project manager shall do the following:

- Inform the site manager of issues, concerns, or complaints
- The project manager must maintain a complaint register that required details of the complaint
- The project manager will provide a written response to the complainant of the results of the investigation and action to be taken to rectify or address the matter(s). Where no action is taken, the reasons why are to be recorded in the register

The workforce shall be informed about the complaints register, its location and the person responsible, to refer residents or the public who wish to lodge a complaint. The complaints register shall be kept for the duration of the project and will be available for government or public review upon request.

Table 4 below shows the environmental risks and issues, and mitigation and monitoring measures for socio-economic aspects.

Table 4 – Socio-economic aspects

ASPECT	ACTIONS AND OR REQUIREMENTS
Domain Manager	- Mining Manager - Site Manager - Employees
Potential issues or impacts	- Employment creation and skills development (both direct and indirect). - Opportunities during the mining phase (Approx. 700-800 jobs). - Social disruption due to the in-migration of additional people.
Management/ Mitigation measures	1. A policy regarding labour recruitment and employment will be compiled for use during the construction phase and early life of mine. The policy is to be reviewed and amended regularly. 2. Maximise local employment and local business opportunities to promote and improve the local economy. 3. Enhance the use of local labour, local skills as far as reasonably possible. Where the required skills do not occur locally, and where appropriate and applicable, ensure that relevant local individuals are trained. 4. Ensure that goods and services are sourced from the local and regional economy as far as reasonably possible. 5. Recruitment may not take place at the gate to the mine, it will take place at designated offices, to be communicated to job seekers and the community. 6. Create a database of employable community members. This database will include identification documents, certificates of highest qualifications and proof of residence confirmed by the leader of the community. 7. Provide contractors with the policy regarding labour recruitment and employment for their implementation. 8. Ensure that this policy is clearly communicated to all employees and to the communities. 9. Fair and equitable recruitment opportunities will be afforded to all with equivalent qualifications. 10. Recruitment practices must be transparent and auditable. 11. Stipulate the preferential use of local labour in all contracts, from communities within 50 km of the mine site, and then those areas from further afield, but without disregarding a person's constitutional rights. 12. Any job vacancy that is advertised must clearly indicate the required and appropriate skills for that position. 13. Actively downplay (through clear, simple, and persistent communication) inflated expectations of unlimited employment opportunities.

ASPECT	ACTIONS AND OR REQUIREMENTS
	14. Make use of locally available raw materials, goods, and services as far as possible, and where appropriate, during construction and operation. 15. A zero-tolerance policy will be adopted and fully enforced with respect to drugs and alcohol on site.
Monitoring requirements	1. Daily observations 2. Weekly checks 3. Monthly report from Manager

3.4 TRAINING AND AWARENESS

All personnel working on the project shall be competent to perform tasks that have the potential to cause an environmental impact. Competence is defined in terms of appropriate education, training, and experience. Training and toolbox talks will be provided to all employees and contractors.

3.5 SITE INDUCTION

All personnel involved in the project shall be inducted to the site with a specific environment and social awareness training, and health and safety issues. The environment and social awareness training shall ensure that personnel are familiar with the principles of this ESMP, the environment and social aspects and impacts associated with their activities, the procedures in place to control these impacts and the consequences of departure from these procedures. The project manager shall ensure a register of completed training is maintained. The site induction should include, but is not limited to the following:

- A general site-specific induction that outlines:
 - o What is meant by “environment” and the ESMP?
 - o Why the environment needs to be protected and conserved?
 - o How mining activities can impact the environment?
 - o What can be done to mitigate against impacts?
- The inductee's role and responsibilities concerning implementing the ESMP
- The site's environmental rules
- Details of how to deal with, and who to contact should any environmental problems occur
- Basic vegetation clearing principals and species identification sheets
- The potential consequences of non-compliance with this ESMP and relevant statutory requirements
- The role of responsible people for the project

4 INCIDENT REPORTING

The proponent must have an accident and incident reporting system that covers all applicable statutory requirements. The section below sets out the minimum requirements for incident reporting and should be used as a basis for incident reporting in the event that no incident reporting system exists.

4.1 MINOR INCIDENT OR “NEAR MISS”

Any incident or “near miss” involving the proponent, a nominated representative, any contractor, or its subcontractors or any third party's personnel, property, plant or equipment, must be:

- 1) Orally reported to the manager or the manager's nominated representative:
 - a. immediately and without delay
 - b. regardless of whether or not injury to personnel has occurred
 - c. or property or equipment has been damaged.
- 2) Written up and handed to the manager or the manager's nominated representative by the end of the shift. The written report should:
 - a. state all known facts and conditions at the time of the incident and
 - b. includes a preliminary assessment of the most likely potential consequences of the incident under the current circumstances

4.2 SERIOUS INCIDENT

For any serious incident involving a fatality, or permanent disability, the incident scene must be left untouched until witnessed by a representative of the police. This requirement does not preclude immediate first aid being administered and the location being made safe.

4.3 INCIDENT REPORT AND CLOSE OUT

The manager must investigate the cause of all work accidents and significant incidents and must provide the results of the investigation and recommendations on how to prevent a recurrence of such incidents. A formal root-cause investigation process should be followed.

5 COMPLIANCE AND ENFORCEMENT

5.1 ENVIRONMENTAL INSPECTIONS AND COMPLIANCE MONITORING

Inspections and audits of the site will be managed and undertaken by the mining manager to check that the standards and procedures set out in this ESMP are being complied with and pollution control measures are in place and working correctly. All equipment will be inspected to ensure they are operating as per specification; no damage has been caused, and no leaks or spills have occurred. Any non-conformance shall be recorded, including the following details: a brief description of non-conformance; the reason for the non-conformance; the responsible party; the result (consequence); and the corrective action is taken and any necessary follow up measures required. The application documentation for renewal of the environmental clearance certificate must include an audit report and copies of the 6 bi-annual reports that were submitted every 6 months for the 3 years that the clearance certificate is valid for.

5.2 HERITAGE PERMIT

As part of the application for an environmental clearance, an application for a permit must first be submitted to the National Heritage Council (NHC). Once issued the permit must be cited and included in the ESIA report and ESMP. The contents of the application for the heritage permit can be obtained from the council. The requirements to renew the heritage permit can also be obtained from the council's head offices in Windhoek.

5.3 WATER PERMITS AND LICENCE

The Water Act of (1956) governs the use of water resources in Namibia and is the enforceable piece of legislation for water related matters. The Water Resources Management Act of (2013), passed but pending regulations (not enforced), provides an improved framework for managing water resources based on the principles of integrated water resource management. While not enforced, it is considered best practice to adhere to its stipulations while ensuring compliance with the Water Act of 1956 at the same time.

5.4 WASTEWATER DISCHARGE PERMIT

In the event that the operations produce wastewater, a permit must be obtained from the Department of Water Affairs (DWA). In order to obtain an effluent wastewater permit, the proponent should provide the following information and complete the application form issued by the DWA:

- Specification of the treatment system (type of technology)
- Description of major activities resulting in effluent generation
- List of contaminants (analysis of effluent samples)

- Effluent quality
- Points of discharge
- Show the present average quantities of incoming water, recycled water, final outflow
- Where final effluent will be discharged

5.5 REPORTING

Reports shall be submitted to the Mining Commissioner in terms of the Minerals (Mining and Prospecting) Act, No. 33 of 1992. The proponent is required to report quarterly, and a report shall be submitted 60 days after the currency of the EPL. Bi-annual environmental reports shall be submitted to the Environmental Commissioner every 6 months of every year. These reports should include records of the monitoring and other deliverables of every aspect or programme described in the EMP.

5.6 NON- COMPLIANCE

Where it has been identified that works are not compliant with this ESMP, the project manager shall employ corrective actions so that the works return to being compliant as soon as possible. In instances where the requirements of the ESMP are not upheld, a non-conformance and corrective action notice shall be produced. The notice shall be generated during the inspections and the project manager shall be responsible for ensuring a corrective action plan is established and implemented to address the identified shortcomings. A non-compliance event / situation is considered if, for example:

- There is evidence of a contravention of this ESMP and associated indicators or objectives
- The site manager and or contractor have failed to comply with corrective or other instructions issued by the environmental manager or qualified authority
- The site manager and or contractor fail to respond to complaints from the public

Activities shall be stopped in the event of a non-compliance until corrective action(s) has been completed.

5.7 DISCIPLINARY ACTION

This EMP is a legally binding document and non-compliance with it shall result in disciplinary action being taken against the perpetrator/s. Such action may take the form of (but will not be limited to):

- Fines / penalties
- Legal action
- Monetary penalties imposed by the proponent on the contractor
- Withdrawal of licence
- Suspension of work

The disciplinary action shall be determined according to the nature and extent of the transgression / non-compliance, and penalties are to be weighed against the severity of the incident.

6 BIODIVERSITY MANAGEMENT PROGRAMME

Table 5 below shows the environmental risks and issues, and mitigation and monitoring measures for biodiversity aspects.

Table 5 – Biodiversity aspects

ASPECT	ACTIONS AND OR REQUIREMENTS	
Potential issues or impacts	– Possible injury or death of animals – Poaching – Habitat fragmentation from clearing, pitting, trenching and opencast mining – Flora disturbance – Habitat loss from excessive clearing	
Management/ Mitigation measures	General	1. Ensure internal land clearing permits are applied for prior to land clearing and through this process the environmental team have the opportunity to recover or rescue plants of significance or plants that can be used for progressive rehabilitation. Permits obtained from Directorate of Forestry. 2. Limit the development to actual sites to be mined and avoid affecting adjacent areas, especially mountainous areas and ephemeral drainage lines, throughout the entire area. 3. Avoid development and associated infrastructure in sensitive areas – e.g. hills and drainage lines (ephemeral rivers/streams) in the immediate area. This would minimise the negative effect on the local environment, especially unique features serving as habitat to various vertebrate fauna species. 4. Minimise areas cleared by ensuring that an early works construction plan or a construction management plan is in place and conveyed to contractors. 5. Avoid all areas not directly targeted for the various mining infrastructures. 6. All workers on-site are to be notified to avoid any excluded areas or species. 7. Identify rare, endemic, endangered, threatened and protected species and demarcate them and avoid cutting them down, trampling them, or removing them, where possible. 8. Remove (e.g. capture) unique fauna and sensitive fauna, as well as slow moving species such as tortoise, chameleon before commencing with the development activities, as well as during the operational phase, and or species serendipitously located during this period

ASPECT	ACTIONS AND OR REQUIREMENTS
	and relocate to a less sensitive/ disturbed sites in the immediate area. 9. Remove unique, sensitive flora (e.g. Aloe spp., <i>Cyphostemma</i> spp.) and protected plant species before commencing with the development activities and relocating to less sensitive/disturbed sites in the immediate area, if disturbance cannot be avoided. 10. Prevent and discourage the setting of snares (poaching), illegal collecting of veld foods (e.g. tortoises, etc.), indiscriminate killing of perceived dangerous species (e.g. snakes, etc.) and collecting of wood as this would diminish and negatively affect the local fauna – especially during the development phase(s). 11. Prevent and discourage the collecting of firewood as dead wood has an important ecological role – especially during the development phase(s). Such collecting of firewood, especially for economic reasons, often leads to abuses – e.g. chopping down of live and or protected tree species such as <i>Acacia erioloba</i>, <i>Combretum imberbe</i>, etc. which are good quality wood. 12. Attempt to avoid the removal of bigger trees during the development phase(s) – especially with the development of access routes – as these serve as habitat for a myriad of fauna. Avoid the destruction of larger trees associated with the ephemeral drainage lines. 13. Avoid trees with raptor nests (especially white-backed vulture) as these bird numbers are declining dramatically throughout their range and are classified as critically endangered by the IUCN (2020). 14. Prevent and discourage fires – especially during the development phase(s) – as this could easily cause runaway veld fires affecting both the local fauna and flora (e.g. loss of grazing and domestic stock mortalities, etc.) for the neighbouring farmers. 15. Prevent domestic pets – e.g. cats and dogs – accompanying the workers during the construction phase as cats decimate the local fauna and interbreed and transmit diseases to the indigenous African wildcat found (and confirmed) in the area. Dogs often cause problems when bonding on hunting expeditions thus negatively affecting the local fauna. The indiscriminate and wanton killing of the local fauna by such pets should be avoided at all costs.

ASPECT	ACTIONS AND OR REQUIREMENTS
	16. Prevent the planting of potentially invasive alien plant species (e.g. <i>Tecoma stans</i>, <i>Pennisetum setaceum</i>, etc.) for ornamental purposes as part of the landscaping – e.g. office buildings, plant site, access gate, etc. Alien species often “escape” and become invasive causing further ecological damage as is evident from previous human habitation in the area (i.e. invasive aliens on site include <i>Opuntia</i>, <i>Prosopis</i> spp.). 17. Eradicate – destroy – all invasive alien plants encountered on site – e.g. <i>Opuntia</i>, <i>Prosopis</i> spp., etc. This would ensure that the spread is limited and show environmental commitment. 18. Incorporate indigenous vegetation – especially the protected species e.g. <i>Aloe</i> spp., <i>Cyphostemma</i> spp., etc. – into the overall landscaping. Indigenous species require less water and overall maintenance 19. Include large/old tree specimens as part of the landscaping at the plant site. 20. Initiate a suitable waste removal system (i.e. remove to Karibib and not store on site) as this often attracts wildlife – e.g. baboons and black-backed jackal, crows, etc. – which may result in human-wildlife conflict issues. 21. Educate/inform contractors and staff on protected species to avoid and the consequences of illegal collection of such species. 22. No snares or catching of animals, no keeping or housing of pets or livestock for food. No poaching. 23. No animals or birds may be collected, caught, consumed, or removed from the site by the contractor or personnel on site. No poaching. 24. Ensure all trenches are backfilled upon completion 25. Progressive rehabilitation during the mining phase should be used as soon as possible and continue throughout the operating phase. 26. Rehabilitation of the disturbed areas – i.e. initial development access route “scars” and associated tracks as well as associated mining/prospecting infrastructures should be rehabilitated as soon as their use is complete, otherwise access needs to be restricted. Preferably workers should be transported in/out to the construction sites on a daily basis to avoid excess damage to the local environment (e.g. fires, wood collection, poaching, etc.). Such rehabilitation would not only confirm the company's environmental

ASPECT	ACTIONS AND OR REQUIREMENTS	
		integrity, but also show true local commitment to the environment. 27. Natural drainage patterns should be restored where possible. 28. Investigate the idea of employing an Environmental Officer during the construction phase(s) to ensure compliance and minimise the overall impact on the flora and the environment.
	Tracks	1. Avoid placing access routes (roads and tracks) through sensitive areas – e.g. over hills and along drainage lines within ephemeral (intermittent) streams and rivers. This would minimise the effect on localised potentially sensitive flora and habitats in the area. 2. Route new tracks around established and protected trees, and clumps of vegetation, where possible 3. Avoid driving randomly through the area (i.e. “track discipline”), but rather stick to permanently placed roads/tracks – especially during the construction phase. This would minimise the effect on localised potentially sensitive flora and habitats in the area 4. Avoid having to create new tracks for ongoing maintenance and inspections. 5. Stick to speed limits that are established to result in fewer faunal road mortalities as well as less dust pollution. Speed humps could also be used to ensure the speed limit. 6. Implement erosion control. – i.e. avoid constructing tracks up steep gradients (where runoff can deeply incise the slope and erode the road); incorporate erosion furrows (runoff sites) and humps along tracks to channel water off the tracks to minimise erosion problems; cross drainage lines at right angles, etc. The area(s) towards and adjacent the drainage line(s) are easily eroded, and further development may exacerbate this problem. Avoid construction within 100 m of the main drainage line(s) (ephemeral streams) to minimise erosion problems as well as preserving the riparian associated flora and fauna.
	Access route	7. Move the proposed D1941 access route just to the north of the WRDs and TSF sites along an existing gravel farm road. This would have less impact on untouched land and the sensitive riverine environments the road will cross.

ASPECT	ACTIONS AND OR REQUIREMENTS	
		8. Revegetate access routes upon completion of installation of associated infrastructure where possible.
	WRD	1. Avoid the destruction of the small ephemeral pan on the north-eastern border of the proposed WRDs, by adjusting the layout slightly. 2. Terrace the waste rock dumps and cover with soil to facilitate stabilisation and rehabilitation.
	TSF	Terrace the tailings storage facility and cover with soil to facilitate stabilisation and rehabilitation
	River diversion	Redirecting the Okawayo River around the pit would have the least impact on the vertebrate fauna.
Monitoring requirements	4. Daily visual inspection during construction of new access tracks/widening, land clearing areas. 5. Daily visual inspection of dams, river diversion for fauna that may have become entrapped. 6. Clearing fire breaks on a regular basis, especially prior to the windier months. 7. Regular checking of rehabilitation areas to ensure that the vegetation is flourishing and not dying. 8. Biodiversity monitoring should be undertaken annually. This program will include, but is not limited to, monitoring of the condition of habitats, ecosystems, topsoil stockpiles, species inventory and alien vegetation control. 9. Vegetation clearing permits are valid and on file.	

7 TRAFFIC MANAGEMENT PROGRAMME

Table 6 below shows the environmental risks and issues, and mitigation and monitoring measures for traffic aspects.

Table 6 – Traffic aspects

ASPECT	ACTIONS AND OR REQUIREMENTS
Potential issues or impacts	– Increased traffic volumes on existing roads – Wear and tear of existing road surfaces – Community safety
Management/ Mitigation measures	1. Designs of the C33 intersection layouts of the mine access road must address design standards and elements such as alignment, sign distances, cross-sections and provisions for other road users including pedestrians, and must be legally compliant. 2. The diversion of the district road D1941 will be required. The access to the dimension stone mines may occur along the existing D1941 up to a point before it reaches the Okawayo River, at which point, a dead end and turning point will be necessary. Access to points further down the D1941 will need to be via the Twin Hills gold mine road. Thus, a permanent new route of the D1941 will be required. 3. Inspect mine vehicles and contractors' vehicles weekly for clean and operational taillights, indicators, reflective signage and reverse horns/beepers to ensure visibility of vehicles, especially at night. 4. The needs of pedestrians should be taken into consideration in the planning and design of the access to the proposed site, as well as the design of the road infrastructure. 5. All employees and contractors must adhere to the speed limits and other road safety procedures, both on the mine site, and on public roads. Include speed limits in the induction and enforce the speed limits. 6. Provide large visible road signage, indicating the presence of heavy vehicle traffic at least 500 m before, on either side of the mine site access road intersection along the C33 road. 7. Road safety issues must be included as part of the overall on-site safety training and at induction.
Monitoring requirements	1. Daily observations 2. Weekly checks

8 SOIL ASPECTS

Table 7 below shows the environmental risks and issues, and mitigation and monitoring measures for soil aspects.

Table 7 – Soil aspects

ASPECT	ACTIONS AND OR REQUIREMENTS	
Potential issues or impacts	– Trenching, pitting and opencast mining can cause changes to soil and landscape – The land clearing activities by mechanical methods would result in erosion issues, especially with the proposed redirection of Okawayo River	
Management/ Mitigation measures	Changes to soil and landscape	1. Topsoil should be separately stockpiled to be re-spread when backfilling. 2. Soils to be stored for longer than three years should preferably not be stockpiled in piles greater than 1.5 m in height. 3. Slopes of the stockpiles should be constructed to minimise the chances of erosion of the soils. 4. Topsoil stockpiles should be vegetated as soon as possible to prevent loss of the resource by wind and water erosion and to retain its micro-biological functions. 5. Monitor vegetation on soil stockpiles to prevent erosion and loss of topsoil. 6. Fertilize and vegetate soil stockpiles where required. 7. Equipment must be in good condition to ensure that lubricant/fuel spills do not contaminate the site. 8. Ensure soils are replaced in layers in which they were removed. 9. Disturbed or excavated areas should be backfilled with the soil material that was removed from it, shaped to free draining slopes and planted with sustainable grass/shrub/tree species. 10. Ensure topsoil stockpiles are not positioned down gradient of potential contamination zones.
	Land clearing	1. Avoid clear felling of vegetation in areas viewed as erosion prone – i.e. ephemeral rivers; steep slopes (hill areas). 2. Reroute or limit the size of or avoid access route(s) in areas viewed as erosion prone – i.e. ephemeral rivers; steep slopes (hill areas). 3. Where new tracks have to be made off the main routes, the routes should be selected causing minimal damage to the environment – e.g. use the same

ASPECT	ACTIONS AND OR REQUIREMENTS
	tracks; cross drainage lines at right angles; avoid placing tracks within drainage lines; avoid collateral damage (i.e. select routes that do not require the unnecessary removal of trees/shrubs, especially protected species). 4. Rehabilitate all new tracks created as far as practically possible. 5. Construct permanent non-gravel or tar roads along vehicle route(s) most often used. 6. Rehabilitate eroded areas annually – i.e. after the rainy season (during winter months). 7. Implement and maintain erosion control measures where applicable – e.g. cross drains on slopes, etc. 8. The option of diversion of the Okawayo River should have the least impact on the general ecology/sensitive habitats and erosion prone areas. 9. Ensure the continuous maintenance of the redirected Okawayo River – i.e. after the rainy season (during winter months). 10. Access route – The option of redirecting D1941 just to the north of the WRDs/TFS would have the least impact on the general ecology/sensitive habitats and erosion prone areas.

9 SURFACE AND GROUNDWATER MANAGEMENT PROGRAMME

9.1 INTRODUCTION

Chemical and waste spills must be contained so as not to contaminate the soil or groundwater. Any contact with groundwater while completing any site activity must be treated with exceptional care and reported immediately to minimize the potential for contamination of an aquifer. It is important to limit the potential for wastewater seepage or spilled liquids or other materials drainage or flow to groundwater.

This surface and groundwater management plan outlines appropriate surface and groundwater water management measures, including response, monitoring programs, and reporting procedures to be implemented.

9.2 OBJECTIVES

This surface and groundwater management plan has been prepared to minimise potential impacts on surface and groundwater resulting from the mining activities. It is important to report any contact with or contamination of groundwater to the environmental coordinator or site manager as soon as possible.

9.3 RESPONSIBILITIES

WORKFORCE AND ALL CONTRACTORS

All personnel working on the site are required to take all reasonable measures to prevent the discharge of sediments and pollutants from the site into surface and groundwater sources. Should an incident occur, all personnel are required to report any contact with groundwater to the environmental coordinator.

ENVIRONMENTAL COORDINATOR

The environmental coordinator will ensure that the objectives listed above are being met and provide performance feedback to the manager.

9.4 SURFACE AND GROUNDWATER MANAGEMENT MEASURES

The surface and groundwater management plan measures (see Table 8) are designed to minimise the runoff of sediment-laden or polluted water/effluent into the surrounding environment. Mining activities that could potentially alter natural surface water and groundwater quality include:

- Chemical spills
- Refuelling

- Seepage of wastewater into groundwater
- Trenching, pitting and open cast mining
- Mine waste and tailings storage
- Poor resource stewardship practices

The following requirements are to be met to ensure that groundwater is not contaminated:

- Fuel/oil and chemicals must be safely stored and removed.
- Any contact with surface or groundwater must be treated with exceptional care and reported immediately, to minimize the potential for contamination of an aquifer.
- Investigate, assess, design, operate, maintain, and monitor mine and mineral materials planned for storage within tailings and waste rock facilities to prevent and manage potential mine drainage contamination.

Table 8 – Water quality mitigation measures

ASPECT	MITIGATION MEASURE	RESPONSIBILITY
Pollution control measures	Visual monitoring and photographic record of any surface and or groundwater intersected by any site activity or material.	Environmental coordinator
	Visual monitoring during rainfall events for runoff of polluted water.	Environmental coordinator
	Vehicles and machinery are to be regularly serviced to minimise oil and fuel leaks.	Site manager
	Good housekeeping shall be maintained and chemicals, and fuel must be stored securely to prevent any accidental spills on the mining site.	Site manager
Sewage	Portable chemical toilet facilities will be hired for onsite use and the supplier/contactors will manage any sewerage generated. Long term sewage management during the operational phase will need to be adequate, as well as pre-approval and related permits based on the design and structure (capacity) required.	Environmental coordinator and site manager
Reduction in surface water recharge into catchment	1. Construct the diversion weir or flood attenuation dam wall upstream of the open pit in accord with engineering specifications to divert 1 in 50-year floods at a safe inflow and out flow rate ensuring the freeboard is sufficient for such flooding. 2. The design of the diversion weir / flood attenuation dam wall should be such that allows sufficient water to flow along the water course	- Mining Manager - Site Manager

ASPECT	MITIGATION MEASURE	RESPONSIBILITY
	downstream of the structures so that the riverine ecosystem can maintain reasonable functioning. 3. To prevent contamination of the watercourses. 4. To ensure that there is continuous, on-going maintenance and monitoring of the condition of the clean and dirty water system, its effectiveness and the water qualities in and around the site.	
Inefficient use of water resources	1. To ensure compliance with all legal obligations. 2. All plant and surface infrastructure (including the TSF and waste rock dumps) to be designed and constructed according to national standards and applicable legislative requirements, to effectively prevent surface water and groundwater contamination. 3. Ensure erosion control and prevention measures are in place during construction. 4. Ensure any new laydown areas that will be used for construction of the mine are located outside of stormwater catchment areas. 5. Installation of diversion structures to divert non-contact surface water away and around the mining operations. 6. Refuelling shall be undertaken in a designated area designed/constructed to standards. 7. All stationary vehicles and machinery must have drip trays to collect leakages of lubricants and oil during any field repairs or emergency maintenance. 8. In the event of pollution, polluted soils must be collected and disposed of at an approved site. 9. A 'good housekeeping' policy shall be adopted across the mining area.	- Mining Manager - Site Manager
Trenching and blasting could penetrate the groundwater table,	1. Dewatering of the pit may be necessary; if suitable this water can either be used in the processing plant or pumped into drainage lines of the catchment downstream of the infrastructure, with all valid permits. 2. The impact of opencast mining and any dewatering of the pit on the surrounding aquifers will be monitored and reported on. Should there be a reduction of the cone as a direct result of dewatering from the pit, then an	- Site Manager - Mining Manager

ASPECT	MITIGATION MEASURE	RESPONSIBILITY
	alternative source of water may need to be identified for the affected users.	
Any hazardous fluid or lubricating chemicals used could enter the aquifer or surface water environment causing pollution	1. Hazardous waste disposal facilities need to be approved by the MEFT prior to construction and / or meet industry standards to prevent pollution events from occurring. 2. Temporary waste disposal facilities will be provided for the collection of waste which will be removed regularly by a reputable contractor to the permitted waste disposal site. 3. Tailings, chemical and hydrocarbon spillages from trucks, conveyors and pipelines will be cleaned up timeously to prevent contamination. 4. Water in the pollution control dams will be used for road watering for dust suppression, make up water where possible, industrial water or for construction, as permitted. 5. The contractors' laydown areas are to be surfaced and will drain to a sump with silt traps and hydrocarbon collectors. 6. All chemicals, bulk fuels, oils and grease and any other hazardous substance, will be stored and handled as per all applicable legislation and national standards. 7. Portable chemical toilets will be provided during the construction phase. They will be routinely cleaned, and sewage disposed of at a licensed sewage treatment plant with the safe disposal certificate to be provided. 8. A sewage plant may be provided for during the operational phase and the treated water will either need to be contained in pollution control dams and will be recycled or if treated water is of high enough standard, it can be flushed into the catchment's water courses. 9. Pollution control dams will be constructed downslope of the mine and plant site to capture all dirty water run-off. 10. Silt traps will be constructed upslope of the pollution control dams and return water dam. 11. The pollution control facilities (pollution control dams, silt traps and return water dam) will be placed on planned maintenance, routine inspections will be implemented, and they will	- Mining Manager - Site Manager

ASPECT	MITIGATION MEASURE	RESPONSIBILITY
	be de-silted periodically to ensure effective performance.	
Lowering of the groundwater levels	1. To maximise the re-use of water during the construction and operational phases to minimise the use of groundwater and clean water (no matter the source). 2. Extraction volumes of water shall be minimal during mining and where possible, water from existing water sources shall be used. 3. Use water effectively and efficiently by following the reduce-recycle-reuse approach. 4. Record volumes of abstraction and supply. 5. A site wide water balance will be kept and updated on a regular basis.	- Site Manager - Mining Manager
Reduction of surface flow downstream of the weir / flood attenuation dam upstream of the mine pit.	1. Minimise the impact on the catchment yield be diverted around the open pit and direct any clean runoff from the mine infrastructure into the same catchment. 2. Contain contaminated water within mining infrastructure sites using berms and direct to sumps for separation and recycling. 3. Construct stormwater diversion berms around any construction sites to divert clean water around and away from these sites. 4. Keep clean and dirty water separate. 5. Minimise water consumption from external sources and recycle as much water as possible. 6. Minimise the risk of discharging contaminated water.	- Mining Manager - Site Manager

9.5 SURFACE AND GROUNDWATER QUALITY MONITORING

Every effort must be made throughout to preserve the quality of surface water and groundwater sources that the proponent may impact. Containment of waste and chemicals and the correct disposal thereof must be of an acceptable standard. Personnel must report any unusual conditions and intersection with surface and groundwater immediately to the environmental coordinator.

The Department of Water Affairs require quarterly reporting for water quality of water from the sources for which a permit was required, namely, for abstraction permits and discharge permits.

1. Daily and weekly observations for any leakages

2. Maintain a record of all abstracted volumes and report to DWA / MAWLR as per permit conditions
3. Install water flow meters if required
4. Maintain a monthly water balance
5. Submit quarterly water quality tests for water and monitoring boreholes, effluent discharge points and any surface water bodies
6. Monitor the integrity of the weir / dam wall in accord with the frequency laid down by engineers who designed the structures
7. Monitor the water table level in the water course downstream of the diversion weir / flood attenuation dam

10 WASTE MANAGEMENT PROGRAMME

10.1 INTRODUCTION

The construction and mining activities will generate both solid and liquid waste. The types of waste generated at the facility are classified as mineral and non-mineral waste. All non-mineral waste will eventually be removed from the mine site and will either be disposed of at the Karibib landfill site (household or garden waste) or the Walvis Bay hazardous waste disposal site. Mineral waste from mining operations is either deposited on the WRD or TSF or a combination of both.

10.2 OBJECTIVES

This waste management programme (see Table 9) has been prepared to ensure the proper storage, transport, treatment, and disposal of waste and where possible will follow the waste hierarchy, which encourages waste avoidance and waste reduction followed by reuse, recycling and reclamation, before waste treatment and waste disposal.

10.3 ROLES AND RESPONSIBILITIES

WORKFORCE AND ALL CONTRACTORS

- Required to ensure that all waste generated during mining activities is removed and disposed of accordingly including providing evidence in the form of waste transfer receipts for the waste moved off site
- Ensure no windblown rubbish pollutes the environment
- Remove waste on a regular basis to prevent vermin, as well as baboons, and black backed jackals and hyenas

SITE MANAGER AND ENVIRONMENTAL COORDINATOR

- Required to inspect receipts and evidence of correct waste handling
- Review waste management practices regularly during the construction and mining operations on site

10.4 SOLID AND LIQUID NON-MINERAL WASTE

The mine site will set up a form of recycling system thus reducing its impacts associated with solid waste generation. Where possible the proponent will implement measures to reduce, reuse and recycle waste generated as part of the operations of the mine. To achieve this a temporary waste storage facility will be required.

Waste will be controlled through prevention and mitigation measures as follows:

- Reduce, reuse, and recycle where possible

- Storage of domestic waste on site may result in the attraction of unwanted scavengers and should be disposed of the accredited site as soon as is feasible
- Hydrocarbon and chemical contaminated solids have the potential to cause contamination to the soil, groundwater and/or surface water, thus correct storage and disposal methods are required. Some of these materials can be recycled or used by other facilities

Table 9 - Waste mitigation measures

ASPECT	MITIGATION MEASURE	RESPONSIBILITY
Environmental contamination from liquid waste	Hydrocarbon and chemical contaminated solids must be stored correctly and disposed of by registered companies.	Site manager and environmental coordinator
	Safe disposal certificates must be kept and provided to the project manager on request.	Environmental coordinator
Littering and environmental contamination from waste	No littering by workers shall be allowed.	Proponent
	All litter on and around the EPL site must be picked up and placed in the bins provided.	All staff
	The site should be always kept tidy and free of litter. All domestic and general waste produced daily should be cleaned and contained daily.	All staff
	No solid waste landfill will be established at the site.	Proponent
	No waste shall be burned or buried anywhere unless permitted to do so.	Proponent
	Waste shall be collected and shall be removed regularly to avoid bad odours.	Site manager
	Hazardous and non-hazardous waste shall be always stored separately.	Site manager and environmental coordinator

10.5 WASTE DISPOSAL MONITORING

Certificates providing the safe disposal of waste from a permitted hazardous waste disposal site must be provided to the manager upon request.

11 SPILL MANAGEMENT PROGRAMME

11.1 INTRODUCTION

The uncontrolled release of fuels and other chemicals has the potential to result in the contamination of soil, groundwater, and surface water, which may lead to serious environmental harm. On this basis, the storage and use of fuels or other chemicals must be managed to minimise the risk of a release, and measures must be in place to promptly reduce and manage impacts should a release occur.

11.2 OBJECTIVES

This spill management plan (see Table 10) has been prepared to minimise the potential for the uncontrolled release of fuels, oils, and other chemicals. Preventative measures to minimise the potential for a spill are listed. Should a spill occur, this plan provides guidance for the proponent on the appropriate spill response measures.

11.3 ROLES AND RESPONSIBILITIES

WORKFORCE AND ALL CONTRACTORS

Required to implement the spill prevention and response measures listed below.

SITE MANAGER/ ENVIRONMENTAL COORDINATOR

Required to ensure that appropriate spill prevention measures (listed below) are implemented and that any spills have been appropriately managed and reported.

11.4 SPILL PREVENTION MEASURES

The following management measures are to be implemented by the proponent:

- Spill kits are to be made available throughout the site. The kits are to include, as a minimum, the following items:
 - o Absorbent materials
 - o Shovels
 - o Heavy-duty plastic bags
 - o Protective clothing (e.g. gloves and overalls)
- Major servicing of equipment shall be undertaken off site or in appropriately equipped workshops
- Provision of adequate and frequent training on spill management, spill response and refuelling must be provided to all onsite staff and contractors

- Fuels, lubricants, and chemicals are to be stored within appropriately sized, impermeable bunds or trays with a capacity not less than 110% of the total volume of products stored
- All fuel and chemical storage and handling equipment (including transfer hoses, etc.) shall be well maintained
- Storage and handling of fuels and chemicals shall follow relevant legislation and regulations
- No refuelling is to take place within 50 metres of groundwater boreholes, surface water or streams
- Material safety data sheet (MSDS) are to be kept for each chemical used on site. These must be easily accessible to all personnel

11.5 SPILL RESPONSE MEASURES

The primary concern, in the event of any spill, is the health and safety of any residents/employees and contractors in the vicinity. Of secondary, but highly significant, importance is the protection of water sources and then soil and vegetation.

The following points therefore apply to all areas on the site:

- Assess the situation for potential hazards
- Do not come into contact with the spilled substance until it has been characterised and necessary personal protective equipment (PPE) is provided
- Isolate the area as required, deferring to on-site authorities as appropriate
- Notify the site manager or safety, health and environmental coordinator

The following measures are to be implemented in response to a spill:

- Spills are to be stopped at source as soon as possible (e.g. close valve or upright drum)
- Spilt material is to be contained to the smallest area possible using a combination of absorbent material, earthen bunds or other containment methods
- Spilt material is to be recovered as soon as possible using appropriate equipment. In most cases, it will be necessary to excavate the underlying soils until clean soils are encountered
- All contaminated materials recovered subsequent to a spill, including soils, absorbent pads and sawdust, are to be disposed to appropriately licensed facilities
- The manager or safety, health and environmental coordinator are to be informed as soon as possible in the event of a spill
- A written Incident Report must be submitted to the manager

Table 10 - Spill mitigation measures

ASPECT	MITIGATION MEASURE	RESPONSIBILITY
Stored Hazardous Chemicals	Hazardous chemicals are to be stored in bunded areas.	Site manager
	Hazardous chemicals (such as fuels) are to be handled over areas provided with impervious surfaces.	Site manager
	Spills of hazardous chemicals are to be contained and cleaned-up to ensure protection of the environment.	All
	All the necessary PPE required for the safe handling and use of petrochemicals and oils shall be provided to, and used or worn by, the onsite staff.	All
Machinery and Equipment Maintenance	Major servicing of equipment shall be undertaken off site or in appropriately equipped workshops.	Site manager
	For small repairs and required maintenance activities all reasonable precautions to avoid oil and fuel spills must be taken (e.g. spill trays, impervious sheets).	Site manager
	Vehicles and machinery are to be regularly serviced to minimise oil and fuel leaks.	Site manager
	All the necessary PPE required for maintenance activities must be issued to staff whose duty it is to manage and maintain the machinery and equipment.	Site manager/ environmental coordinator

Table 11 below shows the environmental risks and issues, and mitigation and monitoring measures for the Spill of hazardous substances.

Table 11 - Spill of hazardous substances

ASPECT	ACTIONS AND OR REQUIREMENTS	
Potential issues or impacts	– Hydrocarbon and chemical handling and storage can cause spillages that lead to groundwater contamination and soil contamination.	
Management/ Mitigation measures	Safe delivery and handling	1. Training employees and toolbox talks. 2. Good housekeeping across the site. 3. Fuel and chemicals are handled with care. 4. Spill kits to be at designated areas across the site or available for use during refueling, fuel/chemical delivery, or use. Absorption material should be available and at hand. Where sawdust is used it should be cleaned up immediately and not left for long periods as this poses a fire hazard. 5. Any major spill is reported once containment has been achieved.

ASPECT	ACTIONS AND OR REQUIREMENTS	
		6. Plant and equipment to be well maintained and serviced regularly. 7. In the field, the use of hydrocarbons tanks under 200 litres can be used for mobile refueling or servicing.
	Storage	1. All tanks to be stored on a non-porous floor and within a bunded area. 2. Bund to be capable of storing at least 110% of the volume of the largest tank. 3. All containers to be suitable for use and not damaged 4. Tanks are always locked. 5. Spill kits available at storage locations and around the site at suitable locations.
	Refuelling	1. Drip tray to be used during refueling of vehicles and on an impermeable flat surface where possible. 2. A funnel should be available and used to avoid spillage during decanting.
	Rehabilitation	Contaminated soils should be removed and deposited on lined storage areas for rehabilitation purposes. Rehabilitation can take place naturally by adding water, air, and fertiliser. The process can be accelerated by using special additives that will breakdown the hydrocarbons. Once rehabilitated the soils can be used for revegetating WRD slopes.
Monitoring requirements	1. Daily observations when fuels/chemicals are delivered and handled 2. Supervision during refueling. 3. Weekly observations monitor containment and storage. 4. Monitor the level of hydrocarbons in contaminated soils after a year of rehabilitation. Monitor each year until the soils are ready for re-use in revegetation projects.	

For large-scale spills and other significant environmental incidents, the fire services should be contacted as required and the office of the Ministry of Environment and Tourism (MET) informed of the incident (telephone +264 61 284 2111). All correspondence with MET should be undertaken by the manager.

For the clean-up of smaller spills, the relevant material safety data sheet (MSDS) should be consulted to determine the appropriate clean-up procedure. Basic spill response training will be provided as part of the site environmental induction, spill response equipment, including relevant MSDS copies, will be provided in areas where potentially environmentally hazardous chemicals may be used.

11.6 SPILL REPORTING

All major petroleum product spills should be reported to the Ministry of Mines and Energy (MME) on Form PP/11 titled “Reporting of major petroleum product spill”, issued by the ministry.

11.7 REHABILITATION OF CONTAMINATED SOILS

All soils that are contaminated with chemicals and or hydrocarbons should be taken to the rehabilitation area. A procedural manual for rehabilitating contaminated soils on site should be developed.

12 AIR QUALITY MANAGEMENT PROGRAMME

12.1 INTRODUCTION

This air quality management plan (see Table 12 and Table 14) describes the strategies and procedures that will be implemented to ensure that the health and amenity of construction workers and nearby sensitive receptors are protected from elevated concentrations of airborne dust and other gaseous emissions (e.g. oxides of nitrogen; nitrogen dioxide, particulate matter; sulphur dioxide and carbon monoxide). Typically, the gases present in a mining environment include carbon monoxide, hydrogen sulphide, sulphur dioxide, methane, nitrogen dioxide and ammonia. In cases where generators and other machinery are used, there will be some release of exhaust fumes that will impact the immediate vicinity but will be of short duration. Finally, releases from on-site laboratory fume hoods and the furnace exhaust can be harmful both to the environment and people.

12.2 OBJECTIVES

This air quality management plan has been prepared to prevent deterioration of air quality and to minimise the potential for emitted dust and airborne pollutants. Preventative measures are listed below.

12.3 RESPONSIBILITIES

WORKFORCE AND ALL CONTRACTORS

To implement the necessary management practices to meet the objectives listed above.

SITE MANAGER/ ENVIRONMENTAL COORDINATOR

To ensure that the objectives listed above are being met and to provide performance feedback to the mining manager.

12.4 AIR QUALITY MANAGEMENT PROCEDURES

Activities that may potentially emit dust and airborne pollutants during the operations include the following:

- Blasting
- Opencast mining
- Vehicle movements
- Machinery operations
- On-site laboratory exhaust and fume hood systems

Opencast mine activities can contribute to ambient noise and vibration, affecting neighbours. The proponent will minimise the potential for dust generation and the emission of airborne pollutants by undertaking the following management measures, as required:

- Blasting to be planned to avoid windy days
- Vehicle movements will be restricted to sealed roads
- Appropriate speed limits will be set and enforced
- Ground disturbance will be minimised as far as practical
- Vehicles and machinery will be maintained so as to limit exhaust fume emissions
- Use and preventative maintenance of effective emission systems on on-site laboratory exhaust and fume hood equipment

Table 12 - Air quality mitigation measures - dust

ASPECT	MITIGATION MEASURE	RESPONSIBILITY
Dust and fumes	Dust suppression measures must be implemented to reduce dust.	- Site manager - Contractor
	Vehicles must adhere to speed limits to avoid producing excessive dust.	- Site manager - Contractor
	Vehicles and machinery are to be regularly serviced according to the manufacturers' specifications and kept in good working order to minimise exhaust emissions.	- Site manager - Contractor
Dust generation can negatively impact occupational health and visibility	Construction and closure phases	
	Air quality impacts during construction would be reduced through basic control measures such as limiting the speed of haul trucks; limit unnecessary travelling of vehicles on untreated roads; and applying dust suppressants on regularly travelled, unpaved sections.	- Mining Manager - Site Manager
	When haul trucks need to use public roads, the vehicles need to be cleaned of all mud and the material transported must be covered to minimise windblown dust.	- Mining Manager - Site Manager
	The access road to the project site also needs to be kept clean to minimise carry-through of mud on to public roads.	- Mining Manager - Site Manager
	Operational phases	
	For the control of vehicle entrained dust a control efficiency (CE) of 90% on unpaved surface roads through the application of chemical surfactants is recommended, with water sprays on the in-pit haul roads to ensure a 50% CE. Drilling operations should be controlled through the application of water sprays at the drill holes ensuring 70% CE.	- Mining Manager - Site Manager

ASPECT	MITIGATION MEASURE	RESPONSIBILITY
	In controlling dust from crushing and screening operations, it is recommended that water sprays be applied to keep the ore wet, to achieve a control efficiency of up to 50%. Mitigation of materials transfer points should be done using water sprays at the tip points. This should result in a 50% control efficiency. Regular clean-up at loading points is recommended.	- Mining Manager - Site Manager

12.5 AIR QUALITY MONITORING

Visual monitoring of mining activities can ensure the minimum discharge of airborne dust and other emissions according to the air quality management programme.

1. Daily observations
2. Air Quality Monitoring

The current dustfall monitoring network, comprising of eight (8) single dustfall units, should be maintained and the monthly dustfall results used as indicators to track the effectiveness of the applied mitigation measures. Dustfall collection should follow the ASTM method.

12.6 ODOURS, NOISE AND VIBRATION IMPACTS

The sensitive receptors within proximity to the site might be the surrounding farmers. Activities related to the opencast mining activities have the potential to generate nuisance odours, noise and vibration that can impact the quality of life for neighbouring residents and tourism activities. However, this potential impact is minimal due to the nature of the mining methods employed.

Notwithstanding the above point, the proponent should continue to ensure potential odours, noise and vibration sources are mitigated through measures such as:

- Avoid noise generating activities at night, especially at night
- Ensure appropriate measures are put in place to rectify odours, noise, and vibration complaints, should they occur
- Scheduling of works to avoid disturbance between the hours of 7 pm and 5 am
- Procedures for receiving complaints from nearby land users or residents to be in place and mitigation measures to be implemented should construction and mining generate excessive and unexpected odours, noise, and vibration

Occupational noise and vibration are managed through the health and safety management plan and therefore not applicable to this ESMP.

Table 13 below shows the environmental risks and issues, and mitigation and monitoring measures for air quality aspects.

Table 13 – Air quality aspects – equipment noise

ASPECT	ACTIONS AND OR REQUIREMENTS
Potential issues or impacts	– Environmental noise evaluation criteria for residential, educational, and institutional receptors could potentially be exceeded at NSR 1 and NSR 4 ¹ due to proposed Twin Hills Gold Project operations refer to Appendix C of the ESIA for further details.
Management/ Mitigation measures	1. All diesel-powered equipment and plant vehicles should be kept at a high level of maintenance. This should particularly include the regular inspection and, if necessary, replacement of intake and exhaust silencers. Any change in the noise emission characteristics of equipment should serve as trigger for withdrawing it for maintenance. 2. In managing noise specifically related to vehicle traffic, efforts should be directed at: a. Minimising individual vehicle engine, transmission, and body noise/vibration. This is achieved through the implementation of an equipment maintenance program to maintain road surfaces regularly to repair potholes etc. b. Keep all roads well maintained and avoid steep inclines or declines to reduce acceleration/brake noise. c. Avoid unnecessary equipment idling. d. Minimising the need for trucks/equipment to reverse. This will reduce the frequency at which disturbing but necessary reverse warnings will occur. Alternatives to the traditional reverse ‘beeper’ alarm such as a ‘self-adjusting’ or ‘smart’ alarm could be considered. These alarms include a mechanism to detect the local noise level and automatically adjust the output of the alarm is so that it is 5 to 10 dB above the noise level near the moving equipment. The promotional material for some smart alarms does state that the ability to adjust the level of the alarm is of advantage to those sites ‘with low ambient noise level’ Invalid source specified. When reversing, vehicles should travel in a direction away from NSR’s if possible.

¹ Airshed 2021 - NSR 1 residential farmhouse to the south of the Twin Hills pit and NSR 4 residential farmhouse to the north of the Osino plant.

ASPECT	ACTIONS AND OR REQUIREMENTS
	3. Where possible, other non-routine noisy activities such as construction, decommissioning, start-up, and maintenance, should be limited to day-time hours. 4. A noise complaints register must be kept. 5. Provision of general notices to the community in the form of notice boards indicating blast times and dates. 6. As the site or activity is near NSRs, equipment and methods to be employed should be reviewed to ensure the quietest available technology is used. Equipment with lower sound power levels must be selected in such instances and vendors/contractors should be required to guarantee optimised equipment design noise levels. 7. As far as is practically possible, sources of significant noise should be enclosed. The extent of enclosure will depend on the nature of the machine and their ventilation requirements. Pumps are examples of such equipment. 8. It should be noted that the effectiveness of partial enclosures and screens can be reduced if used incorrectly, e.g. noise should be directed into a partial enclosure and not out of it, there should not be any reflecting surfaces such as parked vehicles opposite the open end of a noise enclosure. 9. Equipment should be sited as far away from NSRs as possible. Also: a. Machines used intermittently should be shut down between work periods or throttled down to a minimum and not left running unnecessarily. This will reduce noise and conserve energy. b. Plants or equipment from which noise generated is known to be particularly directional, should be orientated so that the noise is directed away from NSRs. c. Acoustic covers of engines should be kept closed when in use or idling. d. Doors to pump houses should always be kept closed. e. Construction materials such as beams should be lowered and not dropped. 10. Regular and effective maintenance of equipment and plants are essential to noise control. Increases in equipment noise are often indicative of eminent mechanical failure. Also, sound reducing equipment/materials can lose effectiveness before failure and can be identified by visual inspection. 11. Noise generated by vibrating machinery and equipment with vibrating parts can be reduced using vibration isolation mountings or proper balancing. Noise generated by friction in

ASPECT	ACTIONS AND OR REQUIREMENTS
	conveyor rollers, trolley etc. can be reduced by sufficient lubrication. 12. Naturally, if noise activities can be minimised or avoided, the amount of noise reaching NSRs will be reduced. Alternatively, the distance between source and receiver must be increased, or noise reduction screens, barriers, or berms must be installed. 13. To increase the distance between source and receiver is often the most effective method of controlling noise since, for a typical point source at ground level, a 6-dB decrease can be achieved with every doubling in distance. It is however conceded that it might not always be possible. 14. If noise control at the source and the use of distance between source and receiver is not possible, screening methods may be considered. The effectiveness of a noise barrier is dependent on its length, effective height, and position relative to the source and receiver as well as material of construction. To optimize the effect of screening, screens should be located close to either the source of the noise, or the receiver. 15. The careful placement of barriers such as screens or berms can significantly reduce noise impacts but may result in additional visual impacts. Although vegetation such as shrubs or trees may improve the visual impact of construction sites, it will not significantly reduce noise impacts and should not be considered as a control measure. 16. Earth berms can be built to provide screening for large scale earth moving operations and can be landscaped to become permanent features once construction is completed. Care should be taken when constructing earth berms since it may become a significant source of dust.
Monitoring requirements	1. Noise monitoring at sites where noise is an issue or may become an issue is essential. Annual noise sampling over a period of 10 to 30 minutes for day- and night-time at NSRs surrounding the Twin Hills Gold Project should be incorporated in an annual environmental noise monitoring programme. 2. If noise related complaints are received short term ambient noise measurements should be conducted as part of investigating the complaints. The results of the measurements should be used to inform any follow up interventions. The investigation of complaints should include an investigation into equipment or machinery that likely result or resulted in noise levels annoying to the community. This could be achieved with source noise measurements.

Table 14 - Air quality aspects – laboratory exhaust and fumes

ASPECT	ACTIONS AND OR REQUIREMENTS
Potential issues or impacts	– On-site mine laboratories without effective environmental controls, such as for furnace exhaust and fume hoods, or in cases where protective systems are poorly maintained, pose an environmental risk that can have impact on protected species, endemic species, their habitat, or people. Consider that daily gold assays are conducted in lab furnaces operating at 1000 degrees Fahrenheit and that atomic absorption photospectrometers aspirate and burn acid solutions of crushed and dissolved ore.
Management/ Mitigation measures	1. All discharge stacks, exhaust chimneys, and fume hood exhaust stacks need to be fitted and installed with manufacturer approved/supplied environmental and health protective systems (scrubbers, filters, etc.). 2. Emissions control and related protective systems require regular inspection, as per manufacturer specifications. 3. Emissions control and related protective systems require regular testing, as per manufacturer specifications. 4. Emissions control and related protective systems require regular maintenance, as per manufacturer specifications. 5. Emissions controls and related protective systems monitoring is required by competent persons. 6. Regular reporting of the performance of the inspection, testing, maintenance, and monitoring systems for the Site Manager is required monthly. The report shall include the performance of the management system as well as the performance of the emission systems.

13 ARCHAEOLOGICAL AND HERITAGE PROGRAMME

The proposed project is subject to heritage survey and assessment at the planning stage. These surveys are based on surface indications alone, and it is therefore possible that sites or items of heritage significance will be found in the course of development work. The procedure set out here covers the reporting and management of such finds.

Scope: The “chance finds” procedure covers the actions to be taken from the discovery of a heritage site or item to its investigation and assessment by a trained archaeologist or other appropriately qualified person.

Compliance: The “chance finds” procedure is intended to ensure compliance with relevant provisions of the National Heritage Act, No. 27 of 2004), especially Section 55 (4): “a person who discovers any archaeological object must as soon as practicable report the discovery to the Council”. The procedure of reporting set out below must be observed so that heritage remains reported to the National Heritage Council (NHC) are correctly identified in the field.

Table 15 below shows the environmental risks and issues, and mitigation and monitoring measures for archaeological and heritage aspects.

Table 15 – Archaeological and heritage aspects

ASPECT	ACTIONS AND OR REQUIREMENTS
Potential issues or impacts	–Impact on heritage features due to site clearing and related heavy equipment use during construction and operations.
Management/ Mitigation measures	1. The sites on the south side of the marble ridge may require mitigation if encroached upon by earthworks associated with the proposed diversion of the Okawayo River. In this case it would be recommended that test excavations are carried out at Site 478 to determine whether the three features noted there are burials. This action will require a permit from the NHC. 2. The ruined colonial farm building Site 480 appears to be vulnerable. 3. Consideration must be given to possible damage to Okawayo farmstead Site 481 caused by blasting and vibration as it is a vulnerable structure. 4. Implement the archaeological “Chance Find” Procedure.
Monitoring requirements	1. Site assessment prior to mining or gravel processing to identify any potential areas of significance. 2. Daily observations.

13.1 RESPONSIBILITY

Operator - to exercise due caution if archaeological remains are found

Foreman - To secure site and advise management timeously

Superintendent - To determine safe working boundary and request inspection

Archaeologist - To inspect, identify, advise management, and recover remains

13.2 PROCEDURE

Action by person identifying archaeological or heritage material:

- a) If operating machinery or equipment stop work
- b) Identify the site with flag tape
- c) Determine GPS position if possible
- d) Report findings to foreman

Action by foreman:

- a) Report findings, site location and actions taken to superintendent
- b) Cease any works in immediate vicinity

Action by superintendent:

- a) Visit site and determine whether work can proceed without damage to findings
- b) Determine and mark exclusion boundary
- c) Site location and details to be added to project GIS for field confirmation by archaeologist
- d) Take and store photographs

Action by archaeologist:

- a) Inspect site and confirm addition to project GIS
- b) Advise NHC and request written permission to remove findings from work area
- c) Recovery, packaging and labelling of findings (with photographs) for transfer to National Museum

In the event of discovering human remains:

- a) Actions as above
- b) Field inspection by archaeologist to confirm that remains are human
- c) Advise and liaise with NHC and Police
- d) Recovery of remains and removal to National Museum or National Forensic Laboratory, as directed by authorities

14 IMPLEMENTATION OF THE ESMP

This environmental and social management plan:

- A. Has been prepared according to a contract with the proponent
- B. Has been prepared based on information provided to ECC up to December 2021
- C. Is for the sole use of the proponent, for the sole purpose of an ESMP
- D. Must not be used (1) by any person other than the proponent or (2) for a purpose other than an ESMP
- E. Must not be copied without the prior written permission of ECC