ENVIRONMENTAL MANAGEMENT PLAN FOR THE AGGREGATE QUARRY CLOSE TO LUDERITZ, KHARAS REGION, NAMIBIA

[Document subtitle]

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Executive Summary

This Environmental Management Plan (EMP) has been prepared for the proposed aggregate quarry located approximately 64–67 kilometres east of Lüderitz in the //Kharas Region of Namibia. The quarry, to be operated by Brucite Investments (Pty) Ltd, aims to supply construction-grade aggregates to support the growing demand for infrastructure development in Lüderitz, Aus, and the wider southern Namibian region. The EMP forms part of the environmental approval process under the Environmental Management Act (No. 7 of 2007) and provides the operational framework for managing environmental and social risks throughout the quarry's lifecycle.

Purpose of the EMP

The EMP translates the findings of the Environmental Scoping Study (ESS) into a practical management tool. Its objectives are to:

- Ensure compliance with Namibian environmental legislation and international best practice.
- Minimise or eliminate adverse environmental and socio-economic impacts.
- Provide clear roles, responsibilities, and monitoring requirements for quarry operations.
- Support continuous improvement and adaptive management throughout the project lifecycle.

Legal and Policy Context

The EMP is underpinned by Namibia's regulatory framework, including the Environmental Management Act (2007), Minerals (Prospecting and Mining) Act (1992), Water Act (1956) and Water Resources Management Act (2013), Labour Act (2007), and other applicable laws. It also aligns with Namibia's commitments to international conventions such as the Convention on Biological Diversity (CBD) and the UNFCCC. Each of these instruments imposes specific requirements on quarry operations, ranging from water permits and safe storage of hazardous substances to rehabilitation obligations and biodiversity protection.

Key Environmental Risks and Mitigation

The main risks identified include:

- Dust and Air Quality: Generated during blasting, crushing, and haulage. Mitigation includes water spraying, covering truck loads, speed limits, and windbreaks.
- Noise and Vibration: From blasting and equipment. Mitigation includes restricting blasting to daylight hours, equipment silencers, and careful blast design.
- Water Use: Potential over-abstraction from scarce groundwater resources. Mitigation includes abstraction permits, efficient spray systems, and monitoring of borehole levels.
- Waste Management: Hydrocarbon spills and poor disposal practices. Mitigation includes bunded storage, spill kits, and licensed waste contractors.
- Biodiversity Loss: Clearance of vegetation and habitat disturbance. Mitigation includes phased extraction, topsoil conservation, and re-vegetation with indigenous species.
- Visual Impacts: Landscape scarring. Mitigation includes progressive rehabilitation and contouring to blend with natural terrain.
- Traffic Safety: Increased heavy vehicle movement on the B4 road. Mitigation includes signage, speed limits, driver training, and road maintenance.
- Health & Safety: Worker exposure to dust, noise, and accidents. Mitigation includes PPE, regular training, and emergency preparedness.

Rehabilitation and Decommissioning

Rehabilitation is a central feature of the EMP. It will occur progressively, with exhausted areas backfilled, contoured, and re-vegetated using indigenous species. At closure, all infrastructure will be removed, contaminated soils remediated, and pits stabilised to ensure long-term safety and environmental recovery. A post-closure monitoring programme of 3–5 years will verify rehabilitation success.

Monitoring and Reporting

Monitoring is designed to ensure accountability and compliance. Dust, noise, water, biodiversity, waste, and rehabilitation progress will be regularly measured. The Environmental Control Officer (ECO) will conduct monthly inspections and compile quarterly reports, with annual Environmental Performance Reports submitted to the Ministry of Environment, Forestry and Tourism (MEFT). Serious incidents such as spills or accidents will be reported immediately.

Emergency Response and Safety

The EMP includes a detailed Emergency Response Plan covering fire, blasting accidents, hydrocarbon spills, traffic incidents, and medical emergencies. An Emergency Response Team (ERT) will be trained to manage crises, supported by regular drills and updated communication procedures with Lüderitz emergency services.

Training and Capacity Building

Training underpins effective EMP implementation. All staff will undergo induction, weekly toolbox talks, quarterly environmental awareness workshops, and specialised training in first aid, spill response, and rehabilitation. A structured Training and Capacity Building Matrix defines topics, frequency, responsibilities, and monitoring indicators.

Stakeholder Engagement

The EMP commits to ongoing engagement with local communities, Lüderitz Town Council, Aus residents, and regulatory authorities. A grievance mechanism will ensure that concerns are addressed transparently and promptly, strengthening community relations.

Conclusion

The EMP provides a robust framework to manage environmental and socio-economic impacts of the proposed quarry. With strict adherence to mitigation measures, monitoring requirements, and rehabilitation commitments, the project is considered environmentally feasible and aligned with Namibia’s legal obligations and international standards. Successful implementation will allow the quarry to deliver essential socio-economic benefits, including local employment and infrastructure support, while safeguarding the fragile desert environment.

1. Introduction

This Environmental Management Plan (EMP) forms part of the Environmental Scoping Study (ESS) and forthcoming Environmental Impact Assessment (EIA) for the proposed aggregate quarry near Lüderitz, //Kharas Region. It provides a structured framework for managing environmental risks during the **planning, construction, operation, and decommissioning phases** of the quarry.

The EMP specifies mitigation measures, assigns responsibilities, and establishes monitoring requirements. Its overall objectives are to:

- Ensure compliance with the **Environmental Management Act (2007)** and related Namibian legislation.
- Minimise negative environmental and social impacts.
- Enhance positive socio-economic benefits.
- Provide a basis for environmental auditing and continuous improvement.

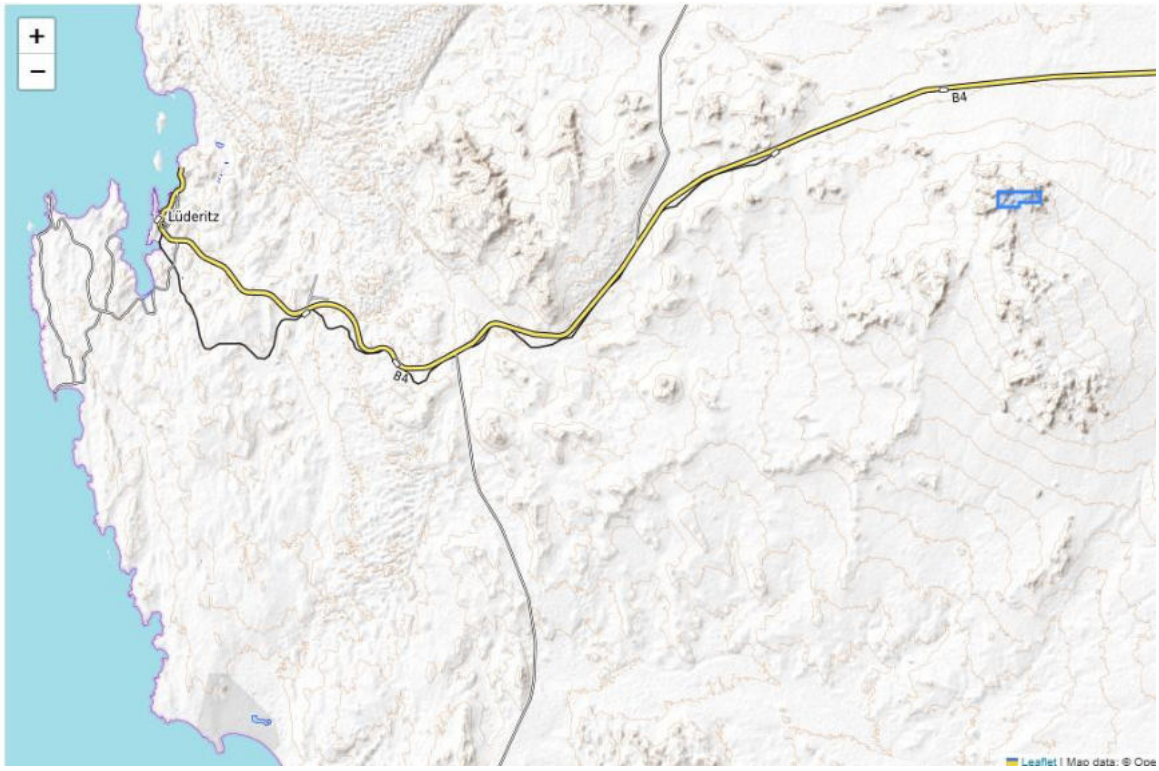

Figure 1. Locality map for the aggregate quarry site close to Luderitz.

2. Legal and Policy Framework

The implementation of this Environmental Management Plan (EMP) is grounded in Namibia's legislative and policy framework, ensuring that quarrying activities are carried out responsibly and in compliance with both national and international requirements. The key applicable laws and guidelines are explained below:

2.1 Environmental Management Act (No. 7 of 2007) and 2012 EIA Regulations

This Act provides the overarching legal framework for environmental protection in Namibia. It makes Environmental Impact Assessments (EIA) mandatory for listed activities, including mining and quarrying, before such projects can commence. The 2012 EIA Regulations provide specific guidance on how EIAs should be conducted, including requirements for scoping, public participation, reporting, and submission of Environmental Management Plans (EMP). For the Lüderitz Quarry, this Act and its regulations are the primary legal instruments governing the environmental approval process.

2.2 Minerals (Prospecting and Mining) Act, 1992

This Act regulates all prospecting, mining, and quarrying activities in Namibia. It requires the proponent to obtain the appropriate mineral rights or quarry licence from the Ministry of Mines and Energy (MME). The Act obligates operators to rehabilitate disturbed land, maintain safety standards, and comply with any licence conditions. For this project, compliance ensures that extraction and processing of aggregate are legally sanctioned and environmentally responsible.

2.3 Water Act, 1956 and Water Resources Management Act, 2013

Although the Water Resources Management Act (2013) has not been fully enforced, the 1956 Water Act remains applicable. These Acts regulate the abstraction and use of water resources, as well as the prevention of pollution. Any groundwater abstraction for quarry operations requires permits from the Ministry of Agriculture, Water and Land Reform (MAWLR). The

Acts also prohibit the discharge of waste, oils, or contaminated runoff into water bodies. For the quarry, compliance includes obtaining abstraction licences, monitoring borehole levels, and ensuring safe management of wastewater and stormwater.

2.4 Labour Act, 2007

This Act governs working conditions, labour relations, and occupational health and safety. It requires employers to provide safe working environments, fair employment practices, and appropriate worker protection. For quarry operations, this includes the provision of personal protective equipment (PPE), safety training, accident reporting systems, and adherence to fair labour standards, especially in prioritising local employment.

2.5 Hazardous Substances Ordinance, 1974

This Ordinance regulates the storage, use, and disposal of hazardous substances, including fuels, lubricants, oils, and blasting chemicals. The proponent must establish bunded storage facilities, spill prevention systems, and safe handling protocols for hydrocarbons and explosives. Compliance ensures protection of workers and prevents contamination of soils and water resources.

2.6 Atmospheric Pollution Prevention Ordinance, 1976

This Ordinance aims to control air pollution, including dust, fumes, and industrial emissions. For the quarry, activities such as blasting, crushing, and transportation generate dust and particulates that must be managed. Mitigation measures such as water spraying, dust suppression systems, and vehicle speed controls align with this Ordinance and minimise air quality impacts on the surrounding environment.

2.7 Explosives Act, 1956

The Act regulates the procurement, storage, transportation, and use of explosives in Namibia. Quarry operations involving blasting must comply with strict safety requirements and obtain necessary authorisations from the Namibian Police Explosives Division. Compliance prevents accidental explosions, ensures safe storage, and protects both workers and the environment.

2.8 National Heritage Act, 2004

This Act provides for the protection and conservation of Namibia's heritage resources, including archaeological sites, graves, and historical artefacts. If chance finds are discovered during quarrying (e.g., stone tools, fossils, graves), work must stop immediately, and the National Heritage Council must be notified for guidance. This ensures that cultural resources are not inadvertently destroyed.

2.9 Namibia's Commitments to International Conventions

Namibia is a signatory to several international environmental conventions that guide national policy:

- **Convention on Biological Diversity (CBD):** Ensures protection of biodiversity and promotes rehabilitation of disturbed ecosystems. Quarry rehabilitation with indigenous vegetation directly supports this commitment.
- **United Nations Framework Convention on Climate Change (UNFCCC):** Requires Namibia to reduce greenhouse gas emissions. Dust suppression, efficient equipment, and fuel management at the quarry contribute to minimising emissions.
- **Basel Convention on the Control of Transboundary Movements of Hazardous Wastes (1989):** Regulates the transport and disposal of hazardous waste. Any hazardous waste generated must be managed using licensed contractors in line with this commitment.

3. Roles and Responsibilities

- **Proponent (Brucite Investments):** Overall accountability for EMP implementation and compliance.

- **Site Manager / Quarry Manager:** Day-to-day responsibility for EMP execution.
- **Environmental Control Officer (ECO):** Monitors compliance, conducts inspections, and reports to MEFT.
- **Contractors & Sub-contractors:** Required to comply with EMP measures.
- **Workers:** Expected to adhere to health, safety, and environmental practices.

4. Environmental Management Actions

This section outlines the practical measures to prevent, reduce, or manage potential environmental and social impacts during the planning, construction, operation, and eventual closure of the quarry. The measures are aligned with Namibian legislation, international best practice, and the mitigation hierarchy of **avoid–minimise–rehabilitate–offset**.

4.1 Dust and Air Quality Management

Quarry operations such as blasting, crushing, stockpiling, and haulage are significant sources of dust. Dust control is essential to protect workers, nearby vegetation, soils, and road users on the B4 national road.

Mitigation Actions:

- Water roads, processing areas, and stockpiles regularly using tankers or fixed spray systems.
- Limit vehicle speeds on gravel roads to 40 km/h or less.
- Cover truck loads during transport and avoid overloading.
- Install windbreaks (berms, vegetation buffers) where practical.
- Maintain crushers and conveyors in good working condition, ensuring dust suppression systems function effectively.

Monitoring: Daily site inspections by the Site Manager; quarterly dust sampling at site boundaries.

4.2 Noise and Vibration Management

Noise and vibration may result from blasting, rock crushing, and machinery operation. While the site is remote, excessive noise can disturb fauna and create safety risks for workers.

Mitigation Actions:

- Restrict blasting to daylight hours and notify nearby stakeholders (e.g., road users, Aus community) in advance.
- Adopt controlled blasting techniques to minimise vibration and fly rock.
- Fit silencers on crushers, loaders, and trucks where possible.
- Service equipment regularly to avoid excessive noise.
- Provide workers with hearing protection.

Monitoring: Noise levels to be measured quarterly at site boundaries and during blasting; maintain blasting records.

4.3 Water Management

The quarry will require water primarily for dust suppression and domestic use. In such an arid area, careful management is necessary to avoid over-abstraction.

Mitigation Actions:

- Obtain abstraction permits from the Ministry of Agriculture, Water and Land Reform (MAWLR) prior to groundwater use.
- Monitor borehole water levels monthly to ensure sustainable abstraction.
- Use water-efficient spray systems (fine misting nozzles instead of high-volume spraying).

- Line sumps and settling ponds to prevent seepage.
- Truck in water from approved sources if local resources show stress.
- Prevent contamination of water sources by ensuring fuel and chemicals are stored in bunded facilities.

Monitoring: Monthly abstraction volume logs; annual water quality tests.

4.4 Waste Management

Waste generated at the quarry includes domestic refuse, scrap metal, rubble, and hazardous waste such as hydrocarbons and explosives residues.

Mitigation Actions:

- Provide colour-coded bins for recyclable and non-recyclable waste.
- Collect waste regularly and dispose through licensed contractors.
- Store fuels and oils in bunded tanks (capacity ≥110% of stored volume).
- Maintain spill kits at fuel storage areas and train staff in their use.
- Collect used oil in drip trays and dispose through authorised recyclers.
- Prohibit on-site burning or burying of waste.

Monitoring: Weekly inspections of storage areas; maintain a waste management register.

4.5 Biodiversity and Ecology

Although vegetation is sparse, desert ecosystems are fragile and recover slowly. Disturbance must be carefully managed.

Mitigation Actions:

- Limit clearance strictly to the active quarry footprint.
- Implement phased extraction to reduce the disturbed area at any one time.

- Store topsoil separately for later rehabilitation.
- Re-vegetate using indigenous, drought-resistant plants sourced locally.
- Train workers to avoid killing or disturbing wildlife unnecessarily.
- Control introduction of invasive alien species.

Monitoring: Annual ecological surveys; photographic records of rehabilitation sites.

4.6 Visual Impact Management

Quarrying alters the natural desert landscape, which is valued for its visual and tourism appeal.

Mitigation Actions:

- Site stockpiles, laydown areas, and offices in locations shielded from the B4 road where possible.
- Rehabilitate exhausted quarry areas progressively to reduce visible scarring.
- Contour slopes and pits to blend with the natural terrain during closure.

Monitoring: Annual photographic surveys from fixed viewpoints.

4.7 Traffic and Road Safety

Transport of aggregates to clients will significantly increase heavy vehicle traffic on the B4 road and access routes.

Mitigation Actions:

- Upgrade and maintain the gravel access road to prevent dust and potholes.
- Install signage at the quarry entrance and B4 intersection to warn road users.
- Train drivers in defensive and safe driving practices.
- Enforce strict speed limits (40 km/h on gravel, 80 km/h on tar).
- Implement a vehicle maintenance schedule.

Monitoring: Quarterly road condition reports; traffic incident register.

4.8 Health and Safety

Quarry operations pose occupational risks, including accidents, dust inhalation, noise exposure, and blasting hazards.

Mitigation Actions:

- Provide PPE (helmets, boots, gloves, dust masks, hearing protection) to all staff.
- Conduct induction training and regular toolbox talks.
- Maintain first aid facilities and emergency response kits.
- Develop and rehearse an emergency response plan (fires, spills, accidents).
- Clearly demarcate hazardous areas with warning signage.

Monitoring: Weekly safety inspections; monthly reports on incidents/accidents.

4.9 Heritage Resources

Chance finds of archaeological artefacts or graves are possible given Namibia's heritage richness.

Mitigation Actions:

- Train workers on chance-find procedures.
- Halt work immediately if artefacts or graves are discovered.
- Notify the National Heritage Council (NHC) for further guidance before resuming work.

Monitoring: ECO to maintain a chance-find register; inspections during site clearance.

5. Rehabilitation and Decommissioning

Rehabilitation and decommissioning are critical components of the quarry life cycle. The fragile desert ecosystem around Lüderitz has a very slow natural recovery rate, and without active intervention, disturbed areas may remain degraded for decades. The rehabilitation strategy is therefore aimed at minimising long-term environmental damage, restoring ecological function, and ensuring that the site is left in a safe and environmentally acceptable condition after quarrying ceases.

5.1 Objectives of Rehabilitation

- Stabilise disturbed land to prevent erosion and dust generation.
- Restore ecological functionality by re-establishing indigenous vegetation cover.
- Blend rehabilitated areas into the surrounding natural landscape to reduce visual scarring.
- Ensure that no hazards (e.g., unstable pit walls, contaminated soils, abandoned waste) remain after closure.
- Provide a post-closure land use that is compatible with surrounding land uses.

5.2 Progressive Rehabilitation During Operations

Rehabilitation will not be left until the end of the quarry's life cycle but will instead occur progressively throughout operations. This ensures that the disturbed footprint is minimised at any one time and allows monitoring of rehabilitation success while operations are still active.

- **Topsoil Management:** Topsoil stripped during site clearance will be stored separately in stockpiles no higher than 2 m to preserve seed banks and soil microorganisms. This material will later be used in re-vegetation.

- **Concurrent Rehabilitation:** Once a quarry block or section is exhausted, backfilling, contouring, and re-vegetation will be initiated immediately rather than waiting for final closure.
- **Phased Extraction:** The site will be quarried in phases, enabling restoration of one area while another is being mined.

5.3 Final Decommissioning Activities

At the end of the quarry's operational lifespan (estimated 10–20 years depending on demand), a structured closure programme will be implemented.

- **Infrastructure Removal:** All non-permanent infrastructure, including site offices, workshops, ablution facilities, and fuel storage areas, will be dismantled and removed. Any waste remaining on-site will be collected and disposed of by licensed contractors.
- **Hazardous Material Management:** Fuel tanks and bunded areas will be decontaminated and inspected for hydrocarbon leaks. Any contaminated soils will be excavated and disposed of safely at an approved hazardous waste facility.
- **Pit Rehabilitation:** Quarry pits will be reshaped to stable slopes (not exceeding 35° where feasible) to prevent collapse. Where backfilling is practical, pits will be partially filled with overburden and rubble to reduce depth.
- **Erosion Control:** Contoured surfaces will be designed to minimise erosion by wind and water. Ripping and soil spreading will be applied to promote infiltration and vegetation establishment.
- **Re-vegetation:** Disturbed areas will be seeded and planted with locally adapted indigenous desert species, sourced from surrounding environments to ensure genetic compatibility. These species will be drought-resistant and resilient to local climatic conditions.
- **Visual Integration:** Rehabilitation will aim to restore the visual quality of the landscape by mimicking surrounding landforms and avoiding sharp contrasts between disturbed and undisturbed areas.

5.4 Post-Closure Monitoring

Rehabilitation success cannot be guaranteed immediately after decommissioning, particularly in arid environments where vegetation growth is slow. A post-closure monitoring period of at least 3–5 years will be implemented to assess vegetation establishment, erosion control, and landscape stability. Monitoring indicators will include:

- Vegetation cover percentage compared to undisturbed reference sites.
- Species diversity and survival rates of planted vegetation.
- Evidence of erosion or dust generation from rehabilitated surfaces.
- Absence of safety hazards (unstable slopes, pits, or abandoned infrastructure).

5.5 Financial Provision for Rehabilitation

The proponent will make adequate financial provision for rehabilitation as part of its operational budgeting. This ensures that resources are available to implement closure activities, regardless of the economic performance of the quarry.

5.6 Socio-Economic Transition

At closure, employees and local communities will be informed well in advance. Where possible, training in alternative livelihoods or involvement in rehabilitation activities will be provided to reduce the socio-economic impacts of project termination.

6. Monitoring and Reporting

Monitoring and reporting are essential to ensure that the mitigation measures outlined in this EMP are effectively implemented, and that the quarry operations remain compliant with Namibian legislation and international best practice. The monitoring programme provides a

mechanism for early detection of environmental problems, adaptive management, and transparent communication with regulators and stakeholders.

6.1 Objectives of Monitoring

- To verify compliance with the EMP and Environmental Clearance Certificate (ECC) conditions.
- To assess the effectiveness of mitigation measures and identify areas for improvement.
- To provide data for decision-making, adaptive management, and continuous environmental performance improvement.
- To ensure transparency through regular reporting to MEFT and engagement with stakeholders.

6.2 Monitoring Programme

The following monitoring activities will be undertaken throughout the quarry lifecycle:

Dust and Air Quality

- Daily visual inspections for excessive dust emissions.
- Quarterly measurement of dust fallout at boundary points and along haul roads.
- Monitoring results compared against Namibian dust standards and World Health Organization (WHO) guidelines.

Noise and Vibration

- Quarterly noise monitoring at selected receptor points (site boundary and along B4 road).
- Blasting vibration measured during each blasting event using seismographs.
- Noise and vibration levels compared to international thresholds (e.g., IFC/WHO guidelines).

Water Use and Quality

- Monthly monitoring of borehole water abstraction volumes.
- Monthly measurement of groundwater levels to detect over-abstraction.
- Annual water quality testing (pH, hydrocarbons, heavy metals, nitrates) to detect contamination.

Waste Management

- Weekly inspections of waste storage areas and bunded fuel tanks.
- Records of waste volumes and disposal routes maintained.
- Annual audit of waste management system by the Environmental Control Officer (ECO).

Biodiversity and Ecology

- Annual ecological survey of rehabilitated areas to assess vegetation establishment and species diversity.
- Photographic monitoring of progressive rehabilitation areas from fixed points.
- Recording of wildlife sightings, mortalities, or incidents of habitat disturbance.

Visual Impact

- Annual photographic monitoring from fixed viewpoints along the B4 road and nearby elevated points.

Traffic and Road Safety

- Quarterly inspection of access roads and signage.

- Maintenance logs of road repairs and grading.
- Traffic incident register maintained and reviewed monthly.

Health and Safety

- Weekly site safety inspections.
- Monthly incident and accident reports compiled by the Safety Officer.
- Records of PPE distribution and training attendance maintained.

Heritage Resources

- Continuous monitoring during ground-disturbing activities.
- Chance-find register maintained by the ECO.

6.3 Reporting Framework

- **Daily:** Site Manager maintains logs of dust suppression, water use, waste handling, and safety checks.
- **Monthly:** Environmental Control Officer (ECO) compiles site inspection reports and submits them to the Proponent's management team.
- **Quarterly:** Consolidated monitoring reports, including dust, noise, water, waste, traffic, and rehabilitation progress, submitted to the Ministry of Environment, Forestry and Tourism (MEFT).
- **Annually:** A comprehensive Environmental Performance Report is prepared and submitted to MEFT, covering compliance with ECC conditions, monitoring results, and progress on rehabilitation. This serves as the basis for ECC renewal.
- **Ad hoc:** Immediate reporting to MEFT in the event of serious incidents, such as hydrocarbon spills, accidents, or non-compliance events.

6.4 Responsibilities

- **Environmental Control Officer (ECO):** Responsible for monitoring implementation, inspections, record-keeping, and reporting.
- **Site Manager / Quarry Manager:** Ensures mitigation measures are implemented and provides resources for monitoring.
- **Proponent (Brucite Investments):** Holds overall accountability and ensures submission of reports to MEFT.
- **Contractors:** Must comply with monitoring requirements relevant to their activities.

6.5 Adaptive Management

Monitoring results will be regularly reviewed by the Proponent and ECO to identify emerging issues or ineffective mitigation measures. If monitoring reveals that impacts are higher than anticipated, corrective actions will be taken immediately, and mitigation strategies revised. This adaptive approach ensures continuous improvement in environmental performance throughout the life of the quarry.

7. Emergency Response Plan

Quarrying operations involve the use of heavy machinery, explosives, fuel, and transport trucks, all of which introduce potential risks to workers, the surrounding environment, and nearby road users. An Emergency Response Plan (ERP) is essential to protect lives, minimise environmental damage, and ensure compliance with Namibian law. The ERP outlines preventive measures, preparedness procedures, response protocols, and communication strategies in the event of an emergency.

7.1 Objectives of the ERP

- To safeguard the health and safety of workers and surrounding communities.
- To minimise environmental damage caused by accidents or hazardous incidents.
- To establish clear communication and chain of command during emergencies.
- To ensure rapid, coordinated, and effective responses to emergencies.
- To comply with the Labour Act (2007), Hazardous Substances Ordinance (1974), and Explosives Act (1956).

7.2 Types of Potential Emergencies

The following emergencies have been identified as possible scenarios for the quarry:

- Fire and Explosions: Fuel storage areas, explosives magazines, or electrical faults.
- Blasting Accidents: Misfires, fly-rock incidents, or premature detonation.
- Hydrocarbon or Chemical Spills: Fuel tank ruptures, pipeline leaks, or chemical spills.
- Traffic and Transport Accidents: Truck collisions on the B4 road or access tracks.
- Worker Accidents: Falls, machinery entrapment, or exposure to dust/noise.
- Medical Emergencies: Heat exhaustion, dehydration, or pre-existing medical conditions.
- Natural Hazards: Extreme weather events such as sandstorms or flash floods.

7.3 Preventive and Preparedness Measures

- **Training:** All workers will undergo induction training covering emergency procedures, first aid basics, fire prevention, and spill response. Toolbox talks will reinforce awareness weekly.

- **Emergency Teams:** A trained Emergency Response Team (ERT) will be designated on-site, including fire marshals, first aiders, and spill response personnel.
- **Equipment:** Maintain first aid kits, fire extinguishers, spill kits, and PPE at strategic points across the site. Equipment will be inspected monthly.
- **Storage and Handling:** Fuels and explosives stored in compliance with national legislation, with restricted access to authorised personnel only.
- **Communication:** Emergency contact numbers (local fire brigade, ambulance services, Lüderitz hospital, police, and MEFT) will be displayed prominently on-site.
- **Mock Drills:** Conduct emergency simulations at least twice a year (fire drill, spill drill, blasting incident drill).

7.4 Response Procedures

a) Fire and Explosions

- Raise alarm immediately and evacuate all non-essential personnel.
- Use portable extinguishers for small, controllable fires.
- For large fires, isolate the area, shut down machinery, and notify the Lüderitz Fire Brigade.
- Explosive magazines will not be approached if involved in a fire; police explosives unit to be contacted immediately.

b) Blasting Accidents

- Cease all work in the blasting area if a misfire is suspected.
- Only the certified blasting supervisor may handle misfires in accordance with Explosives Act protocols.
- Maintain a 500 m safety radius until clearance is given.

c) Hydrocarbon or Chemical Spills

- Stop source of spill immediately (close valve, shut pump, seal leak).

- Deploy spill containment booms or absorbent materials from spill kits.
- Contaminated soil collected and stored for disposal by licensed hazardous waste contractor.
- Major spills reported to MEFT immediately.

d) Traffic and Transport Accidents

- Secure the accident scene and prevent secondary collisions with warning signs.
- Provide first aid and contact emergency services if injuries occur.
- Remove damaged vehicles and clean any fuel or material spills safely.

e) Worker Accidents and Medical Emergencies

- Apply first aid immediately.
- Notify the Site Manager and evacuate injured worker to Lüderitz hospital if required.
- Record incident in accident register and investigate cause.

f) Natural Hazards

- Suspend operations during sandstorms or heavy rain.
- Workers to shelter in designated safe areas.
- Inspect site for damage before resuming work.

7.5 Roles and Responsibilities

- **Proponent (Brucite Investments):** Ensure financial and logistical resources for ERP.
- **Site Manager:** Overall authority during emergencies; initiates emergency response and communication.
- **Emergency Response Team (ERT):** Executes response procedures, provides first aid, and coordinates evacuations.

- **Workers:** Report emergencies immediately and follow instructions.
- **Environmental Control Officer (ECO):** Records all incidents, assesses environmental damage, and reports to MEFT.

7.6 Communication and Reporting

- Emergencies reported immediately to the Site Manager and logged in the Incident Register.
- Serious incidents (e.g., fatalities, large spills, explosions) must be reported to MEFT and relevant authorities within 24 hours.
- After any emergency, a full incident investigation will be carried out to determine causes and prevent recurrence.

7.7 Continuous Improvement

The ERP will be reviewed annually, or after any major incident, to incorporate lessons learned and improve procedures. Emergency drills will be evaluated to identify weaknesses and update the plan accordingly.

8. Training and Capacity Building

8.1 Objectives

The success of this Environmental Management Plan (EMP) depends largely on the competence and awareness of the workforce. Training and capacity building ensure that all employees and contractors understand the environmental, health, and safety requirements of the quarry and have the skills to apply them in their daily work. The objectives of the training programme are to:

- Build awareness of the quarry's environmental risks and mitigation measures.
- Equip workers with the knowledge to comply with Namibian legislation and the EMP.

- Enhance safety culture by embedding best practices in occupational health and safety.
- Develop long-term capacity within the local workforce through skills transfer.
- Ensure continuous improvement by providing refresher courses and adaptive learning.

8.2 Training Components

a) Induction Training

- All new employees and contractors will undergo an environmental and safety induction before commencing work.
- Topics will include the EMP requirements, emergency procedures, waste management protocols, PPE usage, and chance-find procedures for heritage resources.
- Attendance will be mandatory, and completion records maintained.

b) Job-Specific Training

- Machine operators will receive training in safe equipment handling, dust suppression, and spill prevention.
- Blasting teams will be trained and certified under the Explosives Act, focusing on safe blasting practices and misfire management.
- Drivers will be trained in defensive driving, road safety on the B4 highway, and speed-limit compliance.

c) Environmental Awareness

- Quarterly workshops will be conducted to raise awareness of dust, noise, water conservation, biodiversity protection, and rehabilitation requirements.
- Workers will be encouraged to report environmental issues to the Environmental Control Officer (ECO).

d) Health and Safety Training

- PPE usage, safe lifting techniques, and accident prevention will be reinforced during weekly toolbox talks.

- Fire-fighting and first aid training will be provided to selected staff members who will form part of the Emergency Response Team (ERT).
- Training in recognising heat stress, dehydration, and fatigue will be provided due to the hot, arid working environment.

e) Spill and Hazardous Material Response

- Staff handling fuels, lubricants, and chemicals will receive specific training on storage, handling, spill response, and reporting.
- Spill kit demonstrations will be conducted twice annually.

f) Rehabilitation and Closure Awareness

- Workers will be trained in topsoil handling, re-vegetation practices, and progressive rehabilitation techniques.
- This training ensures that closure obligations are integrated into day-to-day operations rather than postponed until the end of the quarry's lifespan.

8.3 Capacity Building for Local Workforce

- The proponent will prioritise recruitment of local residents from Lüderitz, Aus, and surrounding communities.
- Skills transfer will be actively promoted by pairing experienced workers with new recruits.
- Opportunities for certification (e.g., blasting licences, equipment operator training, health and safety qualifications) will be supported.
- Where feasible, training modules will align with Namibia Training Authority (NTA) requirements to enhance worker employability beyond the quarry project.

8.4 Training Schedule

- **Induction Training:** Conducted upon hiring and repeated annually.

- **Toolbox Talks:** Weekly, covering topical environmental, health, and safety issues.
- **Refresher Courses:** Quarterly workshops on dust, water, waste, and biodiversity management.
- **Specialised Training:** Bi-annual spill response drills, fire-fighting drills, and first aid training.
- **Emergency Drills:** Twice yearly, simulating blasting accidents, spills, and fires.

Training Topic	Frequency	Responsible Party	Monitoring Indicators
Environmental & Safety Induction	At hiring (once-off) + annually	Site Manager / Environmental Control Officer (ECO)	Attendance registers; signed induction forms; induction manual available onsite.
Weekly Toolbox Talks	Weekly (every Monday morning)	Site Manager / Safety Officer	Toolbox talk logbook; worker participation records; incident trends monitored.
Job-Specific Training (machine operation, blasting, driving, etc.)	Upon hiring and refresher annually	Site Manager / Contractor Supervisors	Certificates of competency; operator licences; performance assessments.
Environmental Awareness (dust, noise, water, biodiversity, rehabilitation)	Quarterly workshops	ECO with support from external specialists	Attendance sheets; post-training feedback; observed compliance with mitigation measures.
Health & Safety Training (PPE use, safe lifting, accident prevention)	Quarterly refresher + toolbox integration	Safety Officer / Health & Safety Rep	PPE usage audits; accident/incident register; training attendance records.
First Aid Training	Initial certification + refresher every 2 years	Safety Officer / Certified First Aid Trainer	Certified first aiders on-site; validity of certificates; first aid kit inspection logs.
Fire-Fighting Training	Bi-annual	Safety Officer / Fire Marshal	Fire drill reports; inspection of fire extinguishers; worker competency during drills.
Spill Response Training	Bi-annual	ECO / Safety Officer	Spill drill records; spill kit inspection reports; incident response times.

Training Topic	Frequency	Responsible Party	Monitoring Indicators
Emergency Response Drills (fire, blasting accident, transport accident)	Twice yearly (different scenarios each time)	Site Manager / Emergency Response Team	Drill evaluation forms; corrective action plans implemented; lessons learned documented.
Rehabilitation & Closure Awareness	Annually and during progressive rehabilitation works	ECO / Rehabilitation Specialist	Topsoil handling records; photographic rehabilitation monitoring; worker compliance.
Community Engagement Awareness (grievance mechanism, local benefit)	Annually	Proponent / ECO	Grievance logbook; stakeholder engagement records; worker awareness surveys.

8.5 Monitoring and Records

- Attendance registers will be kept for all training sessions.
- Training effectiveness will be evaluated through periodic quizzes, practical demonstrations, and incident investigations.
- Records will be reviewed during annual environmental audits to ensure compliance with EMP and ECC conditions.

9. Stakeholder Engagement

- Maintain communication with Lüderitz Town Council, Aus community, and local authorities.
- Provide updates on project progress, environmental monitoring results, and rehabilitation.
- Establish a grievance mechanism to address community concerns transparently and promptly.

10. Implementation Schedule

- **Pre-construction:** Obtain permits, train staff, establish baseline monitoring.
- **Construction/Operation:** Implement dust, noise, waste, water, and biodiversity management.
- **Decommissioning:** Undertake progressive rehabilitation and final closure activities.

11. Conclusion

The EMP provides a practical framework to minimise negative impacts and maximise socio-economic benefits of the proposed quarry project. Strict adherence to the measures and monitoring requirements outlined herein will ensure compliance with Namibian legislation and international environmental best practice.