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REPORT:

PRELIMINARY ESMP FOR THE PROPOSED CONSTRUCTION OF A GREEN AMMONIA PIPELINE FROM FARM 58 TO THE WALVIS BAY PORT AREA, ERONGO REGION, NAMIBIA

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ABBREVIATIONS

Abbreviation	Description
CE	control efficiency
CEO	Chief Executive Officer
CFC	chlorofluorocarbon
Cleanergy Solutions	Cleanergy Solutions Namibia (Pty) Ltd
CMB.TECH	Compagnie Maritime Belge
dBa	decibels
E	electrical/electronic
ECC	Environmental Compliance Consultancy (Pty) Ltd
e.g.	for example
EM	Environmental Manager
ESMP	environmental and social management plan
EMS	environmental management systems

Abbreviation	Description
ESF	environmental and social framework
ESIA	environmental and social impact assessment
etc.	et cetera
GIS	geographic information system
GPS	global positioning system
HR	Human Resources
I&APs	interested and affected parties
i.e.	that is
IEC	International Electrotechnical Commission
IFC	International Finance Corporation
km/h	kilometre per hour
L	litre
Ltd.	limited
m	metre
MEFT	Ministry of Environment, Forestry and Tourism
MME	Ministry of Mines and Energy
MSDS	material safety data sheets
NHC	National Heritage Council
NSR	noise-sensitive receptor
O&L	Ohlthaver & List Group
OEM	original equipment manual
OSHE	operational safety, health and environment
PE	programmable electronic
PM	particulate matter
PPE	personnel protective equipment
Pty	proprietary
SDS	safety data sheets
SHE	safety, health and environment
SHEQ	safety, health, environment and quality
SOP	standard operating procedure
ToR	terms of reference

1 INTRODUCTION

1.1 PROJECT BACKGROUND

Environmental Compliance Consultancy (Pty) Ltd (ECC) has been appointed by Cleanergy Solutions Namibia (Pty) Ltd (hereinafter referred to as the Proponent or Cleanergy Solutions) to conduct an environmental and social impact assessment (ESIA) and compile a preliminary environmental management plan (ESMP) for the proposed construction of the green ammonia pipeline from Farm 58 to the Walvis Bay port area, in the Erongo Region, Namibia.

Cleanergy Solutions Namibia (Pty) Ltd is a joint venture between Ohlthaver & List (O&L) Group and CMB.TECH. The Ohlthaver & List (O&L) Group is the largest privately owned consortium in Namibia, with an operational track record spanning over a century and covering a diverse number of industries. CMB.TECH, is a Belgium company specialising in the design, construction and operations of large marine and industrial modes of transportation that utilise hydrogen and ammonia. It forms an integral part of Compagnie Maritime Belge which is a family-owned shipping group, founded in 1895.

Cleanergy Solutions established the first green hydrogen production plant outside Walvis Bay, which is completely solar powered and is set to supply fuel for local trucks, port machineries and railway equipment. An ammonia production plant is proposed to be developed on Farm 58, and green ammonia will be supplied to various marine and industrial applications and promote sustainable energy practices in Namibia. The Proponent proposes that the liquid ammonia will be transported from the ammonia production plant via the green ammonia pipeline to the terminal for storage and exporting purposes.

The location of the proposed project site is shown in Figure 1.

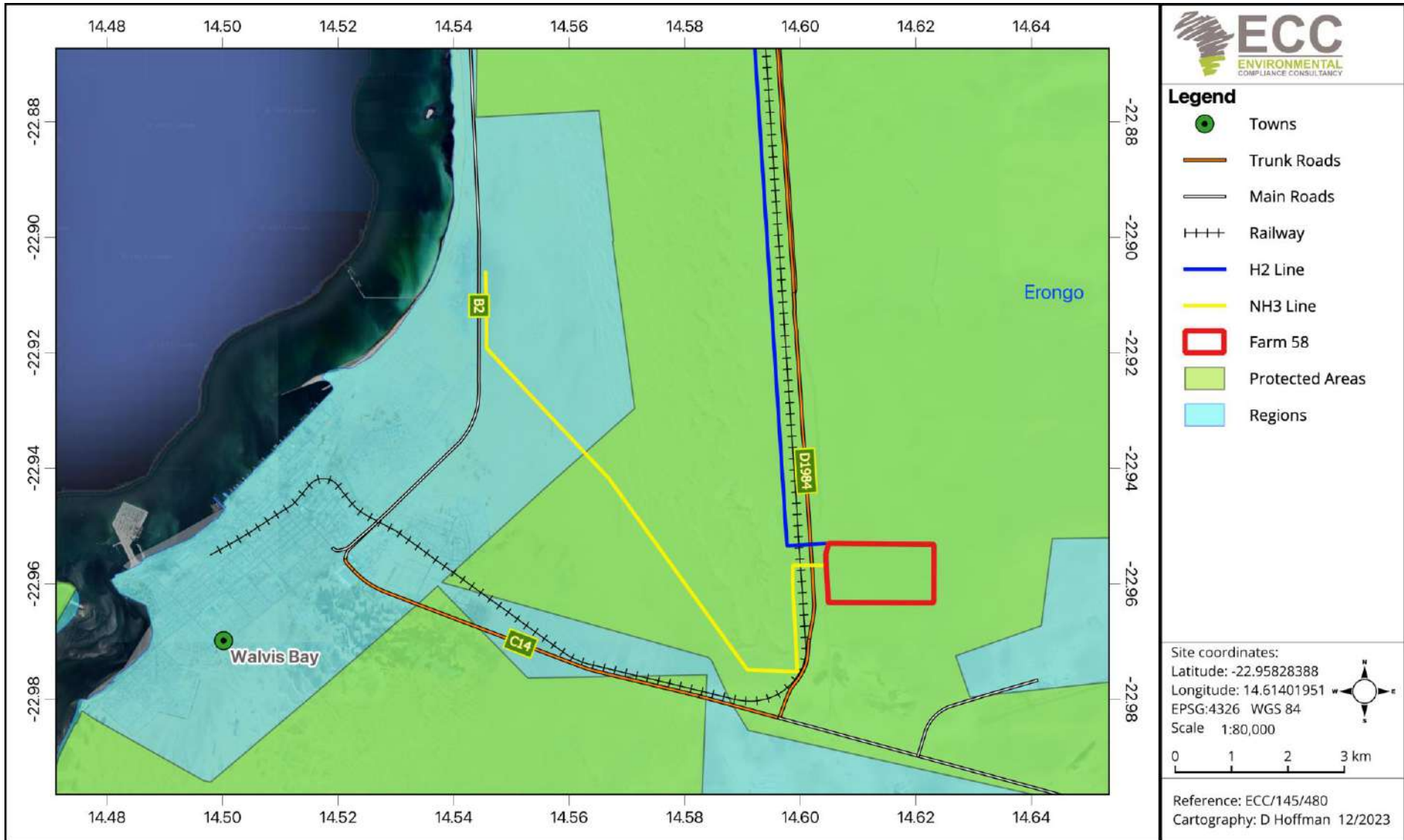


Figure 1: Locality map of the proposed project.

1.2 ENVIRONMENTAL REGULATORY REQUIREMENTS

The proposed project triggers listed activities as stipulated in the Environmental Management Act, No. 7 of 2007 and its Regulations, promulgated in 2012. An environmental scoping report, environmental and social impact assessment (ESIA) and preliminary environmental management plan (ESMP) are required to be submitted as part of the application to support the decision-making process for issuing an environmental clearance certificate.

This report presents the ESMP and has been undertaken in terms of the requirements of the Environmental Management Act, 2007 and its Regulations.

1.3 PURPOSE AND SCOPE OF THIS REPORT

The environmental management plan (ESMP) provides a logical framework, mitigation measures and management strategies for the activities associated with the proposed project. In this way ensuring that the potential environmental 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 assessment. The environmental scoping report should be referred to for further information on the proposed project, assessment methodology and applicable legislation, and assessment findings.

This preliminary ESMP is a live document and shall be reviewed at predetermined intervals, and or updated during the ESIA process when or if the scope of work alters, or when further data or information is added. All personnel working on the project will be legally required to comply with the requirements set out in the final ESMP that is approved by the competent authorities (i.e. MME) and Ministry of Environment, Forestry and Tourism (MEFT).

1.4 MANAGEMENT OF THIS ESMP

The proponent will hold the environmental clearance certificate for the proposed project and will be responsible for the implementation and management of this preliminary ESMP. The implementation and management of this preliminary ESMP, and thus the monitoring of compliance, will be undertaken through daily duties and activities, as well as monthly inspections.

1.5 LIMITATIONS, UNCERTAINTIES, AND ASSUMPTIONS RELATED TO THIS ESMP

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 should be amended, and statutory requirements are to take precedence.

The information contained in this preliminary ESMP is based on the project description as provided in the environmental scoping report. Where the design or operation method is different, this preliminary ESMP may require updating and potential further assessment may be undertaken.

1.6 ENVIRONMENTAL ASSESSMENT PRACTITIONER DECLARATION

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 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 the proponent. No member or employee of ECC has, or has had, any shareholding in the project.

All compliance and regulatory requirements regarding this report should be forwarded by email or posted to the following address:

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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 construction activities can minimise potential impacts on the environment, as far as reasonably practicable.

Environmental Management Plan objectives for the Project are as follows:

- **ESMP Processes:** To achieve all requirements outlined in the ESMP, including maintaining communication with all Interested and Affected Parties (I&APs) and compilation of Performance Assessments;
- **Management systems:** To establish an integrated safety, health, environment and quality (SHEQ) management system to facilitate the implementation of the ESMP
- **Monitoring Surveys:** To undertake effective management, monitoring and research of direct impacts of the project on the environment throughout the project lifecycle
- **Emergencies:** To have appropriate systems of response in place;
- **Socio Economic Issues:** Contribute to the socio-economic development of Namibia.

Environmental Management Plan targets are as follows:

- Zero pollution incidents.
- Minimal vegetation clearing and earthworks.
- Minimal impact on air quality and noise receptors.
- Protect fauna and flora, and
- Use natural resources effectively and efficiently.

2.2 ORGANISATIONAL STRUCTURE, ROLES, AND RESPONSIBILITIES

The Proponent shall be responsible for:

- Establishing an ESMP related organogram for the site to ensure that responsibilities are understood across all levels of the project team.
- 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 principal contractors shall ensure that all subcontractors within their realm of control are adequately informed of their responsibilities and duly empowered to fulfil those responsibilities.

Table 1 lists the roles and responsibilities allocated to different management levels in the company and specific personnel.

Table 1 – Roles and responsibilities.

Role	Responsibilities and duties
Proponent	<ul style="list-style-type: none"> - Responsible for the overall management and implementation of the ESMP. - Ensure that approved tender documents and contract signed with contractors/sub-contractors make clear provision for ESMP/ECC conditions and requirements. - Ensure environmental policies are drafted/updated and communicated to all personnel throughout the company. - Responsible for providing the resources required to effectively run operations and comply with the ESMP. - Appoint all managers needed to ensure effective running of operations. - Ensure systems for proper induction and training of personnel and contractors are in place.
Project manager	<ul style="list-style-type: none"> - Responsible for ensuring compliance with this ESMP including overseeing the construction work, day to day activities during operations, and routine and non-routine maintenance work during operations, as well as the decommissioning of the transformer platforms. - Ensure all personnel are aware of the commitments made in the ESMP and any other relevant regulatory requirements applicable to the project. - Responsible for the management, maintenance and revision of the ESMP. - Ensure adequate resources are made available for implementation of this ESMP. - Maintain the community issues and concern register and keep records of complaints. - Ensure all employees and contractors participate in a site induction process before commencing work on the project and maintain an up-to-date register.

Role	Responsibilities and duties
	<ul style="list-style-type: none"> - Ensure that the best environmental practice is undertaken throughout the project. - Report any non-compliance or accidents to the regulatory authority.
Site manager	<ul style="list-style-type: none"> - Appointed to manage the performance of the construction and operational maintenance activities. - Responsible for implementation and compliance of this ESMP. - Managing the preparation and implementation of method statements for certain activities, and ensuring the environmental manager reviews all method statements and the relevant environmental protocols are incorporated. - Reporting any non-compliance or accidents to the project manager and environmental manager. - Ensuring that all staff have attended a site induction session before the commencement of any work on-site and that they are adequately informed of the requirements of this management plan. - Ensuring that all contract workers, subcontractors and visitors to the site are conversant with the requirements of this ESMP, relevant to their roles on site and always adhere to this ESMP. - Receiving, responding to and recording complaints.
Employees/contractor employees/sub-contractor employees	<ul style="list-style-type: none"> - Responsible for being compliant with this ESMP throughout the construction work, in addition to: - Ensuring they have undertaken a site induction and are conversant with the requirements of this ESMP. - Ensuring appropriate briefings for certain activities have been provided and fully understood. - Adherence to this ESMP at all times. - Reporting of any operations and conditions that deviate from the ESMP or any non-compliant issues or accidents to the environment manager and site manager/contractor.
Safety, health and environment officer(s)	<ul style="list-style-type: none"> - A safety officer for the project will be available, as required, throughout the construction of the project. - Implement all relevant measures to target zero injuries incurred onsite. - Assessing risks on the construction site. - Ensuring a safe working environment. - Carrying out inductions to employees and or contractors for construction and operations activities.

Role	Responsibilities and duties
	<ul style="list-style-type: none"> - Advise and instruct project staff, contractors, sub-contractors on various safety, health and environmental related matters related to project implementation.

2.3 CONTRACTORS/SUB-CONTRACTORS

Any contractors/sub-contractors hired during the construction work or maintenance activities in the operational phase 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.
- Ensuring appropriate corrective or remedial action is taken to address all environmental hazards and incidents reported by the workforce.

2.4 EMPLOYMENT

The Proponent and all contractors shall comply with the requirements of the Republic of Namibia’s 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, where they have the prerequisite skills and experience, 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.
- Should foreign workers be hired, the proponent shall ensure that they always have a valid work permit.
- Every effort shall be made to recruit from the group of unemployed workers living in the surrounding area for positions that entail unskilled work.

3 ENVIRONMENTAL MANAGEMENT PRINCIPLES

3.1 CONTINUAL IMPROVEMENT

The Proponent’s management team is responsible for reviewing and updating this ESMP, which will be supported by the regular reports on the various areas of the site. As part of this review process, the regular reports will be reviewed, identifying any trends or significant areas of concern, as well as measures implemented to manage / resolve environmental or social issues. Compliance and legislative changes will be reviewed, and lessons learnt will be captured. The ESMP will be amended as required and follow up training, awareness or updates will be provided.

Ongoing hazard identification through the review of the ESMP and supporting management plans and SOPs will ensure environmental impacts are curbed or minimised to the greatest extent feasible.

3.2 BEST PRACTICE

The best practice management measures that will be complied with in accordance with the international best practice codes and standards, during project activities are listed Table 2.

Table 2 - A list of environmental best practice measures to be implemented.

Environmental aspect	Best practice requirement
Pollution prevention/ control	<ul style="list-style-type: none"> – IEC 60079 Hazardous Area Classification Standard to be applied and maintained. – IEC 61508 Functional Safety of electrical, electronic and programmable electronic (E/E/PE) safety-related systems to be applied and maintained. – Employees to be trained on relevant SOPs. – Plant and equipment to be maintained and serviced regularly. – Refueling at designated locations, where possible. – Ammonia neutralizing spill kits and various spill kits available where the risk of loss of containment has been identified. – Bunds to be at least 110% of the largest container therein; and – Good housekeeping.
Solid waste management	<ul style="list-style-type: none"> – Good housekeeping (no littering); – Designated waste collection areas around site and one central location. – Bins labelled.

Environmental aspect	Best practice requirement
	<ul style="list-style-type: none"> - Waste to be segregated on-site. - Waste bins emptied on regular basis.
Ground contamination	<ul style="list-style-type: none"> - Spill kits should be available, i.e., ammonia neutralising spill kits. - Chemical and hydrocarbon management protocols enforced on site. - Good housekeeping.
Storage of fuels, oils, chemicals and other hazardous liquids	<ul style="list-style-type: none"> - Storage tanks will be suitable and labelled for the liquid being stored. - Bunds to be at least 110% of the container. - Daily inspections of tanks.
Air quality	<ul style="list-style-type: none"> - Turn off equipment when not in use; and equipment to be maintained and serviced regularly. - Use environmentally friendly substitutes for CFCs where feasible.
Noise	<ul style="list-style-type: none"> - Turn off plant and equipment when not in use; and equipment to be maintained and serviced regularly. - Construction power tools are only to be used during normal working hours during the day. - Outside working hours, the noise levels should be limited to the International Financial Corporation residential noise levels (55 dBA- during the day and 45 dBA- at night).
Health and safety	<ul style="list-style-type: none"> - Appropriate PPE gears should be worn across all work areas. - Risk assessments are to be conducted across all work areas and thereon periodically raise awareness on potential hazards and measures to minimise risks. - Maintain first aid supplies in the workplace and should be easily accessible. - Establish emergency exits, responses mechanisms in different work areas. - Erect appropriate warning signage in different departments, where necessary to keep the workforce informed on potential hazards.
Heritage	<ul style="list-style-type: none"> - The chance finds procedure applies across all work areas to ensure that heritage artifacts and objects are appropriately managed and preserved to the greatest extent feasible.

3.3 ENVIRONMENTAL MONITORING

A monitoring and evaluation program will be used in line with internal OSHE standards to evaluate environmental performance and promote continual improvement. Monitoring also supports environmental management on-site to evaluate how effective the environmental management has been, over an extended period of time. An environmental monitoring schedule will be put in place for the construction and operations based on the recommendations of relevant experts and results of the specialist environmental studies completed as part of this assessment process.

The monitoring program will comprise inter alia:

- Noise monitoring (e.g. effect on mammals and residents nearby). This includes daytime and night-time noise monitoring;
- Biodiversity monitoring (flora and fauna).
- Air quality monitoring (e.g. dust generation during construction) PM_{2.5} and PM₁₀ monitoring; and
- Carbon footprint monitoring.

4 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.

4.1 COMMUNICATIONS

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

- Site induction
- Audits and site inspections
- Toolbox talks, including instruction on incident response procedure, and
- Briefings on key project-specific environmental issues, like feedback on complaints.

This ESMP shall be distributed to the construction team including any contractors to ensure that the environmental requirements are adequately communicated. Key activities and environmentally sensitive operations will be highlighted to workers and contractors.

During the construction phase, 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.

4.2 ENVIRONMENTAL EMERGENCY AND RESPONSE

An emergency is any abnormal event, which demands immediate attention. It is any unplanned event, which results in the temporary loss of management control at site, but where functional resources can manage the response. An emergency response plan document will be put in place that manages the response in relation to emergencies including environmental emergencies. Table 3 list the numbers to be contacted in case of an emergency.

Table 3 - Emergency contact details.

Town	Ambulance	Police	Fire Department
Walvis Bay	+264 85955 / +264 811 245999	+264 64 21 9048	+264 64 20 6425

4.3 COMPLAINTS HANDLING AND RECORDING

Any complaints received verbally 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.
- Maintain a complaint register that requires details of the complaint.
- 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.

4.4 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.

4.5 SITE INDUCTION

All personnel involved in the project shall be inducted to the site with specific environmental and social awareness training, and health and safety issues. The environmental and social awareness training shall ensure that personnel are familiar with the principles of this ESMP, and the environmental 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:

- What is meant by "environment" and "social" in the ESMP?
- Why the environment needs to be protected and conserved?
- How can construction activities impact the environment?
- 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.
- The potential consequences of non-compliance with this ESMP and relevant statutory requirements, and
- The role of responsible people working on the project.

5 INCIDENT REPORTING

The Proponent and appointed contractors must have an internal accident and incident reporting system in place. These internal SOP on reporting accidents and incidents should be followed. The section below provides the minimum requirements for incident reporting and should be used as a basis for incident reporting.

5.1 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 supervisor or the supervisor’s nominated representative:
 - a. Immediately and without delay.
 - b. Regardless of whether or not injury to personnel has occurred.
 - c. Property or equipment has been damaged.
- 2) Written up and handed to the supervisor or the supervisors 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.

5.2 SERIOUS INCIDENTS

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

5.3 INCIDENT REPORT AND CLOSE OUT

The assigned supervisor or 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.

6 REPORTING, COMPLIANCE AND ENFORCEMENT

6.1 ENVIRONMENTAL PERFORMANCE MANAGEMENT

The current summary of a register of environmental risks and issues identifies mitigation and monitoring measures, as well as the roles responsible for execution. The project manager and site manager will use this register to undertake monthly inspections to ensure the project is compliant with this ESMP.

6.2 CONSTRUCTION: ENVIRONMENTAL INSPECTION & COMPLIANCE MONITORING

6.2.1 DAILY COMPLIANCE MONITORING

A copy of this ESMP will be on-site throughout the construction work and will be available upon request. It is the responsibility of the project manager and site manager to ensure this ESMP is complied with through their daily roles. Daily inspections will be undertaken by the site manager (or nominated site supervisor). Any environmental problems or risks identified will be reported to the project manager and actioned as soon as is reasonably practicable.

6.2.2 MONTHLY COMPLIANCE MONITORING

Monthly inspections will be undertaken by the site manager to verify that the standards and procedures set out in this ESMP are being complied with and that environmental control measures are in place and working correctly. Any non-conformance will 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 taken and any necessary follow up measures required.

6.3 OPERATIONS: ENVIRONMENTAL INSPECTIONS AND COMPLIANCE MONITORING

Annual inspections of the associated infrastructure will be managed and undertaken by the project manager. All ammonia pipeline components and any other associated infrastructure will be inspected to ensure that they are functional as required, no damage has been caused, and no leaks or spills or rust have occurred. Any non-conformance will 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 taken and any necessary follow up measures required.

6.4 REPORTING

There will be a requirement to ensure that any incident or non-compliance, including any environmental issue, failure of equipment or accident, is reported to the project manager.

6.5 NON-COMPLIANCE

Where it has been identified that works are not compliant with this ESMP, the project manager will implement corrective action to the extent 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 will be produced. The notice will be generated during the inspections and the project manager will be responsible for ensuring a corrective action plan is established and implemented to address the identified shortcoming.

7 BIODIVERSITY MANAGEMENT PROGRAMME

7.1 INTRODUCTION

Construction, operations on the proposed project will potentially include minimal removal of flora and disturbance of habitat, ecosystems and ecological function in the project footprint. It is therefore vital to ensure that all management, monitoring and mitigation actions are adhered to in order to manage and minimise environmental impacts and any potential pollution that could further impact the receiving environment.

7.2 OBJECTIVES

The ESMP objectives are to minimise negative direct effects of the construction and operations of the ammonia pipeline on the receiving environment. These objectives are:

- Mitigation and monitoring;
- Avoid compromising future exploitation of resources by managing impacts and mitigating or minimising these impacts;
- Establish and maintain an information base that will assist in evaluating the cumulative impacts of the operations and establish recovery rates of biodiversity impacted during operations;
- Ensure the conservation of biodiversity where possible; and
- Offsetting as a last resort.

7.3 RESPONSIBILITIES

Workforce and all contractors

Required to take all reasonable measures to prevent the damage of flora and fauna and release of pollutants from the site into the receiving environment. Report any damage to fauna or flora to the SHE coordinator.

SHE coordinator

Will ensure that the objectives listed above are being met and provide performance feedback to the SHE and Project/General managers, in monthly and compliance audit reports.

7.4 BIODIVERSITY MANAGEMENT MEASURES

The biodiversity management plan measures are designed to minimise the damage to biodiversity on site. This will be updated once the findings of the ESIA biodiversity assessment are completed. Activities that could potentially pose as hazards to protected and endangered species include:

- Chemical spills;
- Refueling spills;
- Stockpiling;
- Traffic activities; and

- Clearing land.

Table 4 below shows the environmental aspects and impacts, and mitigation and monitoring measures for biodiversity aspects.

Table 4 - Biodiversity aspects.

Responsibility	Safety, health and environmental officer(s)
Potential issues or impacts	<ul style="list-style-type: none"> - Possible injury or death of fauna; - Habitat destruction due to excavation activities; - Disturbance to ecosystems functions; and - Loss of protected/vulnerable species.
Mitigation measures	
General	<ul style="list-style-type: none"> - Efforts by the environmental team to recover or rescue plants of significance or plants that can be used for progressive rehabilitation; - Limit the development to actual sites ammonia pipeline corridor; - Avoid development and associated infrastructure in sensitive areas 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; - Minimise areas cleared by ensuring that an early works construction plan or a construction management plan is in place and conveyed to contractors; - All workers on-site are to be notified to avoid any excluded areas or species; - Identify rare, endemic, endangered, threatened and protected species and demarcate them and trampling them or removing them, where possible; - When encountered, remove (e.g., capture) unique fauna and sensitive fauna, as well as slow moving species such as the Palmatogecko and Namaqua chameleon, before commencing with the development activities, as well as during the operational phase, and or species serendipitously located during this period and relocate to a less sensitive/ disturbed sites in the immediate area; - Remove unique, sensitive flora and protected plant species before commencing with the development activities and where possible relocate it to less sensitive/disturbed sites in the immediate area if disturbance cannot be avoided; - Prevent the planting of potentially invasive alien plant species for ornamental purposes or as part of the landscaping. Alien species often “escape” and become invasive causing further ecological damage as is evident from previous human habitation in the area;

Responsibility	Safety, health and environmental officer(s)
	<ul style="list-style-type: none"> – Make an effort to eradicate/destroy invasive alien plants encountered on site. This would ensure that the spread is limited and show environmental commitment; – Incorporate indigenous vegetation, especially protected species, into the overall landscaping. Indigenous species require less water and overall maintenance; – Initiate a suitable waste removal system as waste often attracts wildlife, which may result in human-wildlife conflict issues; – Educate/inform contractors and staff on protected species to avoid and the consequences of illegal collection of such species; – No animals or birds may be collected, caught, consumed or removed from the site by any contractor or personnel on site; – Rehabilitation of the disturbed areas, i.e., initial access route “scars” and associated tracks should be rehabilitated as soon as their use is complete, otherwise access needs to be restricted. Such rehabilitation would not only confirm the company’s environmental integrity, but also show true local commitment to the environment; and – 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	<ul style="list-style-type: none"> – In undisturbed areas, especially offsite, avoid driving randomly through the area (i.e., “track discipline”), but rather stick to permanently placed roads/tracks – especially during the construction phase. This will minimise the effect on localised potentially sensitive flora and habitats in the area; – Avoid having to create new tracks for ongoing maintenance and inspections; – Stick to speed limits that are established to result in fewer faunal road mortalities, habitat disturbances as well as limit dust generation; and – 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	<ul style="list-style-type: none"> – Revegetate access routes upon completion of installation of associated infrastructure, where possible.
Monitoring requirements	
<ul style="list-style-type: none"> – Visual inspection during construction of new access tracks/widening, land clearing areas; – Regular audit around rehabilitated areas to ensure that the vegetation is flourishing and not dying; and – Biodiversity monitoring should be undertaken in line with monitoring programme requirements. This program will include, but is not limited to, monitoring of the condition of habitats in the immediate project area, species inventory and alien vegetation control. 	

8 SURFACE AND GROUNDWATER MANAGEMENT PROGRAMME

8.1 INTRODUCTION

Chemical/hydrocarbon and waste spills (solid/liquid) must be contained, so as not to contaminate the soil or groundwater. Any contact with groundwater must be treated with exceptional care and reported immediately to minimise the potential for contamination of an aquifer. It is important to limit the potential for wastewater seepage to groundwater.

This section outlines appropriate surface and groundwater pollution prevention measures, appropriate monitoring programmes and reporting procedures to be implemented during the different phases of the project.

8.2 OBJECTIVES

This surface and groundwater management plan has been prepared to minimise potential impacts on surface and groundwater resulting from construction and operational activities. It is important to report any contact with, or contamination of, groundwater to the SHE coordinator or relevant department line manager as soon as possible.

8.3 ROLES AND RESPONSIBILITIES

Workforce and all contractors

Required to take all reasonable measures to prevent the discharge of sediments and pollutants from the site towards surface and groundwater sources. Report any contact with groundwater to the SHE coordinator.

SHE coordinator

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

8.4 GROUNDWATER MANAGEMENT MEASURES

The surface and groundwater management plan (Table 5) measures are designed to minimise the runoff of sediment-laden or polluted water/effluent into the surrounding environment. Construction and operational activities that could potentially alter natural groundwater quality include:

- Chemical leaks and related system breaches, leaks and spills;
- Seepage of wastewater into groundwater;
- Overflowing and/or leaking bunded area;
- Refuelling activities and
- Poor resource stewardship practices.

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

- Fuel/oil and chemicals must be safely stored; and
- Any contact with surface or groundwater must be treated with exceptional care and reported immediately, to minimise the potential for contamination of an aquifer.

Table 5 - Water quality mitigation measures.

Responsibility	<ul style="list-style-type: none"> - Project/General manager - Processing manager - Maintenance manager - Employees
Potential issues or impacts	<ul style="list-style-type: none"> - Groundwater contamination due to incidental hydrocarbon spills; - Change in the water table and quality; and - Water contamination due to leaks or effluent.
Mitigation measures	
Protection of ground water	<ul style="list-style-type: none"> - Where the water table is potentially penetrated, a furrow needs to be dug that diverts the water to vegetation. This can only be done for clean (non-contact) water; and - Water saving measures shall be applicable at all times. No taps or pipes left to run, leaks to be detected immediately. Light duty vehicles to be washed in designate wash bays with water recycle systems, as well as silt traps and oil/water separators.
Sewage and grey water from temporary toilets on site	<ul style="list-style-type: none"> - Use of the portable chemical toilets instead of the veld must be strictly adhered to; and - If grey water can be collected from washing facilities, such as sinks and showers, not including toilets, once tested, it should be recycled and: <ul style="list-style-type: none"> o Used for dust suppression. o Used to clean equipment
Lowering of the groundwater table	<ul style="list-style-type: none"> - To maximise the re-use of water during the construction and operational phases to minimise the use of clean water, no matter the source. - Water shall be used purposefully during construction and operations, making use of reclaimed runoff, and recirculated process waters to the maximum extent possible, with supplemental use of external water sources; - Use water effectively and efficiently by following the reduce-recycle-reuse approach; and - A site wide water balance will be kept and updated on a regular basis by the Processing manager.

<p>Inefficient use of water resources</p>	<ul style="list-style-type: none"> – To ensure compliance with all legal obligations; – Pipeline infrastructure to be designed and constructed according to international standards and of engineering standards to limit the potential for leakage that would potentially contaminate surface and groundwater resources; – Ensure erosion control and prevention measures are in place; – Ensure laydown areas or maintenance workshops are located outside of stormwater catchment areas; – Refueling shall be undertaken in a designated area, where possible; – All vehicles and machinery must have drip trays to collect leakages of lubricants and oil during any field repairs or maintenance; – In the event of pollution, polluted material must be collected and disposed of at an approved site; and – A ‘good housekeeping’ policy shall be adopted across the site area.
<p>Any hazardous fluid or lubricating chemicals used could enter the aquifer or surface water environment causing pollution</p>	<ul style="list-style-type: none"> – 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; – Temporary waste disposal facilities will be provided for the collection of waste, which will be removed regularly to the permitted waste disposal site; – Chemical and hydrocarbon spillages from vehicles, the storage terminal and pipelines will be cleaned up timeously to prevent contamination; – The contractors’ laydown and maintenance workshops areas will drain to a sump with silt traps and hydrocarbon collectors; – All chemicals, bulk fuels, oils and grease and any other hazardous substance, will be stored and handled as per applicable legislation and national standards; – Portable chemical toilets will be provided during the project phases. They will be routinely cleaned, and sewage disposed of at a licensed sewage treatment plant with the safe disposal certificate to be provided;
<p>Monitoring requirements</p>	
<ul style="list-style-type: none"> – Monitor (monthly report on) the use of water and keep records of requirements. 	

9 WASTE MANAGEMENT PROGRAMME

9.1 INTRODUCTION

The construction and operational activities will generate both solid and liquid waste. The types of waste generated at the facility are classified as mineral and non-mineralised waste. All non-mineralised waste, if no onsite approved facility/landfill is in place, will be removed from the construction site and will either be disposed of at the local landfill site (non-hazardous waste e.g., household or garden waste), recycling facility or the Walvis Bay hazardous waste disposal site.

9.2 OBJECTIVES

This waste management programme 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.

9.3 ROLES AND RESPONSIBILITIES

Workforce, contractors, suppliers and visitors

- Required to ensure that all waste generated during project activities is handled appropriately, 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.
- Try to minimize the amount of waste produced as far as possible.

Department line managers and SHE coordinator

- Required to inspect receipts and evidence of correct waste handling.
- Review waste management practices regularly during the construction and operational phase.

9.4 SOLID AND LIQUID NON-MINERAL WASTE

Where possible the proponent will implement measures to reduce, reuse and recycle waste generated as part of the construction and operations on site. 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 at a licensed 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; and

- Contract, if required, an onsite licensed waste management contractor.

Table 6 below provides waste mitigation measures and monitoring for waste generated on-site.

Table 6 - Waste mitigate measures.

Responsibility	<ul style="list-style-type: none"> - Project/General manager - Contractor site manager - SHE appointed person /Environmental manager - Employees - Contractors
Potential issues or impacts	<ul style="list-style-type: none"> - Soil, surface water and groundwater contamination due to spillage; - Land and water pollution; - Loss of biodiversity; and - Infectious diseases.
Mitigation measures	
Waste Management Plan	<ul style="list-style-type: none"> - The proponent should compile a waste management plan that should address as a minimum the mitigation measures included below.
Hazardous waste	<ul style="list-style-type: none"> - Hazardous waste (if any generated) will be removed and managed by an approved service provider. - All construction and operational vehicles (4x4 vehicles and trucks) under maintenance should be equipped with a drip tray/or oil spill kit: <ul style="list-style-type: none"> o Drip trays should be cleaned after use, and spillage handled, stored, and disposed of as hazardous waste; o Contractor vehicles and support equipment should be authorised for use onsite prior to accessing the site; and o The vehicle must be inspected as part of the authorization and prior to its entry on site each time. - All vehicles should be maintained regularly to prevent oil leakages. - Maintenance of vehicles must be completed within designated workshops and is not permitted to occur on site or in the field as far as reasonably possible. In instances when emergency field maintenance is required, measures need to be in place to avoid hydrocarbon spillages. - Maintenance and washing of vehicles should be conducted at a suitable site/facility which adhere to the following: <ul style="list-style-type: none"> o The work area/facility should be lined to be impermeable; and

	<ul style="list-style-type: none"> ○ The work area/facility should have an oil-water separator (oil trap) to collect any run-off from the washing and or maintenance activities or be equipped with an oil and water separation system. – Spilled oil or fuel should be treated as hazardous waste, disposed of as it occurs in the appropriate hazardous waste containers (sealable drums) on site, and removed off site regularly, or as required depending on volumes, to the closest licensed hazardous waste disposal site in the vicinity. – All such waste should be provided to specialists in the handling and treatment of such materials. – All hazardous substances (e.g., fuel, grease, oil etc.) or chemicals should be stored in a specific location on an impermeable surface which is bunded and facilities should have leads that can seal.
General waste	<ul style="list-style-type: none"> – The site areas should be kept tidy at all times. – All domestic and general waste produced daily should be contained. – No waste may be buried or burned without a permit to do so or unless done so at a designated waste disposal site. – No waste dumping should be allowed on or around the construction site. – No waste is to be left uncontained. – Waste containers (bins) should be emptied regularly and removed from site to the nearest licensed waste disposal site, or to onsite approved landfill, if sought by the proponent and approved by MEFT. – All recyclable waste needs to be taken to the nearest recycling depot if available. – Enough separate waste containers (bins) for hazardous and domestic/general waste must be provided on site. These should be clearly marked. – Personnel should be sensitized to segregate waste in a responsible manner and not to litter.
Littering and environmental contamination from waste	<ul style="list-style-type: none"> – No littering by workers shall be allowed. – All litter on and around the site must be picked up and placed in the bins provided. – The site should be always kept tidy and free of litter. All domestic and general waste produced daily should be cleaned and contained daily. – No waste shall be burned unless permitted to do so. – Waste shall be collected and shall be removed regularly to avoid bad odors.

	<ul style="list-style-type: none"> - Hazardous and non-hazardous waste shall be always stored separately.
Environmental contamination from liquid waste	<ul style="list-style-type: none"> - Hydrocarbon and chemical liquid waste must be stored correctly and disposed of by registered companies. - Safe disposal certificates must be kept and provided to the SHE manager on request.
Monitoring requirements	
<ul style="list-style-type: none"> - Monitor whether the provisions and instructions set out in this ESMP concerning waste management, is being applied across various domains on-site. - Maintain waste record book for all discharges of wastes and incinerations. - All non-compliances should be recorded and discussed at weekly site meetings and ensure remedial actions are initiated timeously. - All guilty parties that are in contravention of the provisions set out for managing waste should be warned and penalised, and in the event of repeated offenses, further measures should be considered depending on the severity of the impact. 	

9.5 WASTE DISPOSAL MONITORING

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

10 HAZARDOUS SUBSTANCE SPILL MANAGEMENT PROGRAMME

10.1 INTRODUCTION

The uncontrolled release of ammonia, fuel and other hydrocarbons and chemicals has the potential to result in the contamination of soil, groundwater, the intertidal environment and ocean, which may lead to serious environmental and marine harm. Spills can impact on fauna and flora in the project surrounding and degrade or destroy habitat, ecosystems and ecological function. Additionally uncontrolled release of large amounts of ammonia into the atmosphere can impact the respiratory system of people in proximity. On this basis, the storage, handling and use of ammonia, fuels or other hydrocarbons and chemicals must be managed to minimise the risk of release into the surrounding environment. Measures must be in place to promptly prevent and minimise potential impacts should a release occur.

10.2 OBJECTIVES

This spill management plan has been prepared to minimise the potential for the uncontrolled (or accidental) release of ammonia, fuels, oils and other hydrocarbons and chemicals. These plans provide appropriate spill response guidance to the proponent should a spill occur.

10.3 ROLES AND RESPONSIBILITIES

Workforce and all contractors

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

Department line managers/SHE coordinators

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

10.4 SPILL PREVENTION MEASURES

The following hydrocarbon and ammonia leakage management measures are to be implemented by the proponent:

- Spill kits (including ammonia neutralising kits) are to be made available throughout the site. The kits are to include, as a minimum, the following items:
 - o Absorbent materials/salts;
 - o Shovels;
 - o Heavy-duty plastic bags; and
 - o Protective clothing (e.g., gloves and overalls).

- Major servicing of equipment shall be undertaken 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;
- The ammonia carbon steel pipeline includes an installation layer and anti-corrosion measures;
- Fuels, lubricants and other 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 legislations and regulations;
- No refuelling is to take place within 50 metres of groundwater boreholes, surface water or streams as required under the newly promulgated Water Resources Management Act No. 11 of 2013; and
- Material Safety Data Sheets (MSDS(s)) and Safety Data Sheets (SDSs) are to be kept for each chemical used on site. These must be easily accessible to all personnel.

10.5 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 highly significant importance, is the protection of water sources, ecosystems, fauna, 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 identified and characterised and necessary personal protective equipment (PPE) is provided;
- Isolate the area as required; and
- Notify the SHE manager or 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);
- 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 after a spill, including soils, absorbent pads and sawdust, are to be disposed to appropriately licensed facilities.
- Soils may be rehabilitated in an approved manner, such as *in situ* or at an onsite approved and effective bioremediation site;

- The department line manager or SHE coordinator are to be informed as soon as possible in the event of a spill; and
- A written incident report must be submitted to the department line manager.

Table 7 shows the spill mitigation measures.

Table 7 - Spill mitigation measures.

Responsibility	<ul style="list-style-type: none"> - Department line managers - Project manager - Contractor site manager - Employees
Potential issues or impacts	<ul style="list-style-type: none"> - Soil, surface water and ground water contamination due to spillage; - Ammonia and chemical handling and storage can cause spillages that lead to groundwater and soil contamination; and - Loss of biodiversity.
Mitigation measures	
Storage of hazardous chemicals	<ul style="list-style-type: none"> - The ammonia carbon steel pipeline should include an installation layer and anti-corrosion measures - Other hazardous chemicals/hydrocarbons are to be stored in bunded areas, that are impermeable and can contain 110% of the largest volume contained therein; - Hydrocarbons (such as fuels) are to be handled over areas provided with impervious surfaces; - Spills of hazardous chemicals/hydrocarbons are to be contained and cleaned-up to ensure protection of the environment; and - All the necessary PPE required for the safe handling and use of petrochemicals, hydrocarbons and chemical materials.
Machinery and equipment maintenance	<ul style="list-style-type: none"> - Major servicing of equipment shall occur in appropriately equipped workshops when possible; - Ensure spill kits are available where machinery have to be serviced on site. - Vehicles and machinery are to be regularly serviced to minimise oil and fuel leaks; and - All the necessary PPE required for maintenance activities must be issued to staff whose duty is to manage and maintain the machinery and equipment.
Safe delivery and handling	<ul style="list-style-type: none"> - Training employees and toolbox talks; - Spill kits (including ammonia neutraliser kits) should be designated across areas where they are easily accessible including the refuelling, fuel/chemical delivery areas; - Where sawdust is used it should be cleaned up immediately and not left for long periods as this poses a fire hazard;

	<ul style="list-style-type: none"> - Any major spill should be reported once containment has been achieved; and - Plant and equipment to be well maintained and serviced regularly.
Storage	<ul style="list-style-type: none"> - All tanks to be stored on a non-porous floor and within a bunded area; - Bund to be capable of storing at least 110% of the volume of the largest tank; - All containers to be suitable for use and not damaged; - Tanks should be locked at all times; - Relevant permits required for the handling of ammonia should be acquired; and - Relevant permits to be in place for bulk storage of fuel (i.e. diesel and petrol).
Refuelling	<ul style="list-style-type: none"> - Drip tray to be used during refuelling of vehicles when not on an impermeable surface; and - Decanting is prohibited.
Rehabilitation	<ul style="list-style-type: none"> - Contaminated materials should be removed and disposed of at an authorised hazardous waste disposal facility (Walvis Bay). - Contaminated absorbents and materials other than soils must be disposed of at an authorised hazardous waste site; and - Large spills can first be treated <i>in situ</i>, where required.
Monitoring requirements	
	<ul style="list-style-type: none"> - Daily observations when ammonia liquid is handled. - Daily observations when fuels/chemicals are delivered and handled. - Supervision during refuelling. - Weekly observations to monitor containment and storage. - Monitor the degree of hydrocarbons in contaminated soils after a year of rehabilitation. - Monitor each year until the soils are ready for re-use in revegetation projects.

10.6 SPILL REPORTING

Any major ammonia liquid spills should be reported to the competent authority- Ministry of Mines and Energy (MME).

All major petroleum product spills (200 L) should be reported to MME on Form PP/11 titled "Reporting of major petroleum product spill", issued by the ministry of Mines and Energy.

For large-scale fuel spills (≥ 200 L), and other significant environmental incidents, the fire services should be contacted as required and the office of the Ministry of Mines and Energy, Ministry of Agriculture, Water and Land Reform and the Ministry of Environment, Forestry and

Tourism (MEFT) should be informed of the incident immediately. Formal reports to be issued within 24 – 48 hours of the incident occurring and all correspondence with authorities should be undertaken by the Project/General manager in consultation with the CEO or their designate.

For the clean-up of smaller spills, the relevant MSDS or SDSs should be consulted to determine the appropriate clean-up procedures. Basic spill response training will be provided as part of the site environmental induction, spill response equipment, including relevant MSDS copies. This will be provided in areas where potentially environmentally hazardous chemicals may be used.

10.7 REHABILITATION OF CONTAMINATED SOILS

All soils that are contaminated with chemicals (ammonia) and/or hydrocarbons should be taken to the rehabilitation area or treated in situ, if the site has an authorised storage/disposal (Project permitted for onsite bioremediation) area or removed to an authorised waste disposal facility. A procedural manual for rehabilitating contaminated soils on site should be developed. As noted, if rehabilitation is not permitted to be conducted on site, then the contaminated materials are to be removed off site to the licensed Walvis Bay hazardous waste facility.

11 AIR QUALITY MANAGEMENT PROGRAMME

11.1 INTRODUCTION

This air quality management plan describes the strategies and procedures that will be implemented to ensure that the health and comfort of employees, contractors, suppliers, visitors and nearby sensitive receptors (i.e. nearby residents and businesses) 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). In cases where generators and other machineries are used, there will be some release of exhaust fumes, that will impact the immediate vicinity but will be of short duration.

11.2 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.

11.3 ROLES AND RESPONSIBILITIES

Workforce and all contractors

To implement the necessary management practices to meet the air quality objectives and requirements as listed in this section.

Department line managers/ SHE coordinator

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

11.4 AIR QUALITY MANAGEMENT PROCEDURES

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

- Earth moving equipment and vehicle movements;
- Creation of ROW and trench excavation;
- Dust generated from unpaved roads;
- Material handling points;
- Ammonia leaks;
- Sand piles; and
- Machinery operations.

The ammonia pipeline project construction and activities can contribute to ambient noise and vibration which ultimately may affect neighbouring communities.

11.5 AIR QUALITY MONITORING

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

The Proponent will minimise the potential for dust generation and the emission of airborne pollutants by undertaking the following management measures (Table 8), as required:

- Construction activities that are likely to result in dust generation will not be undertaken during excessive windy days;
- Vehicle movements will be restricted to sealed/paved roads as feasibly possible (or where possible);
- Appropriate speed limits will be set and enforced;
- Ground disturbance will be minimised as far as practical; and
- Vehicles and machinery will be maintained to limit exhaust fume emissions.

Table 8 - Air quality mitigation measures.

Responsibility	<ul style="list-style-type: none"> - Department line managers - Contractor site manager
Potential issues or impacts	<ul style="list-style-type: none"> - Impaired visibility for drivers on the B2 and D1984 road. - Impaired visibility of employees; - Respiratory related health issues; and - Potential release of a high concentration of ammonia to the atmosphere may cause an array of health-related hazards.
Mitigation measures	
Dust and fumes	<ul style="list-style-type: none"> - Dust suppression measures must be implemented to reduce dust; - Vehicles must adhere to speed limits to avoid excessive generation of dust - During trench excavation, dust suppression onto sand piles should be considered to limit dust drifted towards the B2 and D1984 roads; and - Vehicles and machinery are to be regularly serviced according to the manufacturers' specifications and kept in good working order to minimise exhaust emissions.
Dust generation can negatively impact occupational health and visibility	<p>Construction and closure phases</p> <ul style="list-style-type: none"> - 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; - 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;

	<ul style="list-style-type: none"> - Contractors should be issued and equipped with appropriate PPE (e.g. dust masks); and - The access road to the project site also needs to be kept clean to minimise carry-through of mud on to public roads.
	Operational phases
	<ul style="list-style-type: none"> - For the control of vehicle entrained dust a control efficiency (CE) target of as high as 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.
Emissions control and reporting	<ul style="list-style-type: none"> - Emissions control and related protective systems require regular inspection, testing and maintenance, by competent persons as per manufacturer specifications; and - Regular reporting of the performance of the inspection, testing, maintenance, and monitoring systems is required monthly. The report shall include the performance of the management system as well as the performance of the emission systems.
Monitoring requirements	
	<ul style="list-style-type: none"> - Daily observations; and - Air quality monitoring: <ul style="list-style-type: none"> o PM_{2.5} and PM₁₀ as well as ammonia gas monitoring.

11.6 NOISE IMPACTS

The sensitive receptors within proximity to the area are commuting traffic, residents, tourists and businesses. Activities related to the project construction have the potential to generate nuisance odours and noise that can impact the quality of life for neighbouring residents and tourism activities. However, the magnitude of impact low due to the duration of the construction phase. Mitigation measures are presented in Table 9.

Table 9 - Noise mitigation measures.

Responsibility	<ul style="list-style-type: none"> - Department line managers - Construction site manager
Potential issues or impacts	<ul style="list-style-type: none"> - Environmental noise evaluation criteria for residential, educational, and institutional receptors may potentially be exceeded at nearby receptors during the project construction phase.
Mitigations measures	
Excessive noise close to sensitive receptors	<ul style="list-style-type: none"> - Whenever possible, project work hours should be conducted between dawn and dusk and the use of heavy equipment, power tools, and the movement of heavy vehicles should not be within a radius of 500 m from sensitive receptors;

	<ul style="list-style-type: none"> – Affected stakeholders should be consulted to project construction and should be updated on the mitigation efforts during regular engagement meetings; – All diesel-powered equipment and vehicles should be kept at a high level of maintenance. This should particularly include the regular inspection; – Any change in the noise emission characteristics of equipment should serve as trigger for withdrawing it for maintenance; – In managing noise specifically related to vehicle traffic, efforts should be directed at: <ul style="list-style-type: none"> ○ Keep all roads well maintained; ○ Avoid unnecessary equipment idling; ○ All equipment and vehicles to be maintained as per the original equipment manual (OEM); and ○ Drawing efforts to minimising noise levels to International Finance Corporation noise levels for residential areas (i.e. 55 dBA during the day and 45 dBA at night). – A noise complaints register must be kept; – As the site or activity is near noise-sensitive receptors (NSR), 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; – 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; – 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 noise reduction walls/padding/berms; – Equipment should be sited as far away from NSRs as possible. Also: <ul style="list-style-type: none"> ○ 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; ○ Equipment from which noise generated is known to be particularly directional, should be orientated so that the noise is directed away from NSRs; ○ Acoustic covers of engines should be kept closed when in use or idling; and ○ Doors to pump houses should always be kept closed
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	<ul style="list-style-type: none"> - Regular and effective maintenance of equipment are essential to noise control. Increases in equipment noise are often indicative of imminent mechanical failure. Also, sound reducing equipment/materials can lose effectiveness before failure and can be identified by visual inspection; - 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 conveyor rollers, etc. can be reduced by sufficient lubrication; - To the extent possible, high noise-level activities shall be minimised or avoided to reduce the noise levels reaching NSRs. Alternatively, and to the extent possible, the distance between source and receiver will be increased, or noise reduction screens, barriers or earthen berms shall be installed (as close to the noise source as possible);
Monitoring requirements	
<ul style="list-style-type: none"> - Sources of excessive noise will be investigated, and recommendations made for mitigation; - Keep complaints register; - Noise monitoring at sites where noise is an issue or may become an issue is essential, especially during construction activities. During operations, annual noise sampling over a period of 10 to 30 minutes for day- and night-time at NSRs surrounding the Ammonia Pipeline Project should be incorporated in a bi-annual environmental noise monitoring programme; and - 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 nuisances at community levels. 	

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

- Eliminate sources or noise and do not operate heavy equipment, whenever possible;
- Ensure appropriate measures are put in place to rectify noise complaints, should there be any on record;
- Procedures for receiving complaints from nearby residents and businesses to be in place and mitigation measures to be implemented should construction generate excessive odours and noise, which is unexpected; and
- All activities to be restricted to daytime hours, where possible.

Occupational noises are managed through the health and safety management plan.

12 TRAFFIC MANAGEMENT PROGRAMME

Table 10 below shows the environmental aspects and impacts, mitigation and monitoring measures to curb the potential impacts aligned to the increase in traffic volumes in the immediate project area.

Table 10 - Traffic mitigation measures.

Responsibility	– Contractor(s)/sub-contractor(s) employees
Potential issues or impacts	– Increased traffic volumes on existing roads; – Wear and tear of existing road surfaces; and – Road safety concerns.
Mitigations measures	
Increased Traffic on road and vehicular accidents	<ul style="list-style-type: none"> – Designs of the intersection layouts of the project access road must address design standards and elements such as alignment, sign distances, cross-sections and provisions for other road users including pedestrians; – Inspect light duty site vehicles that travel offsite regularly, contractors’ vehicles weekly for clean and operational taillights, indicators, reflective signage and reverse horns/beepers to ensure visibility of vehicles, especially at night; – 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; – All employees and contractors must adhere to the speed limits and other road safety procedures, both on site, and on public roads. – Include speed limits in the induction and enforce the speed limits; – Provide large visible road signage, indicating the presence of heavy vehicle traffic at least 500 m before, on either side of the site access road intersection along the road; and – Road safety issues must be included as part of the overall on-site safety training and during inductions.
Monitoring requirements	
	<ul style="list-style-type: none"> – Daily observations; and – Weekly checks.

13 HERITAGE MANAGEMENT PROGRAMME

13.1 INTRODUCTION

Areas of proposed development activity are 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 objects of heritage significance may be discovered (unearthed) during project development work. The procedure set out in this section covers the guideline for managing and reporting of such finds.

Scope: The “chance finds” procedure covers the actions to be taken whenever there is a discovery of a heritage site or object in the project area. This ensures that thoroughly investigations and assessments in respect to such finds are well managed and undertaken by a trained archaeologist or any other competent and 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) which state that: “a person who discovers any archaeological object must as soon as practicable report the discovery to the Council”. The procedure of reporting is set out below and must be observed so that heritage remains or objects are reported to the NHC which essentially ensures their preservation. Table 11 provides a summary of protocols and management measures for dealing with archaeological artefacts which should be always integrated into project functions.

Table 11 - Archaeological and heritage mitigation measures.

Responsibility	<ul style="list-style-type: none"> – Project manager – Site manager
Potential issues or impacts	<ul style="list-style-type: none"> – Impact on heritage features.
Mitigations measures	
Destruction of heritage sites and artifacts	<p>In the unlikely event of a heritage site or object(s) be uncovered or discovered during either construction or operational phase of the project, a “chance find” procedure should be applied in the order they appear below:</p> <ul style="list-style-type: none"> – If operating machinery or equipment, stop work; – Demarcate the site with danger tape; – Determine GPS position if possible; – Report findings to foreman; – Report findings, site location and actions taken to superintendent; – Cease any works in immediate vicinity; – Visit the site and consult with any potentially affected community to determine whether work can proceed without damage to findings;

	<ul style="list-style-type: none"> - Determine and demarcate the exclusion boundary; - Site location and details to be added to the Project's geographic information system (GIS) for field confirmation by an archaeologist; - Inspect site and confirm addition to Project GIS; - Advise the National Heritage Council (NHC) and request written permission to remove findings from work area; and - Contact a certified professional to recover, package and label findings for transfer to the National Museum.
Monitoring requirements	
<ul style="list-style-type: none"> - Ensure workers are aware of and can make use of the chance find procedure. 	

13.2 ROLES AND RESPONSIBILITIES

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 for NHC inspection.

Third party archaeologist - To inspect, identify, advise management, and recover remains.

13.3 PROCEDURE

Action by person identifying archaeological or heritage material:

- a) If operating machinery or equipment, stop work;
- b) Secure the site with danger tape;
- c) Determine GPS position if possible, and
- d) Report findings to foreman.

Action by foreman:

- a) Report findings, site location and actions taken to superintendent, and
- 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, and
- c) Site location and details to be added to Project GIS for field confirmation by archaeologist.

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; and

- c) Recovery, packaging and labelling of findings 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; and
- d) Recovery of remains and removal to National Museum or National Forensic Laboratory, as directed.

14 IMPLEMENTATION OF THE ESMP

This environmental 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 June 2024.
- 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 any purpose other than an ESMP.
- E. Must not be copied without the prior written permission of ECC.